CALCIUM SULFATE LANDFILL BIENNIAL REPORT
(2017-2018)
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

Prepared for:

Olin Corporation
3855 North Ocoee Street; Suite 200
Cleveland, TN 37312

Prepared by:

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511 Congress Street, Suite 200
Portland, Maine 04101

Project No. 6107190016.01.15

February 22, 2019

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(2015-2016)
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ACRONYMS AND ABBREVIATIONS

Wood	Wood Environment & Infrastructure Solutions, Inc.
CSL	Calcium Sulfate Landfill
MassDEP	Massachusetts Department of Environmental Protection
MCLs	Maximum Contaminant Levels (Federal)
MMCL	Massachusetts Maximum Contaminant Levels
Olin	Olin Corporation
ORSG	Office of Research and Standard Guidelines
PCMP	Post Closure Monitoring Plan
SMCLs	Secondary Maximum Contaminate Levels
TDS	total dissolved solids
the Site	51 Eames Street in Wilmington, Massachusetts
QA/QC	Quality Assurance and Quality Control

1.0 INTRODUCTION

This Biennial Report (2017-2018) for the Calcium Sulfate Landfill (CSL) is being submitted on behalf of Olin Corporation (Olin) by Wood Environment & Infrastructure Solutions, Inc. (formerly Amec Foster Wheeler) in accordance with the Post Closure Monitoring Plan (PCMP) (MACTEC, 2006) which was approved by the Massachusetts Department of Environmental Protection (MassDEP) in January 2009 (MACTEC, 2009) and as amended in 2011 (MassDEP, 2011). The PCMP provides information on the construction, closure, geologic and hydrologic conditions of the CSL that will not be repeated in this report.

The CSL is located upon a portion of land owned by Olin located at 51 Eames Street in Wilmington, Massachusetts (the Site). **Figure 1** shows the site location. The facility was formally closed in 1988 and monitoring in 2018 completes the 30th year in the post closure monitoring period. This Biennial Report presents:

1. Closure monitoring requirements;
2. Annual inspection reports which present the inspection of the landfill, including annual inspection of the cap, monitoring wells, access roads, and maintenance activities and corrective measures undertaken based on inspection findings;
3. Semiannual groundwater analytical results and evaluation of trends;
4. A summary of hydrologic conditions including water level measurements and groundwater flow; and
5. Summary and recommendations.

2.0 CLOSURE MONITORING REQUIREMENTS

Inspection, monitoring and maintenance activities for the CSL include:

- Annual inspections of the cover system, access roads, fences, gates and groundwater monitoring well network (see **Table 1**);
- Semiannual groundwater monitoring which is to be completed in the spring and fall to coincide with periods of high and low groundwater level; and
- Biennial monitoring reports.

Table 1 presents the schedule for inspection, maintenance and monitoring activities under the current PCMP. **Figure 2** shows a site plan of the CSL including the locations of monitoring wells. Details of the monitoring well network including elevations, depths, and screened intervals are presented in **Table 2**.

3.0 ANNUAL INSPECTION OF CSL

Inspection, monitoring, and maintenance activities for the CSL were performed in accordance with the PCMP. Following the baseline monitoring period, which ended in 2010, annual inspections of the cover, access road, monitoring well network, and fences and gates have been completed prior to the spring semiannual groundwater monitoring events. Landfill Inspection reports were completed in May and November of 2017 and 2018 and are included in **Appendix A**.

3.1 Findings of Annual Inspections

Spring and fall inspections were completed at the CSL in 2017 and 2018. Observations indicate that the landfill cap and associated landfill components (monitoring wells, fencing, and gate) are in good condition. The cap remains well vegetated, and shows no evidence of erosion, settlement, or ponding of water. The adjacent property (Standard Electric) has expanded their parking lot and has destroyed the access road to the CSL. The CSL can no longer be accessed by vehicle (mower) and therefore the cap vegetation is unable to be mowed.

In April and December 2017, a small amount of erosion was noted on the slope from the Standard Electric parking lot to CSL entry gate. No erosion was noted inside the CSL. A fallen tree was noted on the eastern fence line. A repeat hole was identified in the fence near the southern fence entry gate (adjacent to monitoring well SL-3) that separates the CSL from the Woburn Landfill. The CSL cap vegetation is unable to be cut due to access road removal.

In April and November 2018, fallen trees were cut and removed. The main gate was becoming difficult to open due to excessive vegetation. During both inspections the hole previously noted along the southern fence gate (adjacent to monitoring well SL-3) was repaired and blocked with branches and logs.

3.2 Corrective Actions

No corrective actions other than tree and branch removal and fence repairs were undertaken during this reporting period (January 2017 through December 2018).

4.0 GROUNDWATER MONITORING

Groundwater monitoring was completed semiannually in the spring (May) and fall (December) in accordance with the PCMP. Analytical results from groundwater monitoring events completed from January 2017 through December 2018 are presented in **Table 3**. Chain of custody forms and field data records for the monitoring events are presented in **Appendix B**. Quality assurance and quality control (QA/QC) information relating to groundwater monitoring is discussed in data validation reports presented in **Appendix C**. This discussion includes results of field duplicate and matrix spike/ matrix spike duplicate samples that are collected for sample QA/QC in addition results of laboratory quality control samples. The groundwater analytical results are discussed in the following section.

4.1 Analytical Results

The CSL analytical parameters include: calcium, sulfate, aluminum, chromium, iron, manganese, nickel, sodium, chloride, alkalinity (total, bicarbonate, and carbonate), and total dissolved solids (TDS). State and federal maximum contaminant levels (MMCLs/MCLs) exist for chromium. The most recent groundwater data is consistent with historical data for groundwater at the CSL and indicates the groundwater system is stable. The MCL for chromium was not exceeded in any groundwater samples, therefore analytical data are only presented in tables. Secondary MCLs (SMCLs) exist for sulfate, aluminum, iron, manganese, chloride, and TDS. The concentrations of these parameters have historically been in excess of these SMCLs, but these limits are not enforced as drinking water standards. Sodium concentrations have historically been in excess of the corresponding Massachusetts's Office of Research and Standards Guidelines (ORSGs). The ORSG for sodium is an advisory-only guideline for those on a sodium-restricted diet. The ORSG for sodium of 20 milligrams per liter (mg/L) is equivalent to the federal labeling of sodium in bottled water of 5 mg or less per 8 ounce serving. Nickel did not exceed the corresponding ORSG. There are no groundwater standards or guidelines for calcium and alkalinity.

The CSL contains gypsum (calcium sulfate) which makes calcium and sulfate the primary constituents of interest in groundwater. The monitoring well network monitors groundwater on the southern side of the CSL (CSL-3) adjacent to the Woburn Sanitary Landfill, along the eastern down-gradient side (SL-5, SL-6), along the northern perimeter with locally elevated bedrock (SL-7 and SL-8), and along its western side (SL-1D and SL-2), which may receive some component of groundwater flow from the CSL.

Prior studies by Olin, as discussed in the PCMP (Geomega, 1999), indicate that groundwater sampled from SL-3, shows some impact by the Woburn Sanitary Landfill (located adjacent) with elevated results for bicarbonate alkalinity, iron, and manganese; when compared to the same parameters in the other wells.

All other parameters at the various CSL monitoring wells remain consistent with historic ranges.

Monitoring wells SL-2 and SL-5 were dry in December 2017 and could not be sampled during that event. It has not been possible to collect representative groundwater samples for chemical analysis from SL-7 or SL-8 since 2009. Both SL-7 and SL-8 are typically dry except during periods of high groundwater. It is believed that the wells act as sumps which fill with water during larger precipitation events so that subsequent water levels may not be representative of actual surrounding groundwater elevations. It is recommended that these wells remain in the program and be sampled when water levels permit; and that water elevations from the wells be interpreted accordingly.

4.2 Trend Analysis

Time series plots of calcium, sulfate, aluminum, chloride, chromium, iron, manganese, sodium, and nickel are presented in **Appendix D**. The plots indicate the concentrations of calcium, sulfate, aluminum, chromium, and nickel are stable and within historical ranges. It appears concentrations of sodium and chloride have decreased since November 2014 from monitoring SL-1D. This may have been likely attributed to de-icing activities on the adjacent parking lot. As described above, elevated concentrations of iron and manganese from monitoring well SL-3 are likely impacts from the adjacent Woburn Sanitary Landfill.

4.3 Summary of Hydrologic Conditions

The historical water level data collected from the monitoring well network at the CSL during semiannual sampling events show that groundwater levels are highest in the spring (May); and are lowest in the fall (December). **Table 4** presents groundwater level measurements collected at the CSL since 1991. Interpreted overburden groundwater contours at the CSL for water levels collected in the spring (May) and fall (December) of 2017 and 2018 are shown in **Figures 3 through 6**.

The presence of a topographic high to the east and the Woburn Sanitary landfill to the south, along with a localized divide that runs through the southern portion of the CSL (from the northwest to southeast) results in a localized groundwater flow divide at the CSL where groundwater largely flows to the northeast, with a component to the southwest. The primary flow component is toward SL-5 and SL-6 (northeast), with a component of flow toward SL-3 (south) on the southern side of that localized divide. This is consistent with the groundwater monitoring data that indicate the highest concentrations of calcium and sulfate in groundwater are from SL-5 and SL-6 followed by SL-3. The very low calcium and sulfate concentrations in SL-2 and SL-1D support the interpreted flow direction from the groundwater divide. Therefore, local groundwater flow at the CSL is primarily to the northeast with a component to the southwest.

5.0 SUMMARY

The annual inspection reports indicate the landfill cap, the landfill monitoring wells, and other landfill components (gate and fence) are currently in good condition. No corrective actions are currently required or planned.

Analytical data for the most recent monitoring periods is consistent with historical data and show no State (MMCLs) or Federal (MCLs) water quality standards were exceeded. The secondary (SMCLs) guidance values for aluminum, iron, manganese, sulfate, and TDS were each exceeded in two or more monitoring wells; and the ORSG standard for sodium was exceeded in one monitoring well.

This reporting period concludes the minimum 30-year post closure monitoring period from the time the facility was formally closed in 1988. The CSL is secure and remains in good condition and based on current and historic groundwater results, Olin will seek official termination of the post closure period in accordance with 310CMR 19.142 (8) by petitioning the Department for a written determination that post closure care, maintenance and monitoring are no longer required. In the interim, Olin will continue the current post closure monitoring and maintenance program.

If this determination is made, the CSL will remain subject to the provisions of the Agreement on Consent between Olin and USEPA for the Olin Chemical Superfund Site.

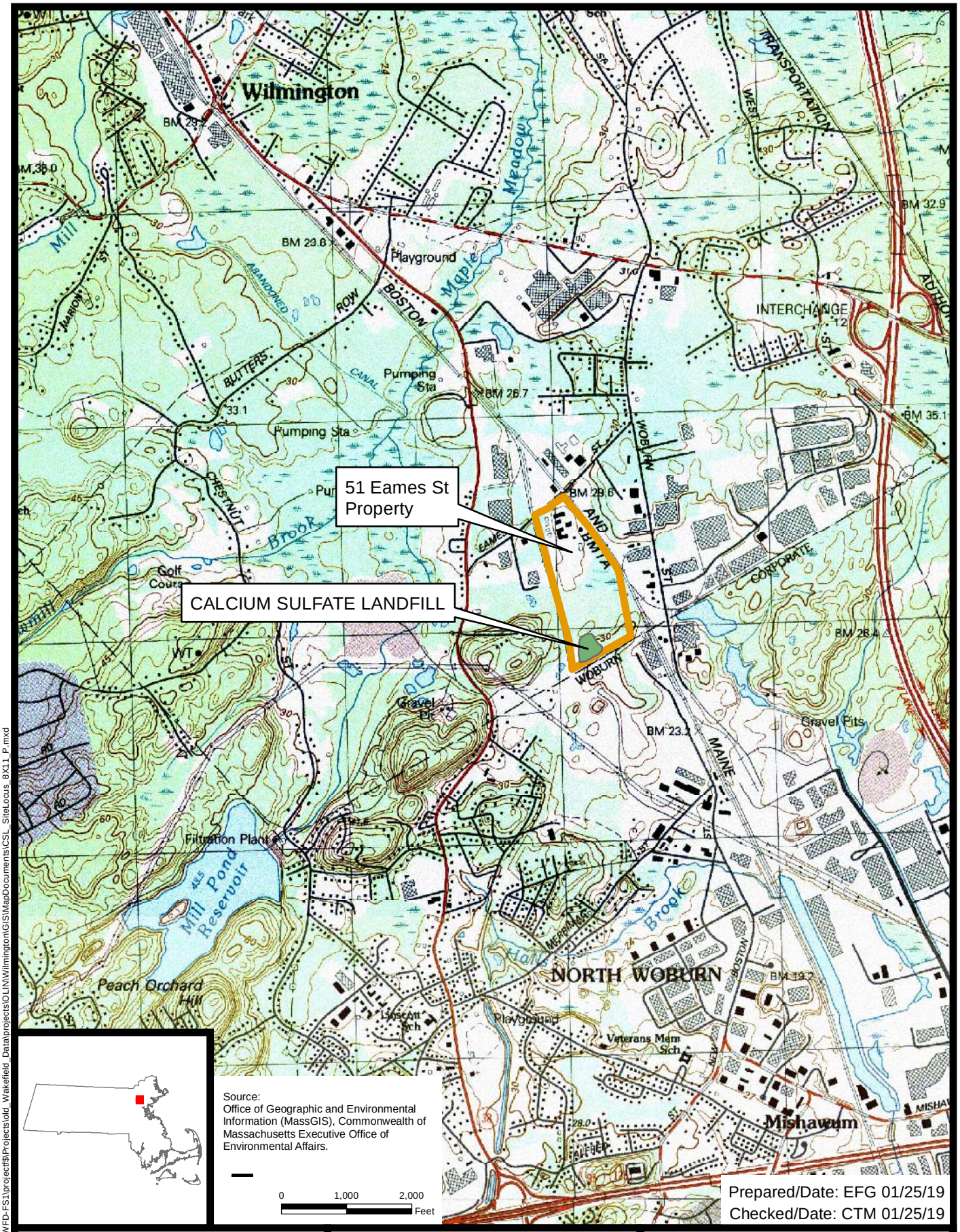
6.0 REFERENCES

Geomega, 1999. Olin Wilmington Technical Series, IV. Geochemical Discrimination Between Groundwater Emanating from the Calcium Sulfate and Woburn Sanitary Landfills. Prepared for Olin Corporation, Wilmington, MA Facility, February 10, 1999.

MACTEC, 2009. Draft Calcium Sulfate Landfill Post Closure Monitoring Plan, prepared for Olin Corporation by MACTEC Engineering & Consulting, Inc. December, 2009.

MassDEP, 2011. Letter from David C. Adams and John A. Carrigan, MADEP, to Steve Morrow, Olin Corporation, regarding Wilmington – Solid Waste/COR, Olin Gypsum Landfill, Approval of Modification of Post Closure Monitoring Plan, Transmittal Number X236418, March 3, 2011.

FIGURES



Prepared/Date: EFG 01/25/19
Checked/Date: CTM 01/25/19

Calcium Sulfate Landfill Biennial Report
51 Eames Street
Wilmington, Massachusetts

wood.

Figure 1
Site Location

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Legend

A CSL Groundwater Monitoring Well
2 Foot Elevation Contour
Fence
Wilmington / Woburn Town Line
Approximate CSL Boundary

wood.

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, MA 01824

0 50 100 200 Feet

Figure 2
Calcium Sulfate Landfill
Site Plan

Biennial Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared by EFG | Checked by CMT

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Legend

- A CSL Groundwater Monitoring Well
- Inferred Groundwater Contour (ft)
- 2 Foot Elevation Contour
- Fence
- Wilmington / Woburn Town Line
- Approximate CSL Boundary

wood.

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, MA 01824

0 50 100 200 Feet

Figure 3
Calcium Sulfate Landfill
Shallow Groundwater Contours
May 3, 2017

Biennial Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared by EFG | Checked by CMT

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Legend

- A CSL Groundwater Monitoring Well
- Inferred Groundwater Contour (ft)
- 2 Foot Elevation Contour
- Fence
- Wilmington / Woburn Town Line
- Approximate CSL Boundary

wood.

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, MA 01824

0 50 100 200 Feet

Figure 4
Calcium Sulfate Landfill
Shallow Groundwater Contours
December 4, 2017

Biennial Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

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Legend

- A CSL Groundwater Monitoring Well
- Inferred Groundwater Contour (ft)
- 2 Foot Elevation Contour
- Fence
- Wilmington / Woburn Town Line
- Approximate CSL Boundary

wood.

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, MA 01824

0 50 100 200 Feet

Figure 5
Calcium Sulfate Landfill
Shallow Groundwater Contours
May 7, 2018

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Olin Chemical Superfund Site
Wilmington, Massachusetts

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Legend

- A CSL Groundwater Monitoring Well
- Inferred Groundwater Contour (ft)
- 2 Foot Elevation Contour
- Fence
- Wilmington / Woburn Town Line
- Approximate CSL Boundary

wood.

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, MA 01824

0 50 100 200 Feet

Figure 6
Calcium Sulfate Landfill
Shallow Groundwater Contours
December 6, 2018

Biennial Report
Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared by EFG | Checked by CMT

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TABLES

Table 1
Post Closure Monitoring Schedule
(Inspection and Groundwater Monitoring)
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Component	Action	Required Frequency
Landfill		
Landfill Cover System	Inspection	Annually in spring (April - June)
Landfill Cover System	Mowing	Annually in summer or as needed
Site Drainage System	Inspection	Annually in spring (April - June)
Site Security (Fences, gates)	Inspection	Annually in spring (April - June)
Access Road	Inspection	Annually in spring (April - June)
Ground Water Monitoring System	Inspection	Annually in spring (April - June)
Ground Water Monitoring Program		
7 monitoring locations	Low flow sampling	Semi-annually in spring and fall
		(May and November)

Notes:
Current Post Closure Monitoring Plan was enacted in 2011
and is to continue through 2018, pending approval by MassDEP.

Completed by: JKR 05/06/2013
Checked by: CTM 01/25/2019

Table 2
Monitoring Well Details
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Monitoring Well	Date Installed	Northing	Easting	Top of Casing Elevation	Ground Elevation	Boring Depth (ft bgs)	Boring Depth (elevation)	Well Depth (ft bgs)	Top of Screen (elevation)	Bottom of Screen (elevation)	Bedrock (elevation)
SL-1D	11/12/1987	555264.40	693229.80	86.36	84.1	14.5	69.6	14.5	79.7	69.7	71.6
SL-2	11/13/1987	555159.10	693244.40	85.74	83.5	15	68.5	15	78.5	68.5	70.5
SL-3	11/20/1987	555090.10	693519.40	92.64	90.2	21	69.2	21	79.5	69.5	71.2
SL-5	11/17/1987	555414.30	693603.20	94.42	92.8	15.5	77.3	15	87.6	77.6	79.8
SL-6	11/18/1987	555479.80	693562.10	92.68	90.1	21	69.1	21	79.1	69.1	71.1
SL-7*	11/19/1987	555538.60	693434.40	95.25	93.3	10	83.1	10	88.3	83.3	86.3
SL-8*	11/19/1987	555466.50	693376.40	92.4	90.9	6	84.9	6	89.9	84.9	87.9

Notes:
All wells are active
* = Wells SL-7 and SL-8 have historically contained little or no groundwater due to shallow depth of bedrock
Elevation in feet msl

Prepared by: JKR 05/06/2013
Checked by: CTM 01/25/2019

Table 3
Summary of Analytical Data Groundwater - January 2017 through December 2018
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Parameter	Range of Detected Concentrations			Average of All Samples	Regulatory Criteria or Guidance	SL-1D 5/3/2017	SL-1D 12/4/2017	SL-1D 5/7/2018	SL-1D 12/6/2018	SL-2 5/3/2017	SL-2 5/7/2018	SL-2 12/6/2018
Total Metals (mg/L)												
Aluminum	0.06	-	0.3	0.119	0.05	0.11 J	0.084 J	0.3	0.18 J	0.064 J	0.18 J	0.079 J
Calcium	18	-	530	230	-	30	25	33	21	40	18	26
Chromium	0.0016	-	0.0079	0.0048	0.10	0.005 U	0.0016 J	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Iron	0.03	-	56	13.6	0.30	0.091	0.064	0.29	0.16	0.1	0.8	0.4
Manganese	0.0012	-	5.8	1.87	0.05	0.014	0.016	0.019	0.011	0.0014 J	0.003 U	0.0012 J
Nickel	0.0014	-	0.0043	0.0033	0.10	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium	2.3	-	57	15.9	20	51	57	57	52	3.6	2.3	4.7
Inorganics (mg/L)												
Total Dissolved Solids (TDS)	58	-	2000	877	500	260	270	280	210	160	58	110
Bicarbonate Alkalinity, as CaCO3	14	-	400	162	-	33	32	38	33	15	14	26
Carbonate Alkalinity, as CaCO3					-	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Alkalinity, as CaCO3	14	-	400	162	-	33	32	38	33	15	14	26
Chloride	2.6	-	100	20	250	100	98	97	73	2.9	2.8	2.6
Sulfate	30	-	1200	441	250	34	33	47	30	93	32	43
Field Parameters												
Temperature (ºC)						14.99	12.40	12.22	10.24	11.15	13.28	8.71
Specific Conductance (mS/cm)						0.339	0.357	0.376	0.326	0.182	0.080	0.139
pH						6.37	5.76	8.43	6.00	6.89	7.71	5.56
Dissolved Oxygen (mg/L)						1.39	1.87	7.69	2.95	6.21	5.89	5.28

Notes:
mg/L = milligram per liter
U = not detected, value is the detection limit
J = value is estimated
Shaded values = Exceed criteria
Regulatory Criteria from "Standards and Guidance for Contaminants in Massachusetts Drinking Waters" , MADEP 2013.
Massachusetts Maximum Contaminant Levels (MCL): Chromium (Total)
Massachusetts Drinking Waters Guidelines (ORSG): Nickel, Sodium
Secondary MCLs: Aluminum, Iron, Manganese, Chloride, Sulfate, TDS

Table 3
Summary of Analytical Data Groundwater - January 2017 through December 2018
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Parameter	Range of Detected Concentrations			Average of All Samples	Regulatory Criteria or Guidance	SL-3 5/3/2017	SL-3 DUP 5/3/2017	SL-3 12/4/2017	SL-3 DUP 12/4/2017	SL-3 5/7/2018	SL-3 DUP 5/7/2018	SL-3 12/6/2018
Total Metals (mg/L)												
Aluminum	0.06	-	0.3	0.119	0.05	0.2 U	0.2 U	0.2 U	0.2 U	0.095 J	0.083 J	0.2 U
Calcium	18	-	530	230	-	140	140	260	250	130	130	170
Chromium	0.0016	-	0.0079	0.0048	0.10	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Iron	0.03	-	56	13.6	0.30	36	35	56	55	28	28	44
Manganese	0.0012	-	5.8	1.87	0.05	3.4	3.4	5.8	5.7	3.1	3.1	3.9
Nickel	0.0014	-	0.0043	0.0033	0.10	0.0014 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium	2.3	-	57	15.9	20	6.6	6.5	9.4	8.9	6.3	6.1	8.6
Inorganics (mg/L)												
Total Dissolved Solids (TDS)	58	-	2000	877	500	480	460	950	970	460	470	660
Bicarbonate Alkalinity, as CaCO3	14	-	400	162	-	370 J	400 J	330 J	320 J	240	240	280
Carbonate Alkalinity, as CaCO3					-	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U	5 U
Total Alkalinity, as CaCO3	14	-	400	162	-	370 J	400 J	330 J	320 J	240	240	280
Chloride	2.6	-	100	20	250	4.8	4.9	7.5	7.6	4.4	4.9	5
Sulfate	30	-	1200	441	250	66	62	420	420	150	160	200
Field Parameters												
Temperature (ºC)						13.20		12.31		13.54		9.22
Specific Conductance (mS/cm)						0.655		0.979		0.561		0.940
pH						7.55		5.99		9.31		5.75
Dissolved Oxygen (mg/L)						0.39		0.47		1.85		8.11

Notes:
mg/L = milligram per liter
U = not detected, value is the detection limit
J = value is estimated
Shaded values = Exceed criteria
Regulatory Criteria from "Standards and Guidance for Contaminants in Massachusetts Drinking Waters" , MADEP 2013.
Massachusetts Maximum Contaminant Levels (MCL): Chromium (Total)
Massachusetts Drinking Waters Guidelines (ORSG): Nickel, Sodium
Secondary MCLs: Aluminum, Iron, Manganese, Chloride, Sulfate, TDS

Table 3
Summary of Analytical Data Groundwater - January 2017 through December 2018
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Parameter	Range of Detected Concentrations			Average of All Samples	Regulatory Criteria or Guidance	SL-5 5/3/2017	SL-5 5/7/2018	SL-5 12/6/2018	SL-6 5/3/2017	SL-6 12/4/2017	SL-6 5/7/2018	SL-6 12/6/2018	SL-6 DUP 12/6/2018
Total Metals (mg/L)													
Aluminum	0.06	-	0.3	0.119	0.05	0.2 U	0.12 J	0.2 U	0.2 U	0.069 J	0.2 U	0.06 J	0.2 U
Calcium	18	-	530	230	-	460	490	520	500	410	530	380	350
Chromium	0.0016	-	0.0079	0.0048	0.10	0.005 U	0.0079	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Iron	0.03	-	56	13.6	0.30	0.11	0.3	0.063	0.035 J	0.15	0.03 J	0.05 UJ	0.18 J
Manganese	0.0012	-	5.8	1.87	0.05	0.2	0.14	0.17	0.22	3.3	0.1	3.2	3.4
Nickel	0.0014	-	0.0043	0.0033	0.10	0.0033 J	0.0043 J	0.004 J	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium	2.3	-	57	15.9	20	7.9	6.4	8.9	7.7	12	7.5	9.8	9.2
Inorganics (mg/L)													
Total Dissolved Solids (TDS)	58	-	2000	877	500	1900	1700	1900	2000	1500	1900	1300	1300
Bicarbonate Alkalinity, as CaCO3	14	-	400	162	-	90	98	130	200	150	210	160	160
Carbonate Alkalinity, as CaCO3					-	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Alkalinity, as CaCO3	14	-	400	162	-	90	98	130	200	150	210	160	160
Chloride	2.6	-	100	20	250	3.8 J	3.3	3.1 J	3.7 J	6.3	3.3	3.2	3.2
Sulfate	30	-	1200	441	250	1100	1200	1000	1100	820	1200	780	720
Field Parameters													
Temperature (ºC)						11.15	9.00	10.24	12.71	11.64	11.41	14.85	
Specific Conductance (mS/cm)						1.81	1.75	1.96	1.82	1.62	1.82	1.29	
pH						7.33	8.57	5.90	6.56	6.15	8.34	5.05	
Dissolved Oxygen (mg/L)						6.69	6.97	8.39	1.97	3.95	2.36	6.25	

Notes:
mg/L = milligram per liter
U = not detected, value is the detection limit
J = value is estimated
Shaded values = Exceed criteria
Regulatory Criteria from "Standards and Guidance for Contaminants in Massachusetts Drinking Waters" , MADEP 2013.
Massachusetts Maximum Contaminant Levels (MCL): Chromium (Total)
Massachusetts Drinking Waters Guidelines (ORSG): Nickel, Sodium
Secondary MCLs: Aluminum, Iron, Manganese, Chloride, Sulfate, TDS

Prepared/Date: KMS 02/06/2019
Checked/Date: CTM 02/08/2019

Table 4
Summary of Groundwater Elevations
Calcium Sulfate Landfill Biennial Report
Olin Chemical Superfund Site - Wilmington, MA

Monitoring Well			Groundwater Elevation														
Location	Northing	Easting	9/30/91	8/14/92	9/3/92	1/7/93	4/21/93	10/8/95	5/1/96	12/17/96	4/7/98	4/22/98	4/29/98	5/2/01	10/31/01	3/2/10	9/28/10
SL-1D	555264.4	693230	80.40	79.01	78.98	82.06	83.07	78.40		83.22	81.51	81.49	-	-	-	82.83	77.40
SL-2	555159.1	693244	78.88	-	77.93	80.84	83.87	76.47	82.76	83.24	80.57	80.29	-	80.04	78.20	81.54	DRY
SL-3	555090.1	693519	78.14	-	77.61	80.53	83.87	75.79	82.93	83.17	80.58	79.99	80.16	79.83	78.01	81.12	76.01
SL-5	555414.3	693603	78.05	-	-	81.42	81.86	-	80.43	82.18	81.30	-	80.75	80.41	78.66	82.87	DRY
SL-6	555479.8	693562	78.06	76.68	76.93	81.73	81.97	75.20	81.70	82.44	81.51	80.92	-	80.71	78.86	82.72	75.22
SL-7	555538.6	693434	84.02	-	-	84.07	84.04	84.06	83.70	-	83.92	83.33	-	83.39	81.56	84.42	DRY
SL-8	555466.5	693376	-	-	-	87.73	86.38	86.81	86.86	-	86.18	87.31	-	-	86.17	88.33	DRY

Monitoring Well			Groundwater Elevation																
Location	Northing	Easting	5/10/11	11/14/11	5/21/12	11/15/12	5/21/12	11/15/12	5/14/13	11/14/13	5/30/14	11/10/14	5/11/15	11/17/15	5/9/16	11/9/16	5/3/17	12/4/17	5/7/18	12/6/18
SL-1D	555264.4	693230	81.21	81.64	81.04	79.15	81.04	79.15	80.71	76.99	81.01	79.29	80.87	77.94	80.84	DRY	81.74	78.78	81.71	82.01
SL-2	555159.1	693244	80.01	80.32	79.63	77.84	79.63	77.84	79.31	75.93	79.72	78.12	79.76	76.61	79.65	DRY	80.52	DRY	80.54	81.03
SL-3	555090.1	693519	79.74	80.01	79.25	77.45	79.25	77.45	78.96	75.79	79.36	77.77	79.19	76.33	79.21	76.37	80.17	77.23	80.27	80.79
SL-5	555414.3	693603	79.55	79.95	79.24	DRY	79.24	DRY	78.57	DRY	78.94	DRY	79.00	DRY	79.12	DRY	80.20	DRY	80.33	81.01
SL-6	555479.8	693562	80.89	81.31	80.53	77.03	80.53	77.03	79.87	75.40	80.37	77.00	80.38	75.95	80.47	75.76	81.60	76.89	81.73	82.30
SL-7	555538.6	693434	83.66	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
SL-8	555466.5	693376	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

Prepared by: CTM 01/25/
Checked by: EFG 02/06/2

APPENDIX A
LANDFILL INSPECTION REPORTS

LANDFILL INSPECTION SHEET

Facility Name: Calcium Sulfate Landfill

Location: 51 Eames Street, Wilmington, Massachusetts

Date of Inspection: 4 /20 /2017

Monitoring Well Condition

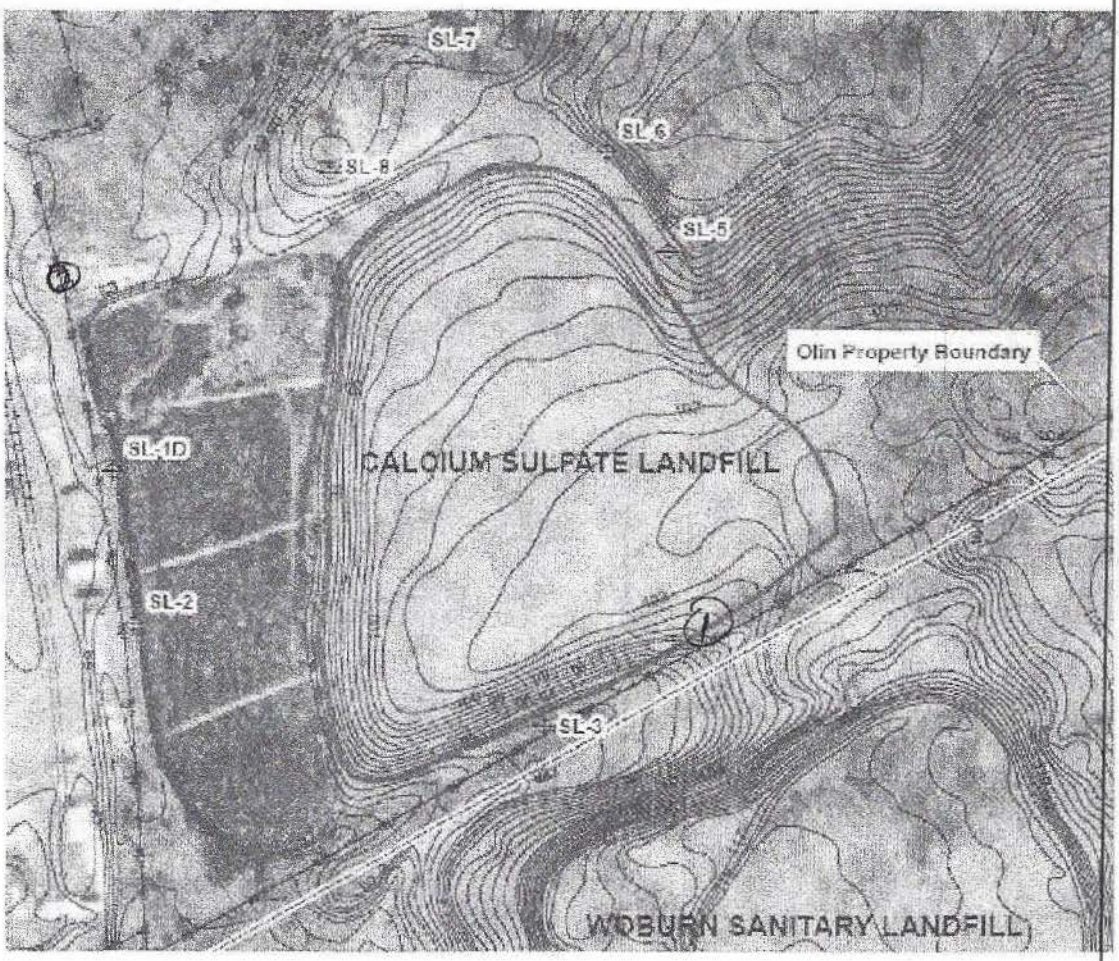
Well ID	Locked	Labeled	Comments
SL-08	X Yes ___ No	X Yes ___ No	
SL-07	X Yes ___ No	X Yes ___ No	
SL-06	X Yes ___ No	X Yes ___ No	
SL-05	X Yes ___ No	X Yes ___ No	
SL-03	X Yes ___ No	X Yes ___ No	
SL-02	X Yes ___ No	X Yes ___ No	
SL-01D	X Yes ___ No	X Yes ___ No	

Landfill Component	Condition	Comments
Access Road	Soil Erosion: ___ Yes X No	
Gate	Hinges Locked: X Yes ___ No	
Fence	Holes: X Yes ___ No Other:	Repeat hole in fence East of SL-3
Vegetative Cover	Soil Erosion: X Yes ___ No Veg Distress: ___ Yes X No Animal Burrows: ___ Yes X No	Minor outside entry gate on slope down to gate. No erosion inside fenced area.
Drainage Swales	Soil Erosion: ___ Yes X No Veg Distress: ___ Yes X No	
Settlement	Depressions: ___ Yes X No Ponding of Water: ___ Yes X No	

Inspector Name (Printed): Brian Guichard

Inspector Signature: _____ Date: 4/20/17

Use map below to locate areas of Erosion (E), Animal Borrow (AB), Vegetative Distress (VD), Holes in Fence (FH), and provide additional comments and descriptions



Additional Notes

1 - Hole

2 - minor Erosion on slope from parking lot

LANDFILL INSPECTION SHEET

Facility Name: Calcium Sulfate Landfill

Location: 51 Eames Street, Wilmington, Massachusetts

Date of Inspection: 12 / 4 /20

Monitoring Well Condition

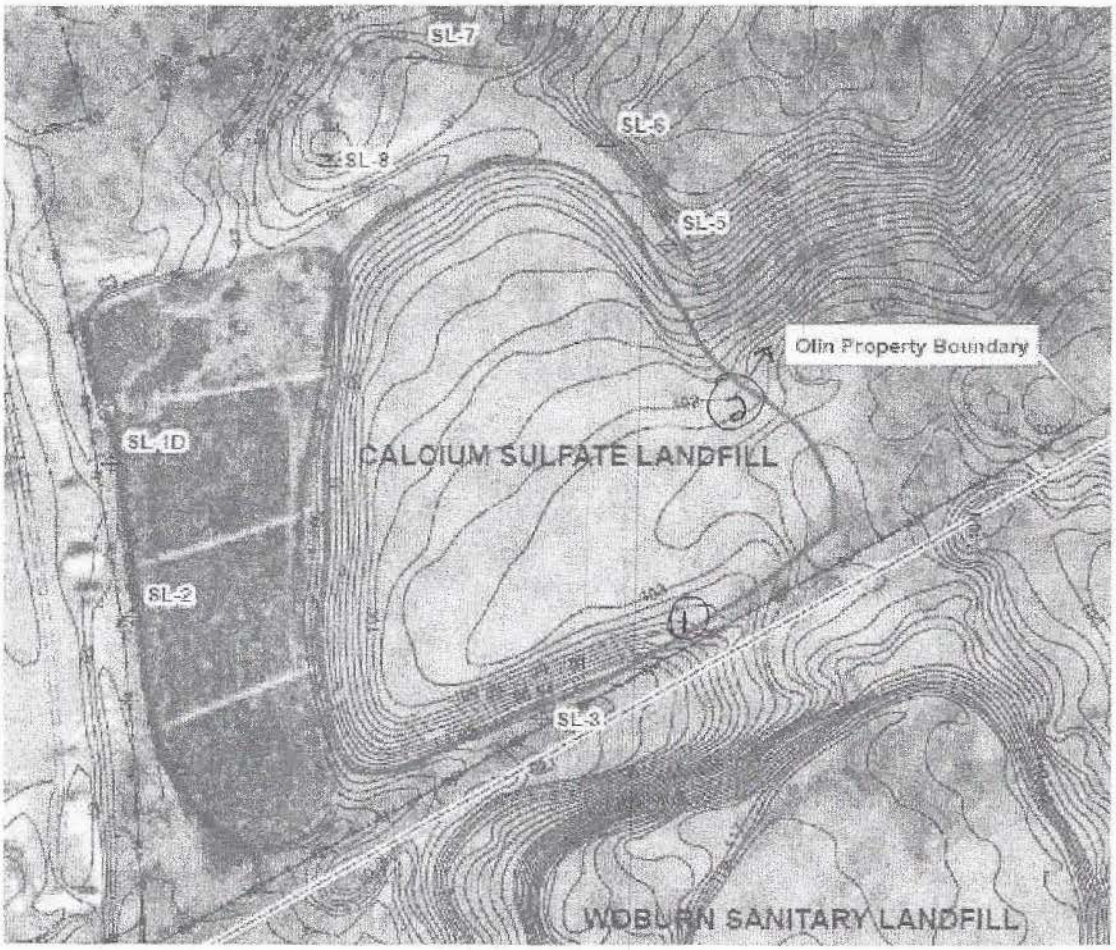
Well ID	Locked	Labeled	Comments
SL-08	x Yes ___ No	x Yes ___ No	
SL-07	x Yes ___ No	x Yes ___ No	
SL-06	x Yes ___ No	x Yes ___ No	
SL-05	x Yes ___ No	x Yes ___ No	
SL-03	x Yes ___ No	x Yes ___ No	
SL-02	x Yes ___ No	x Yes ___ No	
SL-01D	x Yes ___ No	x Yes ___ No	

Landfill Component	Condition	Comments
Access Road	Soil Erosion: ___ Yes x No	
Gate	Hinges Locked: x Yes ___ No	
Fence	Holes: x Yes ___ No Other:	Hole in fence east of SL-3
Vegetative Cover	Soil Erosion: ___ Yes x No Veg Distress: ___ Yes x No Animal Burrows: ___ Yes x No	
Drainage Swales	Soil Erosion: ___ Yes x No Veg Distress: ___ Yes x No	
Settlement	Depressions: ___ Yes x No Ponding of Water: ___ Yes x No	

Inspector Name (Printed): Brian Guichard

Inspector Signature: _____ Date: 12-5-17

Use map below to locate areas of Erosion (E), Animal Borrow (AB), Vegetative Distress (VD), Holes in Fence (FH), and provide additional comments and descriptions



Additional Notes

1- Hole in fence

2- fallen Tree

LANDFILL INSPECTION SHEET

Facility Name: Calcium Sulfate Landfill

Location: 51 Eames Street, Wilmington, Massachusetts

Date of Inspection: 4 / 20 /20 18

Monitoring Well Condition

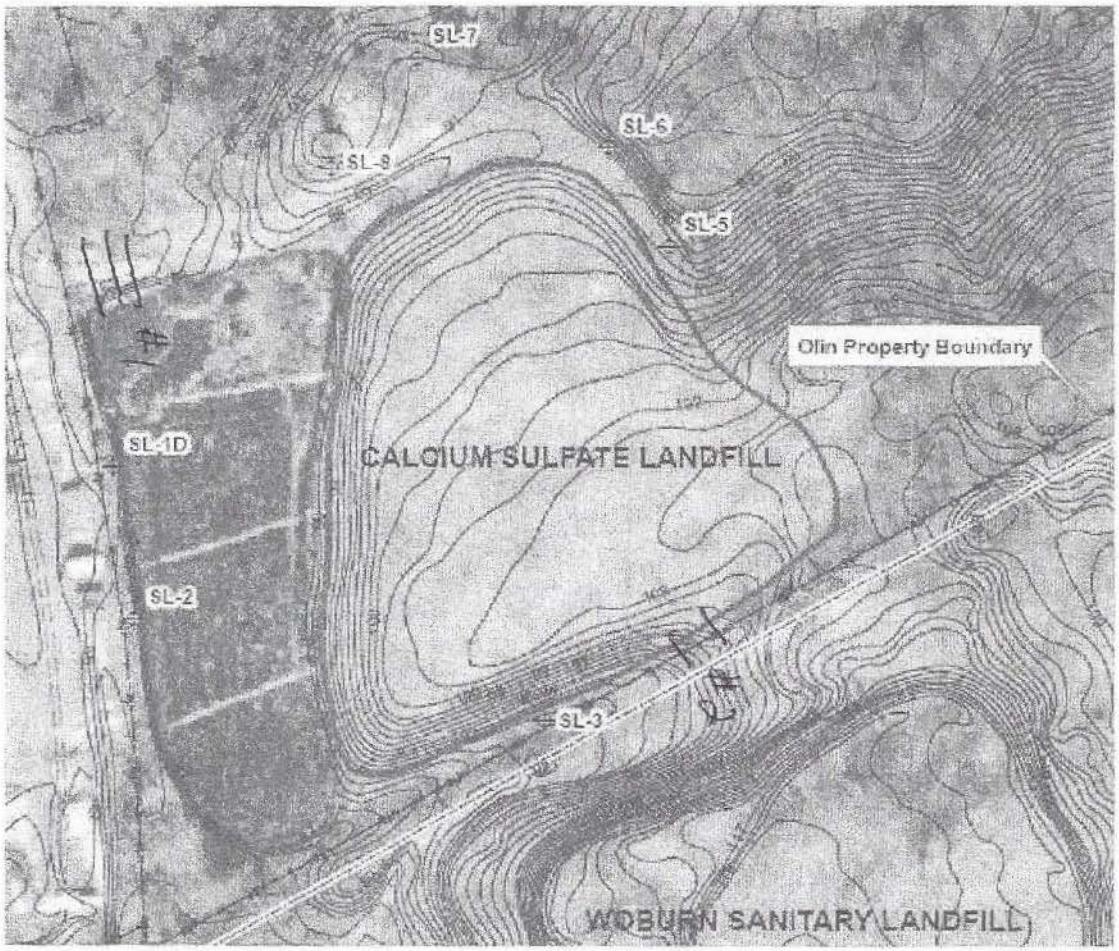
Well ID	Locked	Labeled	Comments
SL-08	X Yes ___ No	X Yes ___ No	
SL-07	X Yes ___ No	X Yes ___ No	
SL-06	X Yes ___ No	X Yes ___ No	
SL-05	X Yes ___ No	X Yes ___ No	
SL-03	X Yes ___ No	X Yes ___ No	
SL-02	X Yes ___ No	X Yes ___ No	
SL-01D	X Yes ___ No	X Yes ___ No	

Landfill Component	Condition	Comments
Access Road	Soil Erosion: ___ Yes X No	Trees fallen inside gate cut + Remove
Gate	Hinges Locked: X Yes ___ No	
Fence	Holes: X Yes ___ No Other:	Cut between Woburn landfill At Repeat location
Vegetative Cover	Soil Erosion: ___ Yes X No Veg Distress: ___ Yes X No Animal Burrows: ___ Yes X No	
Drainage Swales	Soil Erosion: ___ Yes X No Veg Distress: ___ Yes X No	
Settlement	Depressions: ___ Yes X No Ponding of Water: ___ Yes X No	

Inspector Name (Printed): Brian Quichard

Inspector Signature: _____ Date: 4-20-18

Use map below to locate areas of Erosion (E), Animal Borrow (AB), Vegetative Distress (VD), Holes in Fence (FH), and provide additional comments and descriptions



Additional Notes

#1 3 fallen trees Ranging from 4" x 6" diameter, cut and Remove All

#2 Cut in fence between woburn landfill. continued cut at same location. Repair and block area with branches and logs from around the area.

LANDFILL INSPECTION SHEET

Facility Name: Calcium Sulfate Landfill

Location: 51 Eames Street, Wilmington, Massachusetts

Date of Inspection: 11 / 16 /2018

Monitoring Well Condition

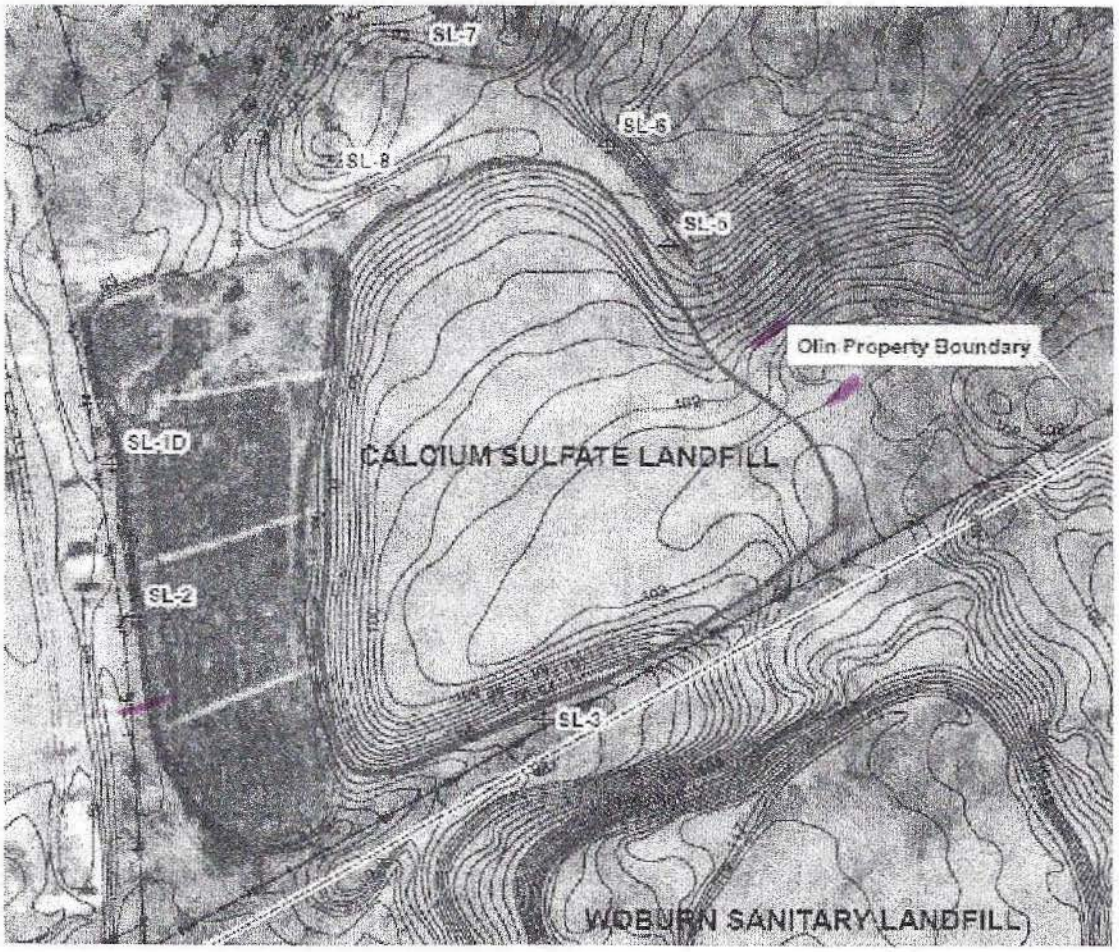
Well ID	Locked	Labeled	Comments
SL-08	✓ Yes ___ No	✓ Yes ___ No	
SL-07	✓ Yes ___ No	✓ Yes ___ No	
SL-06	✓ Yes ___ No	✓ Yes ___ No	Label cracked
SL-05	✓ Yes ___ No	✓ Yes ___ No	Label cracked
SL-03	✓ Yes ___ No	✓ Yes ___ No	
SL-02	✓ Yes ___ No	✓ Yes ___ No	
SL-01D	✓ Yes ___ No	✓ Yes ___ No	

Landfill Component	Condition	Comments
Access Road	Soil Erosion: ___ Yes ✓ No	
Gate	Hinges Locked: ✓ Yes ___ No	gate difficult to open fully due to overgrowth
Fence	Holes: ___ Yes ✓ No Other:	
Vegetative Cover	Soil Erosion: ___ Yes ✓ No Veg Distress: ___ Yes ✓ No Animal Burrows: ___ Yes ✓ No	
Drainage Swales	Soil Erosion: ___ Yes ✓ No Veg Distress: ___ Yes ✓ No	
Settlement	Depressions: ___ Yes ✓ No Ponding of Water: ___ Yes ✓ No	

Inspector Name (Printed): Brian Guidoreal

Inspector Signature: _____ Date: 11-16-18

Use map below to locate areas of Erosion (E), Animal Borrow (AB), Vegetative Distress (VD), Holes in Fence (FH), and provide additional comments and descriptions



Additional Notes

- fallen trees or branches not on cap area
entry gate difficult to open due to overgrowth and gate settling. Readjustment of support hinges may help opening of gate.

APPENDIX B
FIELD DATA RECORDS AND CHAIN OF CUSTODY RECORDS

Field Instrument Calibration Record

Project: Calcium Sulfate CAP

Task ID:

Date: 5-3-17

Sampler Signature:

Job Number:

Equipment Calibration Information

		Standard Value		Meter Value AM		Meter Value PM		Acceptance Criteria*
Horiba		pH	units	pH 3.99	units	pH 4.00	units	+/- 10% of standard
Model No.	U52	Cond.	mS/cm	Cond. 4.49	umho/cm	Cond. 4.43	umho/cm	+/- 10% of standard
Unit ID	Olive	Redox	Mv	Redox 289	Mv	Redox 276	Mv	See note 1
		DO	mg/l	DO 9.96	mg/l	DO 7.97	mg/l	+/- 10% of standard
		Temp.	deg. C	Temp. 16.16	deg. C	Temp. 17.11	deg. C	+/- 2.0 deg. C

Turbidity Meter Hach	Standard Value	Meter Value AM	Meter Value PM	Criteria
Model No. 2100Q	NTU	10.8 NTU	10.7 NTU	within 0.3 NTU
Unit ID Olive	NTU	21.0 NTU	21.1 NTU	+/- 10% of standard
	NTU	103 NTU	103 NTU	
	NTU	819 NTU	832 NTU	

Materials Record		Lot Number
Deionized Water Source		
Trip Blank Water Source		
Sample Preservatives Source		
Disposable Filter Type		
Horiba Calibration Std. Source		
Other		

Calibration Fluids

Standard Source: Horiba Auto Cal Sol

Lot Numbers

pH

Mv

Cond.

Turb.

Notes:

* = If the meter reading is not within accetance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the specified Parameter was not calibrated to the acceptance criteria.

1 = Meter must read within specified range of the Zobel solution (usually 231 +/- 10 mv)

Ambient air used as source for D. O. Calibration

Comments:

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-1D
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 5-3-17
TIME: START 11:25 END 12:00
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 4.62 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
11:30	4.63	150	15.12	0.342	6.31	1.98	3.17	143		
11:35	4.63	150	15.44	0.337	6.26	1.65	3.27	150		
11:40	4.63	150	15.34	0.337	6.28	1.44	3.41	157		
11:45	4.63	150	15.21	0.339	6.34	1.40	3.21	160		
11:50	4.63	150	14.99	0.339	6.37	1.39	2.91	161		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED: _____

LOCATION SKETCH

NOTES

SIGNATURE: _____

revised 5/3/2017

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-2
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 5-3-17
TIME: START 10:45 END 11:17
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 5.22 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final x 0.16 {2-inch} or x 0.65 {4-inch})

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
10:50	5.25	150	12.38	0.183	7.06	8.95	31.9	79		
10:55	5.25	150	11.10	0.180	7.05	6.09	26.8	128		
11:00	5.25	150	10.86	0.179	6.99	6.23	4.51	145		
11:05	5.25	150	11.00	0.181	6.92	6.22	4.01	151		
11:10	5.25	150	11.15	0.182	6.89	6.21	3.28	153		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: (YES) NO

NUMBER OF GALLONS GENERATED: _____

LOCATION SKETCH

NOTES

SIGNATURE: _____

revised 5/3/2017

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-3
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 5-3-17
TIME: START 9:25 END 10:30
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 12.47 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
9:30	12.53	130	13.51	0.297	7.39	5.53	6.92	134		
9:35	12.53	130	13.10	0.674	7.52	0.94	6.21	-58		
9:40	12.53	130	13.23	0.659	7.61	0.49	4.91	-68		
9:45	12.53	130	13.18	0.656	7.55	0.40	4.81	-70		
9:50	12.53	130	13.20	0.655	7.55	0.39	4.24	-73		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED: _____

LOCATION SKETCH

NOTES

SIGNATURE: _____

revised 5/3/2017

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-5
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 5-3-17
TIME: START 8:45 END 9:17
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 14.22 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final x 0.16 {2-inch} or x 0.65 {4-inch})

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
8:50	120	14.25	13.17	1.85	6.98	6.17	4.53	161		
8:55	120	14.25	12.14	1.83	7.35	7.07	1.01	183		
9:00	120	14.25	11.53	1.82	7.36	6.76	1.03	184		
9:05	120	14.25	11.18	1.81	7.34	6.71	0.93	183		
9:10	120	14.25	11.15	1.81	7.33	6.69	0.91	183		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES / NO

NUMBER OF GALLONS GENERATED: _____

LOCATION SKETCH

NOTES

SIGNATURE: _____

revised 5/3/2017

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-6
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 5-3-17
TIME: START 8:05 END 8:40
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 11.08 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
8:10	11.35	115	13.84	1.77	6.53	3.77	2.09	195		
8:15	11.35	115	13.56	1.80	6.53	2.68	1.07	182		
8:20	11.35	115	13.38	1.79	6.53	2.40	1.03	182		
8:25	11.35	115	12.94	1.81	6.55	2.00	0.91	182		
8:30	11.35	115	12.81	1.82	6.56	1.98	0.87	182		
8:35	11.35	115	12.71	1.82	6.56	1.97	0.85	182		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS
To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES / NO

NUMBER OF GALLONS GENERATED: _____

LOCATION SKETCH

NOTES

SIGNATURE: _____

revised 5/3/2017

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

360325-Boston

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

480-117511 COC

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier:	COC No: 480-96420-22984.1
Client Contact: Mr. Brian Guichard	Phone: 9:8658 6121	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

Analysis Reques

Preservation Codes:
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)
Other:

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	~~6040MGP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni~~	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	5-3-17	8:35	G	Water			1	1		1	1	4	
OC-SL-5		9:10		Water			1	1		1	1	4	
OC-SL-3		9:50		Water			1	1		1	1	4	
OC-SL-2		11:10		Water			1	1		1	1	4	
OC-SL-1D		11:50		Water			1	1		1	1	4	
DUP SL-3		9:50		Water			1	1		1	1	4	
SL-3 MS		9:50		Water			1	1		1	1	4	
SL-3 MSD		9:50		Water			1	1		1	1	4	
				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:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-4-17			5-4-17 1045	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-4-17 1800	TAB		5-5-17 0130	TAB
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: 2.2 #1

Field Instrument Calibration Record

Project: Calcium sulfate CAP

Task ID:

Date: 12-4-17

Sampler Signature:

Job Number:

Equipment Calibration Information

		Standard Value		Meter Value AM		Meter Value PM		Acceptance Criteria*
Horiba		pH	units	pH	4.03 units	pH	4.04 units	+/- 10% of standard
Model No.	U52	Cond.	mS/cm	Cond.	4.48 umho/cm	Cond.	4.56 umho/cm	+/- 10% of standard
Unit ID	Olm	Redox	Mv	Redox	3.03 Mv	Redox	212 Mv	See note 1
		DO	mg/l	DO	8.40 mg/l	DO	12.77 mg/l	+/- 10% of standard
		Temp.	deg. C	Temp.	20.37 deg. C	Temp.	10.7 deg. C	+/- 2.0 deg. C

Turbidity Meter	Hach	Standard Value	Meter Value AM	Meter Value PM	Criteria
Model No.	2100Q	NTU	10.1 NTU	10.2 NTU	within 0.3 NTU
Unit ID	Olm	NTU	19.9 NTU	20.1 NTU	+/- 10% of standard
		NTU	101 NTU	100 NTU	
		NTU	783 NTU	807 NTU	

Materials Record		Lot Number
Deionized Water Source		
Trip Blank Water Source		
Sample Preservatives Source		
Disposable Filter Type		
Horiba Calibration Std. Source		
Other		

Calibration Fluids

Standard Source:

Lot Numbers

pH

Mv

Cond.

Turb.

Notes:

* = If the meter reading is not within accetance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the specified Parameter was not calibrated to the acceptance criteria.

1 = Meter must read within specified range of the Zobel solution (usually 231 +/- 10 mv)

Ambient air used as source for D. O. Calibration

Comments:

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-1D
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 12-4-17
TIME: START 10:30 END 11:10
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): FT
PROTECTIVE CASING / WELL DIFFERENCE: FT

INITIAL DEPTH TO WATER: 7.58 FT
WELL DEPTH (TOR): FT
PID AMBIENT AIR: PPM
WELL DIAMETER: IN

FINAL DEPTH TO WATER: FT
SCREEN LENGTH: FT
PID WELL MOUTH: PPM

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:
PRESSURE TO PUMP: PSI

TOTAL VOL. PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)
REFILL TIMER SETTING:
DISCHARGE TIMER SETTING:

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
10:35	7.55	150	11.74	0.372	6.21	4.05	5.7	-1		
10:40	7.58	150	12.04	0.365	5.96	2.87	5.6	62		
10:45	7.58	150	12.39	0.358	5.84	1.83	5.9	116		
10:50	7.58	150	12.39	0.357	5.79	1.88	5.3	122		
10:55	7.58	150	12.40	0.357	5.76	1.87	5.1	128		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO
NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE: _____

LOCATION SKETCH

revised 11/17/2006

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-2
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 12-4-17
TIME: START 10:20 END 10:25
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): FT

PROTECTIVE CASING / WELL DIFFERENCE: FT

INITIAL DEPTH TO WATER: FT

WELL DEPTH (TOR): FT

PID AMBIENT AIR: PPM

WELL DIAMETER: IN

FINAL DEPTH TO WATER: FT

SCREEN LENGTH: FT

PID WELL MOUTH: PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 [2-inch] or x 0.65 [4-inch])

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: PSI

TOTAL VOL. PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING:

DISCHARGE TIMER SETTING:

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
			No Samples Well Dry							

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEC. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES / NO (NO circled)

NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE: _____

LOCATION SKETCH

_____

revised 11/17/2006

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-3
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 12-4-17
TIME: START 9:20 END 10:10
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): FT

PROTECTIVE CASING / WELL DIFFERENCE: FT

INITIAL DEPTH TO WATER: 15.41 FT

WELL DEPTH (TOR): FT

PID AMBIENT AIR: PPM

WELL DIAMETER: IN

FINAL DEPTH TO WATER: FT

SCREEN LENGTH: FT

PID WELL MOUTH: PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 [2-inch] or x 0.65 [4-inch])

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: PSI

TOTAL VOL. PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING:

DISCHARGE TIMER SETTING:

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
9:25	15.52	125	11.49	0.974	6.17	8.41	7.6	-35		
9:30	15.52	125	11.75	0.968	6.11	1.30	7.9	-38		
9:35	15.53	125	12.12	0.976	6.01	0.50	8.2	-44		
9:40	15.53	125	12.28	0.978	6.00	0.49	8.3	-49		
9:45	15.53	125	12.31	0.979	5.99	0.47	8.3	-49		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE: _____

LOCATION SKETCH

revised 11/17/2006

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL5
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 12-4-17
TIME START: 9:05 END: 9:10
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): FT
PROTECTIVE CASING / WELL DIFFERENCE: FT

INITIAL DEPTH TO WATER: FT
WELL DEPTH (TOR): FT
PID AMBIENT AIR: PPM
WELL DIAMETER: IN

FINAL DEPTH TO WATER: FT
SCREEN LENGTH: FT
PID WELL MOUTH: PPM

WELL INTEGRITY:	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:
PRESSURE TO PUMP: PSI

TOTAL VOL. PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)
REFILL TIMER SETTING:
DISCHARGE TIMER SETTING:

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
		no samples well dry								

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn,Fe, Cr, Ni)
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]
[ ] Other				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES / NO
NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE: _____

LOCATION SKETCH

revised 11/17/2005

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: Olin Corporation, Calcium Sulfate Landfill PCMP
SAMPLE I.D. NUMBER: SL-6
ROUND NO.:
EXPLORATION ID:
SITE TYPE:
DATE: 12-4-17
TIME: START 8:20 END 9:05
JOB NUMBER:
FILE TYPE:

WATER LEVEL / PUMP SETTINGS

MEASUREMENT POINT
- [ ] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): _____ FT

PROTECTIVE CASING / WELL DIFFERENCE: _____ FT

INITIAL DEPTH TO WATER: 15.79 FT

WELL DEPTH (TOR): _____ FT

PID AMBIENT AIR: _____ PPM

WELL DIAMETER: _____ IN

FINAL DEPTH TO WATER: _____ FT

SCREEN LENGTH: _____ FT

PID WELL MOUTH: _____ PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: _____ GAL
(initial - final) x 0.16 (2-inch) or x 0.65 (4-inch)

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: _____

PRESSURE TO PUMP: _____ PSI

TOTAL VOL. PURGED: _____ GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

REFILL TIMER SETTING: _____

DISCHARGE TIMER SETTING: _____

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c)	SPECIFIC CONDUCTANCE (ms/cm)	pH (units)	DISS. O2 (mg/L)	TURBIDITY (ntu)	REDOX (mv)	PUMP INTAKE DEPTH (ft)	COMMENTS
8:25	16.21	110	13.35	1.73	5.54	14.25	0.1	254		
8:30	16.43	110	12.11	1.68	5.97	5.59	0.1	237		
8:35	16.48	110	11.98	1.65	6.08	4.63	0.1	232		
8:40	16.50	110	11.84	1.64	6.11	4.00	0.1	232		
8:45	16.52	110	11.69	1.62	6.14	3.97	0.1	231		
8:50	16.55	110	11.64	1.62	6.15	3.95	0.1	230		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] OTHER _____

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] OTHER _____

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER _____

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] Alkalinity	2320B	4 DEG. C	250 ml Poly	[ ] Alkalinity
[ ] TDS	2540C	4 DEG. C	125 ml Poly	[ ] TDS
[ ] Sulfate	300.0/375.2	4 DEG. C	125 ml Poly	[ ] Sulfate
[ ] Metals (Ca, Al, Mn, Fe, Cr, Ni)	6010B	HNO3 to pH <2	500 ml Poly	[ ] Metals (Ca, Al, Mn, Fe, Cr, Ni)
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]
[ ] Other _____				[ ]

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: (YES) NO

NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE: _____

LOCATION SKETCH

revised 11/17/2006

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier Tracking No(s):	COC No: 480-103922-13090.1
Client Contact: Mr. Brian Guichard	Phone: 9786586181	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: calcium sulfate landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

Analysis Requested

480-128388 COC

Preservation Codes:

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)

Other:

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)	6010MCP - metals Cr/Ni/Al/Ca/Mn/Na/Fe	2540C_Calcd - Total Dissolved Solids	2320B, 300.0_28D	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	N	N		
SL-6	12-4-17	8:50	G	Water			1	1	1	3	
SL-3		9:45	G	Water			1	1	1	3	
SL-1D		10:55	G	Water			1	1	1	3	
SL-3 MS		9:45	G	Water			1	1	1	3	
SL-3 MSD		9:45	G	Water			1	1	1	3	
SL-3 DUP		9:45	G	Water			1	1	1	3	
				Water							
				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:	Date/Time:	Company	Received by:	Date/Time:	Company
				12-4-17 1280	TA
	12-4-17 1800			12-5-17 0100	TA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 2.0 #1

Ver: 08/04/2016

Field Instrument Calibration Record

Project: Calcium Sulfate Cap

Task ID:

Date: 5-7-8

Sampler Signature:

Job Number:

Equipment Calibration Information

		Standard Value	Meter Value AM	Meter Value PM	Acceptance Criteria*
Horiba	pH	units	pH 4.0 units	pH 3.99 units	+/- 10% of standard
Model No. U52	Cond.	mS/cm	Cond. 4.49 umho/cm	Cond. 4.48 umho/cm	+/- 10% of standard
Unit ID Olin	Redox	Mv	Redox 300 Mv	Redox 298 Mv	See note 1
	DO	mg/l	DO 11.97 mg/l	DO 12.90 mg/l	+/- 10% of standard
	Temp.	deg. C	Temp. 18.54 deg. C	Temp. 18.38 deg. C	+/- 2.0 deg. C

Turbidity Meter Hach	Standard Value	Meter Value AM	Meter Value PM	Criteria
Model No. 2100Q	10 NTU	10.1 NTU	9.9 NTU	within 0.3 NTU
Unit ID Olin	20 NTU	20.1 NTU	19.9 NTU	+/- 10% of standard
	100 NTU	101 NTU	99.1 NTU	
	800 NTU	793 NTU	789 NTU	

Materials Record		Lot Number
Deionized Water Source		
Trip Blank Water Source		
Sample Preservatives Source		
Disposable Filter Type		
Horiba Calibration Std. Source		
Other		

Calibration Fluids

Standard Source:

Lot Numbers

pH

Mv

Cond.

Turb.

Notes:

* = If the meter reading is not within accetance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the specified Parameter was not calibrated to the acceptance criteria.

1 = Meter must read within specified range of the Zobel solution (usually 231 +/- 10 mv)

Ambient air used as source for D. O. Calibration

Comments:

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	SL-1D	ROUND NO.	
SAMPLE ID		SITE TYPE	Superfund	DATE	5-7-18
TIME START	11:05 END 11:40	JOB NUMBER		BOTTLE TIME	11:30

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): --- FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 4.65 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
11:10	4.68	150	15.95	0.362	8.74	8.64	0.01	176		
11:15	4.68	150	12.90	0.368	8.65	8.42	0.01	190		
11:20	4.68	150	12.23	0.373	8.52	7.84	0.01	197		
11:25	4.68	150	12.19	0.376	8.47	7.75	0.01	197		
11:30	4.68	150	12.22	0.376	8.43	7.69	0.01	197		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	SL-2	ROUND NO.	
SAMPLE ID		SITE TYPE	Superfund	DATE	5-7-18
TIME	START 10:25 END 11:00	JOB NUMBER		BOTTLE TIME	10:50

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: 5.20

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): --- FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
10:30	5.21	145	15.60	0.080	7.34	5.90	13.9	153		
10:35	5.22	145	15.18	0.079	7.40	5.76	10.3	166		
10:40	5.22	145	13.36	0.081	7.61	5.89	2.6	194		
10:45	5.22	145	13.58	0.080	7.69	5.80	0.01	198		
10:50	5.22	145	13.28	0.080	7.71	5.89	0.01	201		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

P:\OLIN\Wilmington\2011 Quarterly Sampling\Field Forms\
GW Sh Blank

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: SL-3
ROUND NO.:
SAMPLE ID:
SITE TYPE: Superfund
DATE: 5-7-18
TIME START: 9:20 END: 10:15
JOB NUMBER:
BOTTLE TIME: 9:45

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: 12.37

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY: YES / NO / N/A
CAP
CASING
LOCKED
COLLAR

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
9:25	12.42	160	13.35	0.589	8.92	2.37	26.6	-22		
9:30	12.43	160	13.48	0.565	9.21	1.91	12.4	-23		
9:35	12.44	160	13.50	0.566	9.27	1.91	12.9	-24		
9:40	12.44	160	13.52	0.560	9.29	1.87	12.4	-26		
9:45	12.45	160	13.54	0.561	9.31	1.85	11.9	-27		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES (circled) NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	SL-5	ROUND NO.	
SAMPLE ID		SITE TYPE	Superfund	DATE	5-2-18
TIME START	8:40 END 9:15	JOB NUMBER		BOTTLE TIME	9:05

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT: [x] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 14.09 TOC FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
8:45	14.18	175	9.34	1.85	8.23	8.85	0.01	117		
8:50	14.18	175	9.01	1.79	8.65	7.58	0.01	138		
8:55	14.18	175	8.98	1.78	8.63	7.14	0.01	144		
9:00	14.18	175	8.94	1.75	8.59	7.01	0.01	149		
9:05	14.18	175	9.00	1.75	8.57	6.97	0.01	153		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

P:\OLIN\Wilmington\2011 Quarterly Sampling Work Records\GW Sk. Plans

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	SL-6	ROUND NO.	
SAMPLE ID		SITE TYPE	Superfund	DATE	5-7-18
TIME	START 7:55 END 8:35	JOB NUMBER		BOTTLE TIME	8:25

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID		MEASUREMENT POINT	[X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING [ ] OTHER	PROTECTIVE CASING STICKUP (FROM GROUND)	— FT.	PROTECTIVE CASING / WELL DIFFERENCE	N/A FT.
INITIAL DEPTH TO WATER	11.95 FT.	WELL DEPTH (TOR)	FT.	PID AMBIENT AIR	N/A PPM	WELL DIAMETER	IN.
FINAL DEPTH TO WATER	FT.	SCREEN LENGTH	FT.	PID WELL MOUTH	N/A PPM	WELL INTEGRITY: CAP / CASING / LOCKED / COLLAR	YES / NO / N/A
DRAWDOWN VOLUME (initial - final x 0.16 (2-inch) or x 0.65 (4-inch))	GAL.	RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED		PRESSURE TO PUMP	N/A PSI		
TOTAL VOL. PURGED (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)	GAL.			REFILL TIMER SETTING	N/A SEC.	DISCHARGE TIMER SETTING	N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1)	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
8:00	11.29	180	12.19	0.243	6.00	9.36	0.01	264		
8:05	11.29	160	14.60	1.69	7.22	6.33	0.01	209		
8:10	11.29	160	12.62	1.78	7.22	4.06	0.01	200		
8:15	11.29	160	11.88	1.81	8.21	2.69	0.01	195		
8:20	11.29	160	11.54	1.82	8.29	2.41	0.01	189		
8:25	11.29	160	11.41	1.82	8.34	2.36	0.01	188		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
[ ] QED BLADDER	[ ] TEFLON OR TEFLON LINED	[ ] POLYVINYL CHLORIDE	[ ] TEFLON
[ ] SIMCO BLADDER	[ ] HIGH DENSITY POLYETHYLENE	[ ] STAINLESS STEEL	[ ] OTHER _____
[ ] GEOPUMP	[ ] LDPE (Dedicated)	[ ] SILICON (Dedicated)	

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES / NO

NUMBER OF GALLONS GENERATED _____

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

360325-Boston

Chain of Custody Record

360325-Boston

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: BRIAN GUICHARD	Lab PM: Mason, Becky C	Carrier	COC No: 480-112446-22984.1
Client Contact: Mr. Brian Guichard	Phone: 978 658 6141	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

480-135564 COC

Analysis Reques

Preservation Codes:
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)
Other:

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	6010MCP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	5-7-18	8:25	G	Water			1	1		1	1	4	
OC-SL-5		9:05		Water			1	1		1	1	4	
OC-SL-3		9:45		Water			1	1		1	1	4	
OC-SL-2		10:50		Water			1	1		1	1	4	
OC-SL-1D		11:30		Water			1	1		1	1	4	
DUP SL-3		9:45		Water			1	1		1	1	4	
SL-3 MS		9:45		Water			1	1		1	1	4	
SL-3 MSD		9:45		Water			1	1		1	1	4	
				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	Date/Time	Company	Received by	Date/Time	Company
[signature]	5-8-18		[signature]	5-8-18 1200	TA
[signature]	5-8-18 1800		[signature]	5-9-18 0130	TAD

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2.3 #1

Ver: 08/04/2016

Field Instrument Calibration Record

Project: Calcium Sulfate Cap

Task ID:

Date: 12-5-18

Sampler Signature:

Job Number:

Equipment Calibration Information

			Standard Value		Meter Value AM		Meter Value PM		Acceptance Criteria*
Horiba	U-52	pH		units	pH 4.01	units	pH 3.94	units	+/- 10% of standard
Model No.		Cond.		mS/cm	Cond. 4.49	umho/cm	Cond. 4.49	umho/cm	+/- 10% of standard
Unit ID	Olin	Redox		Mv	Redox 222	Mv	Redox 223	Mv	See note 1
		DO		mg/l	DO 9.14	mg/l	DO 10.99	mg/l	+/- 10% of standard
		Temp.		deg. C	Temp. 23.91	deg. C	Temp. 24.14	deg. C	+/- 2.0 deg. C

		Standard Value	Meter Value AM	Meter Value PM	Criteria
Turbidity Meter	HACH				
Model No.	2100Q	NTU	18.2 NTU	18.4 NTU	within 0.3 NTU
Unit ID	Olin	NTU	20.5 NTU	20.9 NTU	+/- 10% of standard
		NTU	101 NTU	105 NTU	
		NTU	847 NTU	853 NTU	

Materials Record		Lot Number
Deionized Water Source		
Trip Blank Water Source		
Sample Preservatives Source		
Disposable Filter Type		
Horiba Calibration Std. Source		
Other		

Calibration Fluids

Standard Source:

Lot Numbers

pH

Mv

Cond.

Turb.

Notes:

* = If the meter reading is not within acceptance criteria, clean or replace probe and re-calibrate, or use a different meter if available. If project requirements necessitate use of the instrument, clearly document on all data sheets and log book entries that the specified Parameter was not calibrated to the acceptance criteria.

1 = Meter must read within specified range of the Zobel solution (usually 231 +/- 10 mv)

Ambient air used as source for D. O. Calibration

Comments:

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: SL-11D
ROUND NO.:
SAMPLE ID:
SITE TYPE: Superfund
DATE: 12-6-18
TIME START 10:35 END 11:10
JOB NUMBER:
BOTTLE TIME: 11:00

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 4.35 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY: YES NO N/A
CAP
CASING
LOCKED
COLLAR

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
10:40	4.39	160	9.69	0.331	6.03	3.59	52.0	186		
10:45	4.39	160	9.84	0.330	5.99	3.21	38.3	191		
10:50	4.39	160	10.02	0.328	6.00	2.95	36.7	195		
10:55	4.39	160	10.13	0.327	5.99	2.92	37.4	198		
11:00	4.39	160	10.24	0.326	6.00	2.95	38.3	198		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: SL-2
ROUND NO.:
SAMPLE ID:
SITE TYPE: Superfund
DATE: 12-6-18
TIME START: 10:00 END: 10:35
JOB NUMBER:
BOTTLE TIME: 10:25

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 4.71 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 [2-inch] or x 0.65 [4-inch])

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
10:05	4.75	150	8.09	0.146	5.74	6.26	150	58		
10:10	4.75	150	9.14	0.140	5.54	5.27	52	128		
10:15	4.75	150	9.04	0.137	5.55	5.34	31.2	153		
10:20	4.75	150	8.83	0.138	5.56	5.31	32.3	155		
10:25	4.75	150	8.71	0.139	5.56	5.28	33.4	157		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	SL-3	ROUND NO.	
SAMPLE ID		SITE TYPE	Superfund	DATE	
TIME START	9:15 END 9:50	JOB NUMBER		BOTTLE TIME	9:40

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 11.85 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
9:20	11.92	160	8.50	0.979	5.84	18.76	24.3	-48		
9:25	11.92	160	8.65	0.978	5.76	9.32	22.4	-53		
9:30	11.92	160	8.92	0.942	5.74	8.21	20.1	-55		
9:35	11.92	160	9.16	0.941	5.75	8.14	22.6	-56		
9:40	11.92	160	9.22	0.940	5.75	8.11	21.9	-57		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and DEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED: _____

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: SL-5
ROUND NO.:
SAMPLE ID:
SITE TYPE: Superfund
DATE: 12-6-18
TIME START: 8:35 END: 9:10
JOB NUMBER:
BOTTLE TIME: 9:00

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [x] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): --- FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 13.41 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DRAWDOWN VOLUME: GAL.
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL PURGED: GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1)	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
8:40	13.51	160	10.65	2.03	5.97	9.40	9.4	160		
8:45	13.52	160	10.47	1.99	5.92	8.81	4.9	167		
8:50	13.52	160	10.45	1.98	5.89	8.57	4.7	169		
8:55	13.52	160	10.38	1.96	5.89	8.41	4.9	176		
9:00	13.54	160	10.34	1.96	5.90	8.39	4.8	175		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected

	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: SL-6
ROUND NO.:
SAMPLE ID:
SITE TYPE: Superfund
DATE: 12-6-18
TIME START 7:30 END 8:35
JOB NUMBER:
BOTTLE TIME: 7:55

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): — FT.

PROTECTIVE CASING / WELL DIFFERENCE: N/A FT.

INITIAL DEPTH TO WATER: 10.38 FT.

WELL DEPTH (TOR): FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: IN.

FINAL DEPTH TO WATER: FT.

SCREEN LENGTH: FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY: YES NO N/A
CAP
CASING
LOCKED
COLLAR

DRAWDOWN VOLUME: GAL
(initial - final x 0.16 (2-inch) or x 0.65 (4-inch))

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: GAL
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (uS/cm) (3%)	pH (units) (+/- 0.1	DISS. O2 (mg/L) (10%)(>0.5)	TURBIDITY (NTU) (10%) (> 5)	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
7:35	10.65	150	18.40	1.39	5.10	7.69	0.01	217		
7:40	10.65	150	17.05	1.37	5.09	6.71	0.01	207		
7:45	10.65	150	15.19	1.30	5.04	6.28	0.01	203		
7:50	10.65	150	14.99	1.30	5.04	6.31	0.01	203		
7:55	10.65	150	14.85	1.29	5.05	6.25	0.01	203		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [ ] GEOPUMP

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [ ] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [ ] SILICON (Dedicated)

TYPE OF BLADDER MATERIAL
- [ ] TEFLON
- [ ] OTHER

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs: Trimethylpentenes	8260 B	HCL / 4 DEG. C	3 X 40 mL	[ ] VOCs
[ ] SVOCs: NDPA and BEHP	8270 C	4 DEG. C	2 X 1 L AG	[ ] SVOCs
[ ] VPH	MA VPH	HCL / 4 DEG. C	3 X 40 mL	[ ] VPH
[ ] Dissolved Fe	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Fe
[ ] pH	SM 4500 H+B	4 DEG. C	1 X 500 mL	[ ] pH
[ ] Ammonia-Nitrogen	10-107-06-1	H2SO4 / 4 DEG. C	1 X 250 mL	[ ] Ammonia-Nitrogen
[ ] Chloride	300.0	4 DEG. C	1 X 500 mL	[ ] Chloride
[ ] Sulfate	300.0	4 DEG. C	1 X 500 mL	[ ] Sulfate
[ ] Specific Conductivity	SM 2510B	4 DEG. C	1 X 500 mL	[ ] Specific Conductivity
[ ] Dissolved Al, Cr	DIS. 6010B	HNO3 / 4 DEG. C	1 X 500 mL	[ ] Dis. Al, Cr

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES NO

NUMBER OF GALLONS GENERATED:

NOTES

SIGNATURE:

LOCATION SKETCH

Sampled by:

Prepared by:

Checked by:

Olin CORP

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

360325-Boston

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier Tracking No(s):	COC No: 480-116092-2
Client Contact: Mr. Brian Guichard	Phone: 9786586121	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

480-146398 COC

Preservation
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 - Hexa...
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)
Other:

Analysis Requested

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	~~6010MCP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni~~	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	12-6-18	7:55	G	Water			1	1		1	1	4	
OC-SL-5		9:00	G	Water			1	1		1	1	4	
OC-SL-3		9:40	G	Water			1	1		1	1	4	
OC-SL-2		10:25	G	Water			1	1		1	1	4	
OC-SL-1D		11:00	G	Water			1	1		1	1	4	
DUP SL-6		7:55	G	Water			1	1		1	1	4	
SL-6 MS		7:55	G	Water			1	1		1	1	4	
SL-6 MSD		7:55	G	Water			1	1		1	1	4	
				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:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]			[signature]	12-6-18 1400	[signature]
[signature]	12-6-18 1800	[signature]	Jordan Valcarone	12-07-18 0100	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.7 #1

Ver: 08/04/2016

APPENDIX C
DATA VALIDATION REPORTS
(PROVIDED ON CD)

To: James Cashwell
From: Chris Ricardi
Date: July 19, 2017
Subject: Calcium Sulfate Landfill Semiannual Monitoring – May 2017

DATA VALIDATION REPORT
MAY 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS
TestAmerica Laboratories Data Set 480-117511-1

1.0 INTRODUCTION

Groundwater samples were collected from the Olin Chemical Superfund Site on May 3, 2017. Samples were analyzed by TestAmerica Laboratories in Buffalo, New York. Data were reported in sample delivery group (SDG) 480-117511-1. A summary of samples included in this review is contained in Table 1. Samples reviewed in this report were analyzed for the following U.S. Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996), USEPA wastewater (USEPA, 1993), or Standard Methods (APHA, 1995):

- total metals (aluminum, calcium, chromium, iron, manganese, nickel, and sodium) by USEPA Method 6010
- general chemistry analyses for total, carbonate, and bicarbonate alkalinity by SM 2320, chloride and sulfate by USEPA Method E300, and total dissolved solids (TDS) by SM A2540C

The Draft Post Closure Plan (MACTEC, 2006) and the Massachusetts Department of Environmental Protection (MassDEP) Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) [MassDEP, 2010] were used as references during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington groundwater monitoring tasks. Final sample results are presented on data summaries in Table 2. A summary of qualified results is presented on Table 3.

2.0 METALS

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
* Matrix Spike Analysis
* Field Duplicate Results

* Laboratory Control Sample
  Detection limits

***** = indicates that criteria were met for this parameter

2.1 Validation Observations and Actions

Detection Limits

The reporting limit (RL) for aluminum (200 µg/L) is greater than the reporting limit of 100 µg/L specified in the Final Interim Response Steps Work Plan (IRSWP); however, the laboratory reports detections between the RL and the method detection limit (MDL) of 60 µg/L.

The RL for calcium (500 µg/L) is greater than the reporting limit of 200 µg/L specified in the IRSWP. Calcium was detected in all samples at concentrations greater than the RL.

3.0 GENERAL CHEMISTRY – Alkalinity, Chloride, Sulfate, and Total Dissolved Solids

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
  Matrix Spike Analysis
* Laboratory Duplicate Analysis
* Field Duplicate Analysis
* Laboratory Control Sample
  Detection limits

***** **=** indicates that criteria were met for this parameter

3.1 Validation Observations and Actions

Matrix Spikes

A matrix spike (MS) and matrix spike duplicate (MSD) analysis for alkalinity was performed on sample SL-3. The percent recoveries reported were compared to the laboratory control limits of 60-140. The percent recoveries in the MS (53) and MSD (52) were below the lower control limit. Results for alkalinity were qualified estimated (J) in sample SL-3 and in the associated field duplicate sample DUP-SL-3. A reason code of MS-L was assigned to these results as presented in Table 3.

Detection Limits

The RL for carbonate and bicarbonate alkalinity (5 mg/L) is greater than the reporting limit of 1 mg/L specified in the IRSWP. Bicarbonate alkalinity was reported at concentrations greater than the RL in all samples. Detections of carbonate alkalinity would be reported between the RL and the MDL of 0.79 mg/L.

The RL for TDS (20 mg/L) in samples OC-SL-5 and OC-SL-6 is greater than the RL of 10 mg/L specified in the IRSWP. Positive detections for TDS were reported for all samples.

Chris Ricardi, NRCC-EAC Senior Chemist	7/17/17 Date
Peter H. Thompson Project Manager	1/10/18 Date

References:

American Public Health Association (APHA), 1995. "Standard Methods for Examination of Water and Wastewater"; 19th Edition; APHA, 1015 Fifteenth St., NW. Washington, D.C. 20005.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2006. "Draft Calcium Sulfate Landfill Post Closure Monitoring Plan"; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; December, 2006.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2008. "Final Interim Response Steps Work Plan"; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 8, 2008.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.

Massachusetts Department of Environmental Protection (MassDEP), 2010. “The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)”; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.

U.S. Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)”, EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).

USEPA, 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 -December 1996.

TABLE 1
SAMPLE SUMMARY
DATA VALIDATION REPORT
May 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

					Method Class	Metals	Inorganics & Wet Chem		
					Analysis Method	SW6010	A2320	A2540C	E300
					Fraction	Total	Total	Total	Total
Lab SDG	**Media**	**Location**	**Field Sample ID**	**Field Sample Date**	**QC Code**	Count	Count	Count	Count
480-117511-1	GW	SL-1D	OC-SL-1D	5/3/2017	FS	7	3	1	2
480-117511-1	GW	SL-2	OC-SL-2	5/3/2017	FS	7	3	1	2
480-117511-1	GW	SL-3	DUP-SL-3	5/3/2017	FD	7	3	1	2
480-117511-1	GW	SL-3	OC-SL-3	5/3/2017	FS	7	3	1	2
480-117511-1	GW	SL-5	OC-SL-5	5/3/2017	FS	7	3	1	2
480-117511-1	GW	SL-6	OC-SL-6	5/3/2017	FS	7	3	1	2

Notes:
FS = Field Sample
FD = Field Duplicate
GW = Groundwater

Created by: KMS 6/23/17
Checked by: JAR 7/13/17

TABLE 2
FINAL RESULTS SUMMARY
DATA VALIDATION REPORT
MAY 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

			Location	SL-1D		SL-2		SL-3		SL-3		SL-5		SL-6	
			Lab SDG	480-117511-1		480-117511-1		480-117511-1		480-117511-1		480-117511-1		480-117511-1	
			Sample Date	5/3/2017		5/3/2017		5/3/2017		5/3/2017		5/3/2017		5/3/2017	
			Sample ID	OC-SL-1D		OC-SL-2		DUP-SL-3		OC-SL-3		OC-SL-5		OC-SL-6	
			QC Code	FS		FS		FD		FS		FS		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010	T	Aluminum	ug/l	110	J	64	J	200	U	200	U	200	U	200	U
SW6010	T	Calcium	ug/l	30,000		40,000		140,000		140,000		460,000		500,000	
SW6010	T	Chromium	ug/l	5	U	5	U	5	U	5	U	5	U	5	U
SW6010	T	Iron	ug/l	91		100		35,000		36000		110		35	J
SW6010	T	Manganese	ug/l	14		1.4	J	3,400		3400		200		220	
SW6010	T	Nickel	ug/l	10	U	10	U	10	U	1.4	J	3.3	J	10	U
SW6010	T	Sodium	ug/l	51,000		3,600		6,500		6,600		7,900		7,700	
A2320	T	Bicarbonate Alkalinity, as CaCO3	mg/l	33		15		400	J	370	J	90		200	
A2320	T	Carbonate Alkalinity, as CaCO3	mg/l	5	U	5	U	5	UJ	5	UJ	5	U	5	U
A2320	T	Total Alkalinity, as CaCO3	mg/l	33		15		400	J	370	J	90		200	
A2540C	T	Total Dissolved Solids	mg/l	260		160		460		480		1900		2000	
E300	T	Chloride	mg/l	100		2.9		4.9		4.8		3.8	J	3.7	J
E300	T	Sulfate	mg/l	34		93		62		66		1100		1100	

Notes:
FS = Field Sample
FD = Field Duplicate
U = Not detected, value is the reporting limit
J = Value is estimated
mg/l = milligrams per liter

Created by: KMS 7/17/17
Checked by: JAR 7/18/17

TABLE 3
DATA VALIDATION ACTION SUMMARY
DATA VALIDATION REPORT
MAY 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

Lab Sample Delivery Group	Analysis Method	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units	Lab ID
480-117511-1	A2320	480-117511-3	OC-SL-3	Bicarbonate Alkalinity, as CaCO3	370		370	J	MS-L	mg/l	TALBFLO
480-117511-1	A2320	480-117511-3	OC-SL-3	Carbonate Alkalinity, as CaCO3	5	U	5	UJ	MS-L	mg/l	TALBFLO
480-117511-1	A2320	480-117511-3	OC-SL-3	Total Alkalinity, as CaCO3	370	F1	370	J	MS-L	mg/l	TALBFLO
480-117511-1	A2320	480-117511-6	DUP-SL-3	Bicarbonate Alkalinity, as CaCO3	400		400	J	MS-L	mg/l	TALBFLO
480-117511-1	A2320	480-117511-6	DUP-SL-3	Carbonate Alkalinity, as CaCO3	5	U	5	UJ	MS-L	mg/l	TALBFLO
480-117511-1	A2320	480-117511-6	DUP-SL-3	Total Alkalinity, as CaCO3	400		400	J	MS-L	mg/l	TALBFLO

Units:
mg/l = milligrams per liter

Validation Qualifiers:
J = Value is estimated

Validation Reason Codes:
MS-L = MS and/or MSD Recovery low

Created by: KMS 7/17/17
Checked by: JAR 7/18/17

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-117511-1
Client Project/Site: Olin Calcium Sulfate Landfill

For:
Olin Corporation
PO BOX 248
Charleston, Tennessee 37310-0248

Attn: Mr. James Cashwell

Authorized for release by:
5/22/2017 9:06:58 AM
Denise Giglia, Project Management Assistant II
denise.giglia@testamericainc.com

Designee for

Becky Mason, Project Manager II
(413)572-4000
becky.mason@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

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.

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Definitions/Glossary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

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.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

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.
F1	MS and/or MSD Recovery is outside acceptance limits.
B	Compound was found in the blank and sample.

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)

Case Narrative

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Job ID: 480-117511-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-117511-1

Receipt
The samples were received on 5/5/2017 1:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.2º C.

HPLC/IC
Method 300.0: The following samples were reported with elevated reporting limits for all analytes: OC-SL-6 (480-117511-1), OC-SL-5 (480-117511-2), OC-SL-3 (480-117511-3), OC-SL-1D (480-117511-5) and DUP-SL-3 (480-117511-6). The samples were analyzed at a dilution based on screening results.

Method 300.0: The following sample was diluted to bring the concentration of target analytes within the calibration range: OC-SL-6 (480-117511-1) and OC-SL-5 (480-117511-2). 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 6010: At the request of the client, an abbreviated/modified MCP compound list was reported for this job.

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

General Chemistry
Method SM 2540C: Due to the matrix, the initial volumes used for the following sample deviated from the standard procedure: OC-SL-6 (480-117511-1) and OC-SL-5 (480-117511-2). The reporting limits (RLs) have been adjusted proportionately.

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

MassDEP Analytical Protocol Certification Form

Laboratory Name: **TestAmerica Buffalo** Project #: **480-117511**

Project Location: **Olin Calcium Sulfate Landfill** RTN:

This form provides certifications for the following data set: list Laboratory Sample ID Number(s):

480-117511[1-6]

Matrices: ■ Groundwater/Surface Water ☐ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocols (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	Mass DEP VPH CAM IV A ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	Mass DEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	Mass DEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ■	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐	

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding time.	■ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	■ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	■ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	■ Yes ☐ No
E	a. VPH, EPH and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	■ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	■ Yes ☐ No[1]

Data User Note: ***Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WCS-07-350***

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	■ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s) ?	☐ Yes ■ No[1]

[1] All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: Position: Project Manager Assistant II

Printed Name: Denise L. Giglia Date: 5/22/17 8:51

Detection Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-6 — Lab Sample ID: 480-117511-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	500000		500	100	ug/L	1		6010	Total/NA
Manganese	220		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	7700		1000	320	ug/L	1		6010	Total/NA
Iron	35	J	50	19	ug/L	1		6010	Total/NA
Chloride	3.7	J	5.0	2.8	mg/L	10		300.0	Total/NA
Sulfate	1100		100	17	mg/L	50		300.0	Total/NA
Alkalinity, Total	200		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	200		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	2000		20	8.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-5 — Lab Sample ID: 480-117511-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	3.3	J	10	1.3	ug/L	1		6010	Total/NA
Calcium	460000		500	100	ug/L	1		6010	Total/NA
Manganese	200		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	7900		1000	320	ug/L	1		6010	Total/NA
Iron	110		50	19	ug/L	1		6010	Total/NA
Chloride	3.8	J	5.0	2.8	mg/L	10		300.0	Total/NA
Sulfate	1100		100	17	mg/L	50		300.0	Total/NA
Alkalinity, Total	90		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	90		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1900		20	8.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-3 — Lab Sample ID: 480-117511-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	1.4	J	10	1.3	ug/L	1		6010	Total/NA
Calcium	140000		500	100	ug/L	1		6010	Total/NA
Manganese	3400		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	6600		1000	320	ug/L	1		6010	Total/NA
Iron	36000		50	19	ug/L	1		6010	Total/NA
Chloride	4.8		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	66	B	10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	370	F1	5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	370		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	480		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-2 — Lab Sample ID: 480-117511-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	64	J	200	60	ug/L	1		6010	Total/NA
Calcium	40000		500	100	ug/L	1		6010	Total/NA
Manganese	1.4	J	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	3600		1000	320	ug/L	1		6010	Total/NA
Iron	100		50	19	ug/L	1		6010	Total/NA
Chloride	2.9		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	93	B	2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	15		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	15		5.0	0.79	mg/L	1		SM 2320B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-2 (Continued) — Lab Sample ID: 480-117511-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	160		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-1D — Lab Sample ID: 480-117511-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	110	J	200	60	ug/L	1		6010	Total/NA
Calcium	30000		500	100	ug/L	1		6010	Total/NA
Manganese	14		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	51000		1000	320	ug/L	1		6010	Total/NA
Iron	91		50	19	ug/L	1		6010	Total/NA
Chloride	100		1.0	0.56	mg/L	2		300.0	Total/NA
Sulfate	34	B	4.0	0.70	mg/L	2		300.0	Total/NA
Alkalinity, Total	33		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	33		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	260		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: DUP-SL-3 — Lab Sample ID: 480-117511-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	140000		500	100	ug/L	1		6010	Total/NA
Manganese	3400		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	6500		1000	320	ug/L	1		6010	Total/NA
Iron	35000		50	19	ug/L	1		6010	Total/NA
Chloride	4.9		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	62	B	10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	400		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	400		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	460		10	4.0	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-6

Lab Sample ID: 480-117511-1
Date Collected: 05/03/17 08:35
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 13:57	1
Nickel	ND		10	1.3	ug/L		05/05/17 14:13	05/08/17 13:57	1
Aluminum	ND		200	60	ug/L		05/05/17 14:13	05/08/17 13:57	1
Calcium	**500000**		500	100	ug/L		05/05/17 14:13	05/08/17 13:57	1
Manganese	**220**		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 13:57	1
Sodium	**7700**		1000	320	ug/L		05/05/17 14:13	05/08/17 13:57	1
Iron	**35**	**J**	50	19	ug/L		05/05/17 14:13	05/08/17 13:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.7**	**J**	5.0	2.8	mg/L			05/16/17 14:55	10
Sulfate	**1100**		100	17	mg/L			05/18/17 17:06	50
Alkalinity, Total	**200**		5.0	0.79	mg/L			05/05/17 20:39	1
Alkalinity, Bicarbonate	**200**		5.0	0.79	mg/L			05/05/17 20:39	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 20:39	1
Total Dissolved Solids	**2000**		20	8.0	mg/L			05/10/17 09:14	1

Client Sample ID: OC-SL-5

Lab Sample ID: 480-117511-2
Date Collected: 05/03/17 09:10
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 14:00	1
Nickel	**3.3**	**J**	10	1.3	ug/L		05/05/17 14:13	05/08/17 14:00	1
Aluminum	ND		200	60	ug/L		05/05/17 14:13	05/08/17 14:00	1
Calcium	**460000**		500	100	ug/L		05/05/17 14:13	05/08/17 14:00	1
Manganese	**200**		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 14:00	1
Sodium	**7900**		1000	320	ug/L		05/05/17 14:13	05/08/17 14:00	1
Iron	**110**		50	19	ug/L		05/05/17 14:13	05/08/17 14:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.8**	**J**	5.0	2.8	mg/L			05/16/17 15:03	10
Sulfate	**1100**		100	17	mg/L			05/18/17 17:14	50
Alkalinity, Total	**90**		5.0	0.79	mg/L			05/05/17 20:45	1
Alkalinity, Bicarbonate	**90**		5.0	0.79	mg/L			05/05/17 20:45	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 20:45	1
Total Dissolved Solids	**1900**		20	8.0	mg/L			05/10/17 09:14	1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-117511-3
Date Collected: 05/03/17 09:50
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 14:04	1
Nickel	**1.4**	**J**	10	1.3	ug/L		05/05/17 14:13	05/08/17 14:04	1
Aluminum	ND		200	60	ug/L		05/05/17 14:13	05/08/17 14:04	1
Calcium	**140000**		500	100	ug/L		05/05/17 14:13	05/08/17 14:04	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-117511-3
Date Collected: 05/03/17 09:50
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	3400		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 14:04	1
Sodium	6600		1000	320	ug/L		05/05/17 14:13	05/08/17 14:04	1
Iron	36000		50	19	ug/L		05/05/17 14:13	05/08/17 14:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.8		2.5	1.4	mg/L			05/16/17 15:36	5
Sulfate	66	B	10	1.7	mg/L			05/16/17 15:36	5
Alkalinity, Total	370	F1	5.0	0.79	mg/L			05/08/17 22:24	1
Alkalinity, Bicarbonate	370		5.0	0.79	mg/L			05/08/17 22:24	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/08/17 22:24	1
Total Dissolved Solids	480		10	4.0	mg/L			05/10/17 09:14	1

Client Sample ID: OC-SL-2

Lab Sample ID: 480-117511-4
Date Collected: 05/03/17 11:10
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 14:32	1
Nickel	ND		10	1.3	ug/L		05/05/17 14:13	05/08/17 14:32	1
Aluminum	64	J	200	60	ug/L		05/05/17 14:13	05/08/17 14:32	1
Calcium	40000		500	100	ug/L		05/05/17 14:13	05/08/17 14:32	1
Manganese	1.4	J	3.0	0.40	ug/L		05/05/17 14:13	05/08/17 14:32	1
Sodium	3600		1000	320	ug/L		05/05/17 14:13	05/08/17 14:32	1
Iron	100		50	19	ug/L		05/05/17 14:13	05/08/17 14:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2.9		0.50	0.28	mg/L			05/16/17 15:11	1
Sulfate	93	B	2.0	0.35	mg/L			05/16/17 15:11	1
Alkalinity, Total	15		5.0	0.79	mg/L			05/05/17 20:49	1
Alkalinity, Bicarbonate	15		5.0	0.79	mg/L			05/05/17 20:49	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 20:49	1
Total Dissolved Solids	160		10	4.0	mg/L			05/10/17 09:14	1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-117511-5
Date Collected: 05/03/17 11:50
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 14:36	1
Nickel	ND		10	1.3	ug/L		05/05/17 14:13	05/08/17 14:36	1
Aluminum	110	J	200	60	ug/L		05/05/17 14:13	05/08/17 14:36	1
Calcium	30000		500	100	ug/L		05/05/17 14:13	05/08/17 14:36	1
Manganese	14		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 14:36	1
Sodium	51000		1000	320	ug/L		05/05/17 14:13	05/08/17 14:36	1
Iron	91		50	19	ug/L		05/05/17 14:13	05/08/17 14:36	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-117511-5
Date Collected: 05/03/17 11:50
Matrix: Water
Date Received: 05/05/17 01:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	100		1.0	0.56	mg/L			05/16/17 15:20	2
Sulfate	34	B	4.0	0.70	mg/L			05/16/17 15:20	2
Alkalinity, Total	33		5.0	0.79	mg/L			05/05/17 20:55	1
Alkalinity, Bicarbonate	33		5.0	0.79	mg/L			05/05/17 20:55	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 20:55	1
Total Dissolved Solids	260		10	4.0	mg/L			05/10/17 09:14	1

Client Sample ID: DUP-SL-3

Lab Sample ID: 480-117511-6
Date Collected: 05/03/17 09:50
Matrix: Water
Date Received: 05/05/17 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 14:39	1
Nickel	ND		10	1.3	ug/L		05/05/17 14:13	05/08/17 14:39	1
Aluminum	ND		200	60	ug/L		05/05/17 14:13	05/08/17 14:39	1
Calcium	140000		500	100	ug/L		05/05/17 14:13	05/08/17 14:39	1
Manganese	3400		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 14:39	1
Sodium	6500		1000	320	ug/L		05/05/17 14:13	05/08/17 14:39	1
Iron	35000		50	19	ug/L		05/05/17 14:13	05/08/17 14:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.9		2.5	1.4	mg/L			05/16/17 15:28	5
Sulfate	62	B	10	1.7	mg/L			05/16/17 15:28	5
Alkalinity, Total	400		5.0	0.79	mg/L			05/05/17 21:41	1
Alkalinity, Bicarbonate	400		5.0	0.79	mg/L			05/05/17 21:41	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 21:41	1
Total Dissolved Solids	460		10	4.0	mg/L			05/10/17 09:14	1

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Method: 6010 - Metals (ICP)

Lab Sample ID: MB 480-355892/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/05/17 14:13	05/08/17 13:14	1
Nickel	ND		10	1.3	ug/L		05/05/17 14:13	05/08/17 13:14	1
Aluminum	ND		200	60	ug/L		05/05/17 14:13	05/08/17 13:14	1
Calcium	ND		500	100	ug/L		05/05/17 14:13	05/08/17 13:14	1
Manganese	ND		3.0	0.40	ug/L		05/05/17 14:13	05/08/17 13:14	1
Sodium	ND		1000	320	ug/L		05/05/17 14:13	05/08/17 13:14	1

Lab Sample ID: MB 480-355892/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356570 — **Prep Batch: 355892**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		50	19	ug/L		05/05/17 14:13	05/09/17 13:14	1

Lab Sample ID: LCS 480-355892/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	200	198		ug/L		99	80 - 120
Nickel	200	190		ug/L		95	80 - 120
Aluminum	10000	9740		ug/L		97	80 - 120
Calcium	10000	9730		ug/L		97	80 - 120
Manganese	200	204		ug/L		102	80 - 120
Sodium	10000	9670		ug/L		97	80 - 120
Iron	10000	10400		ug/L		104	80 - 120

Lab Sample ID: LCSD 480-355892/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	200	197		ug/L		99	80 - 120	1	20
Nickel	200	189		ug/L		94	80 - 120	1	20
Aluminum	10000	9680		ug/L		97	80 - 120	1	20
Calcium	10000	9640		ug/L		96	80 - 120	1	20
Manganese	200	203		ug/L		101	80 - 120	1	20
Sodium	10000	9600		ug/L		96	80 - 120	1	20
Iron	10000	10300		ug/L		103	80 - 120	2	20

Lab Sample ID: 480-117511-3 MS — **Client Sample ID: OC-SL-3MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		200	194		ug/L		97	75 - 125
Nickel	1.4	J	200	194		ug/L		96	75 - 125
Aluminum	ND		10000	9910		ug/L		99	75 - 125
Calcium	140000		10000	145000	4	ug/L		73	75 - 125

Method: 6010 - Metals (ICP) (Continued)

Lab Sample ID: 480-117511-3 MS — **Client Sample ID: OC-SL-3MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Manganese	3400		200	3540	4	ug/L		46	75 - 125
Sodium	6600		10000	16200		ug/L		95	75 - 125
Iron	36000		10000	44900		ug/L		93	75 - 125

Lab Sample ID: 480-117511-3 MSD — **Client Sample ID: OC-SL-3MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356361 — **Prep Batch: 355892**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		200	194		ug/L		97	75 - 125	0	20
Nickel	1.4	J	200	193		ug/L		96	75 - 125	0	20
Aluminum	ND		10000	9790		ug/L		98	75 - 125	1	20
Calcium	140000		10000	149000	4	ug/L		107	75 - 125	2	20
Manganese	3400		200	3640	4	ug/L		96	75 - 125	3	20
Sodium	6600		10000	16300		ug/L		97	75 - 125	1	20
Iron	36000		10000	46100		ug/L		106	75 - 125	3	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-357644/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 357644

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/16/17 14:47	1
Sulfate	0.520	J	2.0	0.35	mg/L			05/16/17 14:47	1

Lab Sample ID: LCS 480-357644/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 357644

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	52.4		mg/L		105	90 - 110
Sulfate	50.0	50.0		mg/L		100	90 - 110

Lab Sample ID: 480-117511-3 MS — **Client Sample ID: OC-SL-3MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 357644

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4.8		250	273		mg/L		107	81 - 120
Sulfate	66	B	250	317		mg/L		100	80 - 120

Lab Sample ID: 480-117511-3 MSD — **Client Sample ID: OC-SL-3MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 357644

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	4.8		250	272		mg/L		107	81 - 120	0	20

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 480-117511-3 MSD — **Client Sample ID: OC-SL-3MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 357644

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	66	B	250	317		mg/L		101	80 - 120	0	20

Lab Sample ID: MB 480-358065/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 358065

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/18/17 14:40	1
Sulfate	ND		2.0	0.35	mg/L			05/18/17 14:40	1

Lab Sample ID: LCS 480-358065/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 358065

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.2		mg/L		100	90 - 110
Sulfate	50.0	49.4		mg/L		99	90 - 110

Lab Sample ID: 480-117511-2 MS — **Client Sample ID: OC-SL-5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 358065

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	1100		2500	3590		mg/L		100	80 - 120

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 480-355974/30 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 355974

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			05/05/17 21:09	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			05/05/17 21:09	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 21:09	1

Lab Sample ID: MB 480-355974/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 355974

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			05/05/17 19:13	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			05/05/17 19:13	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/05/17 19:13	1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCS 480-355974/31 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 355974

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	94.5		mg/L		95	90 - 110

Lab Sample ID: LCS 480-355974/8 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 355974

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	94.4		mg/L		94	90 - 110

Lab Sample ID: MB 480-356429/30 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			05/09/17 00:38	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			05/09/17 00:38	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/09/17 00:38	1

Lab Sample ID: MB 480-356429/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			05/08/17 21:48	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			05/08/17 21:48	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/08/17 21:48	1

Lab Sample ID: LCS 480-356429/31 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	94.7		mg/L		95	90 - 110

Lab Sample ID: LCS 480-356429/8 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	96.2		mg/L		96	90 - 110

Lab Sample ID: 480-117511-3 MS — **Client Sample ID: OC-SL-3MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	370	F1	100	426	F1	mg/L		53	60 - 140

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: 480-117511-3 MSD — **Client Sample ID: OC-SL-3MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356429

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity, Total	370	F1	100	425	F1	mg/L		52	60 - 140	0	20

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

Lab Sample ID: MB 480-356577/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356577

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			05/10/17 09:14	1

Lab Sample ID: LCS 480-356577/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 356577

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			521	509		mg/L		98	85 - 115		

QC Association Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Metals

Prep Batch: 355892

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	3005A	
480-117511-2	OC-SL-5	Total/NA	Water	3005A	
480-117511-3	OC-SL-3	Total/NA	Water	3005A	
480-117511-4	OC-SL-2	Total/NA	Water	3005A	
480-117511-5	OC-SL-1D	Total/NA	Water	3005A	
480-117511-6	DUP-SL-3	Total/NA	Water	3005A	
MB 480-355892/1-A	Method Blank	Total/NA	Water	3005A	
LCS 480-355892/2-A	Lab Control Sample	Total/NA	Water	3005A	
LCSD 480-355892/3-A	Lab Control Sample Dup	Total/NA	Water	3005A	
480-117511-3 MS	OC-SL-3MS	Total/NA	Water	3005A	
480-117511-3 MSD	OC-SL-3MSD	Total/NA	Water	3005A	

Analysis Batch: 356361

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	6010	355892
480-117511-2	OC-SL-5	Total/NA	Water	6010	355892
480-117511-3	OC-SL-3	Total/NA	Water	6010	355892
480-117511-4	OC-SL-2	Total/NA	Water	6010	355892
480-117511-5	OC-SL-1D	Total/NA	Water	6010	355892
480-117511-6	DUP-SL-3	Total/NA	Water	6010	355892
MB 480-355892/1-A	Method Blank	Total/NA	Water	6010	355892
LCS 480-355892/2-A	Lab Control Sample	Total/NA	Water	6010	355892
LCSD 480-355892/3-A	Lab Control Sample Dup	Total/NA	Water	6010	355892
480-117511-3 MS	OC-SL-3MS	Total/NA	Water	6010	355892
480-117511-3 MSD	OC-SL-3MSD	Total/NA	Water	6010	355892

Analysis Batch: 356570

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-355892/1-A	Method Blank	Total/NA	Water	6010	355892

General Chemistry

Analysis Batch: 355974

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	SM 2320B	
480-117511-2	OC-SL-5	Total/NA	Water	SM 2320B	
480-117511-4	OC-SL-2	Total/NA	Water	SM 2320B	
480-117511-5	OC-SL-1D	Total/NA	Water	SM 2320B	
480-117511-6	DUP-SL-3	Total/NA	Water	SM 2320B	
MB 480-355974/30	Method Blank	Total/NA	Water	SM 2320B	
MB 480-355974/7	Method Blank	Total/NA	Water	SM 2320B	
LCS 480-355974/31	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 480-355974/8	Lab Control Sample	Total/NA	Water	SM 2320B	

Analysis Batch: 356429

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-3	OC-SL-3	Total/NA	Water	SM 2320B	
MB 480-356429/30	Method Blank	Total/NA	Water	SM 2320B	
MB 480-356429/7	Method Blank	Total/NA	Water	SM 2320B	
LCS 480-356429/31	Lab Control Sample	Total/NA	Water	SM 2320B	

General Chemistry (Continued)

Analysis Batch: 356429 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-356429/8	Lab Control Sample	Total/NA	Water	SM 2320B	
480-117511-3 MS	OC-SL-3MS	Total/NA	Water	SM 2320B	
480-117511-3 MSD	OC-SL-3MSD	Total/NA	Water	SM 2320B	

Analysis Batch: 356577

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	SM 2540C	
480-117511-2	OC-SL-5	Total/NA	Water	SM 2540C	
480-117511-3	OC-SL-3	Total/NA	Water	SM 2540C	
480-117511-4	OC-SL-2	Total/NA	Water	SM 2540C	
480-117511-5	OC-SL-1D	Total/NA	Water	SM 2540C	
480-117511-6	DUP-SL-3	Total/NA	Water	SM 2540C	
MB 480-356577/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-356577/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 357644

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	300.0	
480-117511-2	OC-SL-5	Total/NA	Water	300.0	
480-117511-3	OC-SL-3	Total/NA	Water	300.0	
480-117511-4	OC-SL-2	Total/NA	Water	300.0	
480-117511-5	OC-SL-1D	Total/NA	Water	300.0	
480-117511-6	DUP-SL-3	Total/NA	Water	300.0	
MB 480-357644/4	Method Blank	Total/NA	Water	300.0	
LCS 480-357644/3	Lab Control Sample	Total/NA	Water	300.0	
480-117511-3 MS	OC-SL-3MS	Total/NA	Water	300.0	
480-117511-3 MSD	OC-SL-3MSD	Total/NA	Water	300.0	

Analysis Batch: 358065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-117511-1	OC-SL-6	Total/NA	Water	300.0	
480-117511-2	OC-SL-5	Total/NA	Water	300.0	
MB 480-358065/4	Method Blank	Total/NA	Water	300.0	
LCS 480-358065/3	Lab Control Sample	Total/NA	Water	300.0	
480-117511-2 MS	OC-SL-5	Total/NA	Water	300.0	

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-6 — Lab Sample ID: 480-117511-1

Date Collected: 05/03/17 08:35
Date Received: 05/05/17 01:30
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 13:57	LMH	TAL BUF
Total/NA	Analysis	300.0		10	357644	05/16/17 14:55	DMR	TAL BUF
Total/NA	Analysis	300.0		50	358065	05/18/17 17:06	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	355974	05/05/17 20:39	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Client Sample ID: OC-SL-5 — Lab Sample ID: 480-117511-2

Date Collected: 05/03/17 09:10
Date Received: 05/05/17 01:30
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 14:00	LMH	TAL BUF
Total/NA	Analysis	300.0		10	357644	05/16/17 15:03	DMR	TAL BUF
Total/NA	Analysis	300.0		50	358065	05/18/17 17:14	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	355974	05/05/17 20:45	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Client Sample ID: OC-SL-3 — Lab Sample ID: 480-117511-3

Date Collected: 05/03/17 09:50
Date Received: 05/05/17 01:30
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 14:04	LMH	TAL BUF
Total/NA	Analysis	300.0		5	357644	05/16/17 15:36	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	356429	05/08/17 22:24	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Client Sample ID: OC-SL-2 — Lab Sample ID: 480-117511-4

Date Collected: 05/03/17 11:10
Date Received: 05/05/17 01:30
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 14:32	LMH	TAL BUF
Total/NA	Analysis	300.0		1	357644	05/16/17 15:11	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	355974	05/05/17 20:49	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-117511-5
Date Collected: 05/03/17 11:50
Matrix: Water
Date Received: 05/05/17 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 14:36	LMH	TAL BUF
Total/NA	Analysis	300.0		2	357644	05/16/17 15:20	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	355974	05/05/17 20:55	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Client Sample ID: DUP-SL-3

Lab Sample ID: 480-117511-6
Date Collected: 05/03/17 09:50
Matrix: Water
Date Received: 05/05/17 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			355892	05/05/17 14:13	BMB	TAL BUF
Total/NA	Analysis	6010		1	356361	05/08/17 14:39	LMH	TAL BUF
Total/NA	Analysis	300.0		5	357644	05/16/17 15:28	DMR	TAL BUF
Total/NA	Analysis	SM 2320B		1	355974	05/05/17 21:41	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	356577	05/10/17 09:14	EKB	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Accreditation/Certification Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-17 *

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
6010	3005A	Water	Aluminum
6010	3005A	Water	Calcium
6010	3005A	Water	Chromium
6010	3005A	Water	Iron
6010	3005A	Water	Manganese
6010	3005A	Water	Nickel
6010	3005A	Water	Sodium

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Method	Method Description	Protocol	Laboratory
6010	Metals (ICP)	SW846	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2320B	Alkalinity	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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 BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Olin Corporation
Project/Site: Olin Calcium Sulfate Landfill

TestAmerica Job ID: 480-117511-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-117511-1	OC-SL-6	Water	05/03/17 08:35	05/05/17 01:30
480-117511-2	OC-SL-5	Water	05/03/17 09:10	05/05/17 01:30
480-117511-3	OC-SL-3	Water	05/03/17 09:50	05/05/17 01:30
480-117511-4	OC-SL-2	Water	05/03/17 11:10	05/05/17 01:30
480-117511-5	OC-SL-1D	Water	05/03/17 11:50	05/05/17 01:30
480-117511-6	DUP-SL-3	Water	05/03/17 09:50	05/05/17 01:30

Login Sample Receipt Checklist

Client: Olin Corporation

Job Number: 480-117511-1

Login Number: 117511
List Number: 1
Creator: Williams, Christopher S

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	OLIN
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

360325-Boston

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480-117511 COC

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier:	COC No: 480-96420-22984.1
Client Contact: Mr. Brian Guichard	Phone: 9:8658 6121	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

Analysis Reques

Preservation Codes:
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)
Other:

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	~~6040MGP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni~~	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	5-3-17	8:35	G	Water			1	1		1	1	4	
OC-SL-5		9:10		Water			1	1		1	1	4	
OC-SL-3		9:50		Water			1	1		1	1	4	
OC-SL-2		11:10		Water			1	1		1	1	4	
OC-SL-1D		11:50		Water			1	1		1	1	4	
DUP SL-3		9:50		Water			1	1		1	1	4	
SL-3 MS		9:50		Water			1	1		1	1	4	
SL-3 MSD		9:50		Water			1	1		1	1	4	
				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:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-4-17			5-4-17 1045	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-4-17 1800	TAB		5-5-17 0130	TAB
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: 2.2 #1

To: James Cashwell
From: Chris Ricardi
Date: June 5, 2018
Subject: Calcium Sulfate Landfill Semiannual Monitoring – December 2017

DATA VALIDATION REPORT
DECEMBER 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS
TestAmerica Laboratories Data Set 480-128388-1

1.0 INTRODUCTION

Groundwater samples were collected from the Olin Chemical Superfund Site on December 4, 2017. Samples were analyzed by TestAmerica Laboratories in Buffalo, New York. Data were reported in sample delivery group (SDG) 480-128388-1. A summary of samples included in this review is contained in Table 1. Samples reviewed in this report were analyzed for the following U.S. Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996), USEPA wastewater (USEPA, 1993), or Standard Methods (APHA, 2008):

- total metals (aluminum, calcium, chromium, iron, manganese, nickel, and sodium) by USEPA Method 6010
- general chemistry analyses for total, carbonate, and bicarbonate alkalinity by SM 2320, chloride and sulfate by USEPA Method E300, and total dissolved solids (TDS) by SM A2540C

The Draft Post Closure Plan (MACTEC, 2006), the Final Interim Response Steps Work Plan (IRSWP) [MACTEC, 2007], and the Massachusetts Department of Environmental Protection (MassDEP) Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) [MassDEP, 2010] were used as references during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington groundwater monitoring tasks. Final sample results are presented on data summaries in Table 2. A summary of qualified results is presented on Table 3.

2.0 METALS

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
  Blanks
* Matrix Spike Analysis

* Field Duplicate Results
* Laboratory Control Sample
  Detection limits

***** = indicates that criteria were met for this parameter

2.1 Validation Observations and Actions

Blanks

Manganese was found in the method blank (0.5 µg/L) associated with all samples. An action level was established at five times the blank concentration. Sample results were greater than the action level and data were not qualified. The lab qualifier B was removed.

Detection Limits

The reporting limit (RL) for aluminum (200 µg/L) is greater than the reporting limit of 100 µg/L specified in the Final Interim Response Steps Work Plan (IRSWP); however, the laboratory reports detections between the RL and the method detection limit (MDL) of 60 µg/L.

The RL for calcium (500 µg/L) is greater than the reporting limit of 400 µg/L specified in the IRSWP. Calcium was detected in all samples at concentrations greater than the RL.

3.0 GENERAL CHEMISTRY – Alkalinity, Chloride, Sulfate, and Total Dissolved Solids

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
  Matrix Spike Analysis
* Laboratory Duplicate Analysis
* Field Duplicate Analysis
* Laboratory Control Sample
  Detection limits

***** **=** indicates that criteria were met for this parameter

3.1 Validation Observations and Actions

Matrix Spikes

A matrix spike (MS) and matrix spike duplicate (MSD) analysis for alkalinity was performed on sample SL-3. The percent recoveries reported were compared to the laboratory control limits of 60-140. The percent recoveries in the MS (40) and MSD (37) were below the lower control limit.

Results for alkalinity were qualified estimated (J) in sample SL-3 and in the associated field duplicate sample DUP-SL-3. A reason code of MS-L was assigned to these results as presented in Table 3.

Detection Limits

The RL for carbonate and bicarbonate alkalinity (5 mg/L) is greater than the reporting limit of 1 mg/L specified in the IRSWP. Bicarbonate alkalinity was reported at concentrations greater than the RL in all samples. Detections of carbonate alkalinity would be reported between the RL and the MDL of 0.79 mg/L.

The RL for TDS (20 mg/L) in sample SL-6 is greater than the RL of 10 mg/L specified in the IRSWP. Positive detections for TDS were reported for all samples.

Chris Ricardi, NRCC-EAC Senior Chemist	6/5/18 Date
Michael Murphy Project Principal	6/19/18 Date

References:

American Public Health Association (APHA), 2008. "Standard Methods for Examination of Water and Wastewater"; On-line Publication; APHA, 1015 Fifteenth St., NW, Washington, D.C. 20005.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2006. “Draft Calcium Sulfate Landfill Post Closure Monitoring Plan”; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; December, 2006.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2007. “Final Interim Response Steps Work Plan”; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; August 8, 2007.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2008. “Final Interim Response Steps Work Plan”; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 8, 2008.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. “Final Remedial Investigation/Feasibility Study Project Operations Plan”; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.

Massachusetts Department of Environmental Protection (MassDEP), 2010. “The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)”; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.

U.S. Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)”, EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).

USEPA, 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 -December 1996.

TABLE 1
SAMPLE SUMMARY
DATA VALIDATION REPORT
DECEMBER 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

					Lab ID	TALBFLO			
					Method Class	Metals	Inorganics & Wet Chem		
					Analysis Method	SW6010	A2320	A2540C	E300
					Fraction	T	T	T	T
Lab SDG	**Media**	**Location**	**Field Sample ID**	**Field Sample Date**	**QC Code**				
480-128388-1	GW	SL-1D	SL-1D	12/4/2017	FS	7	3	1	2
480-128388-1	GW	SL-3	SL-3	12/4/2017	FS	7	3	1	2
480-128388-1	GW	SL-3	SL-3 DUP	12/4/2017	FD	7	3	1	2
480-128388-1	GW	SL-6	SL-6	12/4/2017	FS	7	3	1	2

Notes:
FS = Field Sample
FD = Field Duplicate
GW = Groundwater

Created by: KMS 5/18/18
Checked by: JPP 5/25/18

TABLE 2
FINAL RESULTS SUMMARY
DATA VALIDATION REPORT
DECEMBER 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

				SL-1D		SL-3		SL-3		SL-6	
				480-128388-1		480-128388-1		480-128388-1		480-128388-1	
				12/4/2017		12/4/2017		12/4/2017		12/4/2017	
				SL-1D		SL-3		SL-3 DUP		SL-6	
				FS		FS		FD		FS	
				Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010	T	Aluminum	ug/l	84	J	200	U	200	U	69	J
SW6010	T	Calcium	ug/l	25,000		260,000		250,000		410,000	
SW6010	T	Chromium	ug/l	1.6	J	5	U	5	U	5	U
SW6010	T	Iron	ug/l	64		56000		55000		150	
SW6010	T	Manganese	ug/l	16		5800		5700		3300	
SW6010	T	Nickel	ug/l	10	U	10	U	10	U	10	U
SW6010	T	Sodium	ug/l	57,000		9,400		8,900		12,000	
A2320	T	Bicarbonate Alkalinity, as CaCO3	mg/l	32		330	J	320	J	150	
A2320	T	Carbonate Alkalinity, as CaCO3	mg/l	5	U	5	UJ	5	UJ	5	U
A2320	T	Total Alkalinity, as CaCO3	mg/l	32		330	J	320	J	150	
A2540C	T	Total Dissolved Solids	mg/l	270		950		970		1500	
E300	T	Chloride	mg/l	98		7.5		7.6		6.3	
E300	T	Sulfate	mg/l	33		420		420		820	

Notes:
FS = Field Sample
FD = Field Duplicate
U = Not detected, value is the reporting limit
J = Value is estimated
ug/l = micrograms per liter
mg/l = milligrams per liter
T = total

Created by: KMS 5/18/18
Checked by: JPP 5/25/18

TABLE 3
DATA VALIDATION ACTION SUMMARY
DATA VALIDATION REPORT
DECEMBER 2017 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

□□□□□□	□□□□□□□□ □□□□□□	□□□□□□□□□□□□	□□□□□□□□□□□□	**Parameter**	**Lab Result**	**Lab Qualifier**	**Final Result**	**Final Qualifier**	**Val Reason Code**	**Units**	**Lab ID**
480-128388-1	A2320	480-128388-2	SL-3	Bicarbonate Alkalinity, as CaCO3	330		330	J	MS-L	mg/l	TALBFLO
480-128388-1	A2320	480-128388-2	SL-3	Carbonate Alkalinity, as CaCO3	5	U	5	UJ	MS-L	mg/l	TALBFLO
480-128388-1	A2320	480-128388-2	SL-3	Total Alkalinity, as CaCO3	330	F1	330	J	MS-L	mg/l	TALBFLO
480-128388-1	A2320	480-128388-4	SL-3 DUP	Bicarbonate Alkalinity, as CaCO3	320		320	J	MS-L	mg/l	TALBFLO
480-128388-1	A2320	480-128388-4	SL-3 DUP	Carbonate Alkalinity, as CaCO3	5	U	5	UJ	MS-L	mg/l	TALBFLO
480-128388-1	A2320	480-128388-4	SL-3 DUP	Total Alkalinity, as CaCO3	320		320	J	MS-L	mg/l	TALBFLO

Units:
mg/l = milligrams per liter

Validation Qualifiers:
J = Value is estimated
U = Not detected, value is the reporting limit

Validation Reason Codes:
MS-L = MS and/or MSD Recovery low

Created by: KMS 5/18/18
Checked by: JPP 5/25/18

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-128388-1
Client Project/Site: Olin Wilmington MA Calcium Sulfate LF

For:
Olin Corporation
PO BOX 248
Charleston, Tennessee 37310-0248

Attn: Mr. James Cashwell

Authorized for release by:
12/18/2017 4:16:40 PM
Denise Giglia, Project Management Assistant II
denise.giglia@testamericainc.com

Designee for

Becky Mason, Project Manager II
(413)572-4000
becky.mason@testamericainc.com

LINKS

Review your project results through TotalAccess

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

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.

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Definitions/Glossary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

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.
B	Compound was found in the blank and sample.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery is outside acceptance limits.
E	Result exceeded calibration range.

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)

Case Narrative

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Job ID: 480-128388-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-128388-1

Receipt
The samples were received on 12/5/2017 1:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0º C.

HPLC/IC
Method 300.0: The following samples was diluted to bring the concentration of target analytes within the calibration range: SL-6 (480-128388-1), SL-3 (480-128388-2) and SL-3 DUP (480-128388-4). Elevated reporting limits (RLs) are provided.

Method 300.0: The following sample was diluted to bring the concentration of target analytes within the calibration range: SL-6 (480-128388-1). 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 6010: At the request of the client, an abbreviated/modified MCP compound list was reported for this job.

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

General Chemistry
Method SM 2540C: Due to the matrix, the initial volume(s) used for the following sample deviated from the standard procedure: SL-6 (480-128388-1). The reporting limits (RLs) have been adjusted proportionately.

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

MassDEP Analytical Protocol Certification Form

Laboratory Name: **TestAmerica Buffalo** Project #: **480-128388**

Project Location: **Olin Wilmington MA Calcium Sulfate** RTN:

This form provides certifications for the following data set: list Laboratory Sample ID Number(s):

480-128388[1-4]

Matrices: ■ Groundwater/Surface Water ☐ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocols (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	Mass DEP VPH CAM IV A ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	Mass DEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	Mass DEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ■	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐	

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding time.	■ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	■ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	■ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	■ Yes ☐ No
E	a. VPH, EPH and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	■ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	■ Yes ☐ No[1]

Data User Note: ***Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WCS-07-350***

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	■ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s) ?	☐ Yes ■ No[1]

[1] All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: Position: Project Manager Assistant II

Printed Name: Denise L. Giglia Date: 12/18/17 16:11

Detection Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Client Sample ID: SL-6 — Lab Sample ID: 480-128388-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	69	J	200	60	ug/L	1		6010	Total/NA
Calcium	410000		500	100	ug/L	1		6010	Total/NA
Manganese	3300	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	12000		1000	320	ug/L	1		6010	Total/NA
Iron	150		50	19	ug/L	1		6010	Total/NA
Chloride	6.3		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	820		40	7.0	mg/L	20		300.0	Total/NA
Alkalinity, Total	150		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	150		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1500		20	8.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: SL-3 — Lab Sample ID: 480-128388-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	260000		500	100	ug/L	1		6010	Total/NA
Manganese	5800	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	9400		1000	320	ug/L	1		6010	Total/NA
Iron	56000		50	19	ug/L	1		6010	Total/NA
Chloride	7.5		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	420		10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	330	F1	5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	330		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	950		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: SL-1D — Lab Sample ID: 480-128388-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chromium	1.6	J	5.0	1.0	ug/L	1		6010	Total/NA
Aluminum	84	J	200	60	ug/L	1		6010	Total/NA
Calcium	25000		500	100	ug/L	1		6010	Total/NA
Manganese	16	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	57000		1000	320	ug/L	1		6010	Total/NA
Iron	64		50	19	ug/L	1		6010	Total/NA
Chloride	98		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	33		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	32		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	32		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	270		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: SL-3 DUP — Lab Sample ID: 480-128388-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	250000		500	100	ug/L	1		6010	Total/NA
Manganese	5700	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	8900		1000	320	ug/L	1		6010	Total/NA
Iron	55000		50	19	ug/L	1		6010	Total/NA
Chloride	7.6		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	420		10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	320		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	320		5.0	0.79	mg/L	1		SM 2320B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Client Sample ID: SL-3 DUP (Continued)

Lab Sample ID: 480-128388-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	970		10	4.0	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Client Sample ID: SL-6

Lab Sample ID: 480-128388-1
Date Collected: 12/04/17 08:50
Matrix: Water
Date Received: 12/05/17 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/05/17 09:03	12/08/17 23:36	1
Nickel	ND		10	1.3	ug/L		12/05/17 09:03	12/08/17 23:36	1
Aluminum	**69**	**J**	200	60	ug/L		12/05/17 09:03	12/08/17 23:36	1
Calcium	**410000**		500	100	ug/L		12/05/17 09:03	12/08/17 23:36	1
Manganese	**3300**	**B**	3.0	0.40	ug/L		12/05/17 09:03	12/08/17 23:36	1
Sodium	**12000**		1000	320	ug/L		12/05/17 09:03	12/08/17 23:36	1
Iron	**150**		50	19	ug/L		12/05/17 09:03	12/08/17 23:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**6.3**		2.5	1.4	mg/L			12/07/17 22:19	5
Sulfate	**820**		40	7.0	mg/L			12/08/17 15:06	20
Alkalinity, Total	**150**		5.0	0.79	mg/L			12/06/17 20:04	1
Alkalinity, Bicarbonate	**150**		5.0	0.79	mg/L			12/06/17 20:04	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 20:04	1
Total Dissolved Solids	**1500**		20	8.0	mg/L			12/05/17 19:32	1

Client Sample ID: SL-3

Lab Sample ID: 480-128388-2
Date Collected: 12/04/17 09:45
Matrix: Water
Date Received: 12/05/17 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/05/17 09:03	12/08/17 23:39	1
Nickel	ND		10	1.3	ug/L		12/05/17 09:03	12/08/17 23:39	1
Aluminum	ND		200	60	ug/L		12/05/17 09:03	12/08/17 23:39	1
Calcium	**260000**		500	100	ug/L		12/05/17 09:03	12/08/17 23:39	1
Manganese	**5800**	**B**	3.0	0.40	ug/L		12/05/17 09:03	12/08/17 23:39	1
Sodium	**9400**		1000	320	ug/L		12/05/17 09:03	12/08/17 23:39	1
Iron	**56000**		50	19	ug/L		12/05/17 09:03	12/08/17 23:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**7.5**		2.5	1.4	mg/L			12/07/17 20:22	5
Sulfate	**420**		10	1.7	mg/L			12/07/17 20:22	5
Alkalinity, Total	**330**	**F1**	5.0	0.79	mg/L			12/06/17 20:10	1
Alkalinity, Bicarbonate	**330**		5.0	0.79	mg/L			12/06/17 20:10	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 20:10	1
Total Dissolved Solids	**950**		10	4.0	mg/L			12/05/17 19:32	1

Client Sample ID: SL-1D

Lab Sample ID: 480-128388-3
Date Collected: 12/04/17 10:55
Matrix: Water
Date Received: 12/05/17 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	**1.6**	**J**	5.0	1.0	ug/L		12/05/17 09:03	12/08/17 23:57	1
Nickel	ND		10	1.3	ug/L		12/05/17 09:03	12/08/17 23:57	1
Aluminum	**84**	**J**	200	60	ug/L		12/05/17 09:03	12/08/17 23:57	1
Calcium	**25000**		500	100	ug/L		12/05/17 09:03	12/08/17 23:57	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Client Sample ID: SL-1D

Lab Sample ID: 480-128388-3
Date Collected: 12/04/17 10:55
Matrix: Water
Date Received: 12/05/17 01:00

Method: 6010 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	16	B	3.0	0.40	ug/L		12/05/17 09:03	12/08/17 23:57	1
Sodium	57000		1000	320	ug/L		12/05/17 09:03	12/08/17 23:57	1
Iron	64		50	19	ug/L		12/05/17 09:03	12/08/17 23:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	98		0.50	0.28	mg/L			12/07/17 22:34	1
Sulfate	33		2.0	0.35	mg/L			12/07/17 22:34	1
Alkalinity, Total	32		5.0	0.79	mg/L			12/06/17 20:28	1
Alkalinity, Bicarbonate	32		5.0	0.79	mg/L			12/06/17 20:28	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 20:28	1
Total Dissolved Solids	270		10	4.0	mg/L			12/05/17 19:32	1

Client Sample ID: SL-3 DUP

Lab Sample ID: 480-128388-4
Date Collected: 12/04/17 09:45
Matrix: Water
Date Received: 12/05/17 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/05/17 09:03	12/09/17 00:11	1
Nickel	ND		10	1.3	ug/L		12/05/17 09:03	12/09/17 00:11	1
Aluminum	ND		200	60	ug/L		12/05/17 09:03	12/09/17 00:11	1
Calcium	250000		500	100	ug/L		12/05/17 09:03	12/09/17 00:11	1
Manganese	5700	B	3.0	0.40	ug/L		12/05/17 09:03	12/09/17 00:11	1
Sodium	8900		1000	320	ug/L		12/05/17 09:03	12/09/17 00:11	1
Iron	55000		50	19	ug/L		12/05/17 09:03	12/09/17 00:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7.6		2.5	1.4	mg/L			12/07/17 22:48	5
Sulfate	420		10	1.7	mg/L			12/07/17 22:48	5
Alkalinity, Total	320		5.0	0.79	mg/L			12/06/17 20:34	1
Alkalinity, Bicarbonate	320		5.0	0.79	mg/L			12/06/17 20:34	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 20:34	1
Total Dissolved Solids	970		10	4.0	mg/L			12/05/17 19:32	1

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Method: 6010 - Metals (ICP)

Lab Sample ID: MB 480-390435/1-A
Matrix: Water
Analysis Batch: 391376

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 390435

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/05/17 09:03	12/08/17 23:15	1
Nickel	ND		10	1.3	ug/L		12/05/17 09:03	12/08/17 23:15	1
Aluminum	ND		200	60	ug/L		12/05/17 09:03	12/08/17 23:15	1
Calcium	ND		500	100	ug/L		12/05/17 09:03	12/08/17 23:15	1
Manganese	0.500	J	3.0	0.40	ug/L		12/05/17 09:03	12/08/17 23:15	1
Sodium	ND		1000	320	ug/L		12/05/17 09:03	12/08/17 23:15	1
Iron	ND		50	19	ug/L		12/05/17 09:03	12/08/17 23:15	1

Lab Sample ID: LCS 480-390435/2-A
Matrix: Water
Analysis Batch: 391376

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 390435

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	200	207		ug/L		103	80 - 120
Nickel	200	207		ug/L		104	80 - 120
Aluminum	10000	10100		ug/L		101	80 - 120
Calcium	10000	10100		ug/L		101	80 - 120
Manganese	200	218		ug/L		109	80 - 120
Sodium	10000	9780		ug/L		98	80 - 120
Iron	10000	10200		ug/L		102	80 - 120

Lab Sample ID: LCSD 480-390435/3-A
Matrix: Water
Analysis Batch: 391376

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 390435

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	200	202		ug/L		101	80 - 120	2	20
Nickel	200	208		ug/L		104	80 - 120	0	20
Aluminum	10000	9960		ug/L		100	80 - 120	1	20
Calcium	10000	9920		ug/L		99	80 - 120	2	20
Manganese	200	215		ug/L		108	80 - 120	1	20
Sodium	10000	9690		ug/L		97	80 - 120	1	20
Iron	10000	10100		ug/L		101	80 - 120	2	20

Lab Sample ID: 480-128388-2 MS
Matrix: Water
Analysis Batch: 391376

Client Sample ID: SL-3 MS
Prep Type: Total/NA
Prep Batch: 390435

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		200	207		ug/L		103	75 - 125
Nickel	ND		200	216		ug/L		108	75 - 125
Aluminum	ND		10000	10600		ug/L		106	75 - 125
Calcium	260000		10000	280000	4	ug/L		177	75 - 125
Manganese	5800	B	200	6210	4	ug/L		188	75 - 125
Sodium	9400		10000	20200		ug/L		108	75 - 125
Iron	56000		10000	68800	4	ug/L		126	75 - 125

Method: 6010 - Metals (ICP) (Continued)

Lab Sample ID: 480-128388-2 MSD — **Client Sample ID: SL-3 MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 391376 — **Prep Batch: 390435**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		200	203		ug/L		101	75 - 125	2	20
Nickel	ND		200	213		ug/L		107	75 - 125	1	20
Aluminum	ND		10000	10500		ug/L		105	75 - 125	1	20
Calcium	260000		10000	267000	4	ug/L		46	75 - 125	5	20
Manganese	5800	B	200	5860	4	ug/L		16	75 - 125	6	20
Sodium	9400		10000	19700		ug/L		103	75 - 125	2	20
Iron	56000		10000	64700	4	ug/L		86	75 - 125	6	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-390955/28 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390955

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			12/07/17 18:55	1
Sulfate	ND		2.0	0.35	mg/L			12/07/17 18:55	1

Lab Sample ID: LCS 480-390955/27 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390955

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	51.0		mg/L		102	90 - 110
Sulfate	50.0	52.0		mg/L		104	90 - 110

Lab Sample ID: 480-128388-2 MS — **Client Sample ID: SL-3 MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390955

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.5		250	259		mg/L		101	81 - 120
Sulfate	420		250	649	E	mg/L		92	80 - 120

Lab Sample ID: 480-128388-2 MSD — **Client Sample ID: SL-3 MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390955

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	7.5		250	261		mg/L		101	81 - 120	1	20
Sulfate	420		250	647	E	mg/L		91	80 - 120	0	20

Lab Sample ID: 480-128388-4 MS — **Client Sample ID: SL-3 DUP**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390955

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	7.6		250	260		mg/L		101	81 - 120
Sulfate	420		250	651	E	mg/L		91	80 - 120

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Lab Sample ID: MB 480-391142/28 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 391142

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			12/08/17 14:58	1
Sulfate	ND		2.0	0.35	mg/L			12/08/17 14:58	1

Lab Sample ID: LCS 480-391142/27 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 391142

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	48.4		mg/L		97	90 - 110
Sulfate	50.0	46.2		mg/L		92	90 - 110

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 480-390882/30 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390882

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			12/06/17 18:26	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			12/06/17 18:26	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 18:26	1

Lab Sample ID: MB 480-390882/54 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390882

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			12/06/17 20:57	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			12/06/17 20:57	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/06/17 20:57	1

Lab Sample ID: LCS 480-390882/31 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390882

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	97.3		mg/L		97	90 - 110

Lab Sample ID: LCS 480-390882/55 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390882

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	97.8		mg/L		98	90 - 110

Lab Sample ID: 480-128388-2 MS — **Client Sample ID: SL-3 MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 390882

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	330	F1	100	367	F1	mg/L		40	60 - 140

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: 480-128388-2 MSD
Matrix: Water
Analysis Batch: 390882

Client Sample ID: SL-3 MSD
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity, Total	330	F1	100	365	F1	mg/L		37	60 - 140	1	20

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

Lab Sample ID: MB 480-390623/1
Matrix: Water
Analysis Batch: 390623

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	ND		10	4.0	mg/L			12/05/17 19:32	1

Lab Sample ID: LCS 480-390623/2
Matrix: Water
Analysis Batch: 390623

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			514	479		mg/L		93	85 - 115		

QC Association Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Metals

Prep Batch: 390435

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	3005A	
480-128388-2	SL-3	Total/NA	Water	3005A	
480-128388-3	SL-1D	Total/NA	Water	3005A	
480-128388-4	SL-3 DUP	Total/NA	Water	3005A	
MB 480-390435/1-A	Method Blank	Total/NA	Water	3005A	
LCS 480-390435/2-A	Lab Control Sample	Total/NA	Water	3005A	
LCSD 480-390435/3-A	Lab Control Sample Dup	Total/NA	Water	3005A	
480-128388-2 MS	SL-3 MS	Total/NA	Water	3005A	
480-128388-2 MSD	SL-3 MSD	Total/NA	Water	3005A	

Analysis Batch: 391376

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	6010	390435
480-128388-2	SL-3	Total/NA	Water	6010	390435
480-128388-3	SL-1D	Total/NA	Water	6010	390435
480-128388-4	SL-3 DUP	Total/NA	Water	6010	390435
MB 480-390435/1-A	Method Blank	Total/NA	Water	6010	390435
LCS 480-390435/2-A	Lab Control Sample	Total/NA	Water	6010	390435
LCSD 480-390435/3-A	Lab Control Sample Dup	Total/NA	Water	6010	390435
480-128388-2 MS	SL-3 MS	Total/NA	Water	6010	390435
480-128388-2 MSD	SL-3 MSD	Total/NA	Water	6010	390435

General Chemistry

Analysis Batch: 390623

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	SM 2540C	
480-128388-2	SL-3	Total/NA	Water	SM 2540C	
480-128388-3	SL-1D	Total/NA	Water	SM 2540C	
480-128388-4	SL-3 DUP	Total/NA	Water	SM 2540C	
MB 480-390623/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-390623/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 390882

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	SM 2320B	
480-128388-2	SL-3	Total/NA	Water	SM 2320B	
480-128388-3	SL-1D	Total/NA	Water	SM 2320B	
480-128388-4	SL-3 DUP	Total/NA	Water	SM 2320B	
MB 480-390882/30	Method Blank	Total/NA	Water	SM 2320B	
MB 480-390882/54	Method Blank	Total/NA	Water	SM 2320B	
LCS 480-390882/31	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 480-390882/55	Lab Control Sample	Total/NA	Water	SM 2320B	
480-128388-2 MS	SL-3 MS	Total/NA	Water	SM 2320B	
480-128388-2 MSD	SL-3 MSD	Total/NA	Water	SM 2320B	

Analysis Batch: 390955

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	300.0	
480-128388-2	SL-3	Total/NA	Water	300.0	

QC Association Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

General Chemistry (Continued)

Analysis Batch: 390955 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-3	SL-1D	Total/NA	Water	300.0	
480-128388-4	SL-3 DUP	Total/NA	Water	300.0	
MB 480-390955/28	Method Blank	Total/NA	Water	300.0	
LCS 480-390955/27	Lab Control Sample	Total/NA	Water	300.0	
480-128388-2 MS	SL-3 MS	Total/NA	Water	300.0	
480-128388-2 MSD	SL-3 MSD	Total/NA	Water	300.0	
480-128388-4 MS	SL-3 DUP	Total/NA	Water	300.0	

Analysis Batch: 391142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-128388-1	SL-6	Total/NA	Water	300.0	
MB 480-391142/28	Method Blank	Total/NA	Water	300.0	
LCS 480-391142/27	Lab Control Sample	Total/NA	Water	300.0	

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Client Sample ID: SL-6
Date Collected: 12/04/17 08:50
Date Received: 12/05/17 01:00

Lab Sample ID: 480-128388-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			390435	12/05/17 09:03	EMB	TAL BUF
Total/NA	Analysis	6010		1	391376	12/08/17 23:36	LMH	TAL BUF
Total/NA	Analysis	300.0		5	390955	12/07/17 22:19	RJS	TAL BUF
Total/NA	Analysis	300.0		20	391142	12/08/17 15:06	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	390882	12/06/17 20:04	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	390623	12/05/17 19:32	CDC	TAL BUF

Client Sample ID: SL-3
Date Collected: 12/04/17 09:45
Date Received: 12/05/17 01:00

Lab Sample ID: 480-128388-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			390435	12/05/17 09:03	EMB	TAL BUF
Total/NA	Analysis	6010		1	391376	12/08/17 23:39	LMH	TAL BUF
Total/NA	Analysis	300.0		5	390955	12/07/17 20:22	RJS	TAL BUF
Total/NA	Analysis	SM 2320B		1	390882	12/06/17 20:10	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	390623	12/05/17 19:32	CDC	TAL BUF

Client Sample ID: SL-1D
Date Collected: 12/04/17 10:55
Date Received: 12/05/17 01:00

Lab Sample ID: 480-128388-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			390435	12/05/17 09:03	EMB	TAL BUF
Total/NA	Analysis	6010		1	391376	12/08/17 23:57	LMH	TAL BUF
Total/NA	Analysis	300.0		1	390955	12/07/17 22:34	RJS	TAL BUF
Total/NA	Analysis	SM 2320B		1	390882	12/06/17 20:28	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	390623	12/05/17 19:32	CDC	TAL BUF

Client Sample ID: SL-3 DUP
Date Collected: 12/04/17 09:45
Date Received: 12/05/17 01:00

Lab Sample ID: 480-128388-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			390435	12/05/17 09:03	EMB	TAL BUF
Total/NA	Analysis	6010		1	391376	12/09/17 00:11	LMH	TAL BUF
Total/NA	Analysis	300.0		5	390955	12/07/17 22:48	RJS	TAL BUF
Total/NA	Analysis	SM 2320B		1	390882	12/06/17 20:34	ALZ	TAL BUF
Total/NA	Analysis	SM 2540C		1	390623	12/05/17 19:32	CDC	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Accreditation/Certification Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-18

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
6010	3005A	Water	Aluminum
6010	3005A	Water	Calcium
6010	3005A	Water	Chromium
6010	3005A	Water	Iron
6010	3005A	Water	Manganese
6010	3005A	Water	Nickel
6010	3005A	Water	Sodium

Method Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Method	Method Description	Protocol	Laboratory
6010	Metals (ICP)	SW846	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2320B	Alkalinity	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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 BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Olin Corporation
Project/Site: Olin Wilmington MA Calcium Sulfate LF

TestAmerica Job ID: 480-128388-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-128388-1	SL-6	Water	12/04/17 08:50	12/05/17 01:00
480-128388-2	SL-3	Water	12/04/17 09:45	12/05/17 01:00
480-128388-3	SL-1D	Water	12/04/17 10:55	12/05/17 01:00
480-128388-4	SL-3 DUP	Water	12/04/17 09:45	12/05/17 01:00

Login Sample Receipt Checklist

Client: Olin Corporation

Job Number: 480-128388-1

Login Number: 128388
List Number: 1
Creator: Williams, Christopher S

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	OLIN
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier Tracking No(s):	COC No: 480-103922-13090.1
Client Contact: Mr. Brian Guichard	Phone: 9786586181	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: calcium sulfate landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

Analysis Requested

480-128388 COC

Preservation Codes:

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)

Other:

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)	6010MCP - metals Cr/Ni/Al/Ca/Mn/Na/Fe	2540C_Calcd - Total Dissolved Solids	2320B, 300.0_28D	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	N	N		
SL-6	12-4-17	8:50	G	Water			1	1	1	3	
SL-3		9:45	G	Water			1	1	1	3	
SL-1D		10:55	G	Water			1	1	1	3	
SL-3 MS		9:45	G	Water			1	1	1	3	
SL-3 MSD		9:45	G	Water			1	1	1	3	
SL-3 DUP		9:45	G	Water			1	1	1	3	
				Water							
				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:	Date/Time:	Company	Received by:	Date/Time:	Company
				12-4-17 1280	TA
	12-4-17 1800			12-5-17 0100	TA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 2.0 #1

Ver: 08/04/2016

To: Chinny Esakkiperumal
From: Chris Ricardi
Date: December 14, 2018
Subject: Calcium Sulfate Landfill Semiannual Monitoring – May 2018

DATA VALIDATION REPORT
MAY 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

TestAmerica Laboratories Data Set 480-135564-1

1.0 INTRODUCTION

Groundwater samples were collected from the Olin Chemical Superfund Site on May 7, 2018. Samples were analyzed by TestAmerica Laboratories in Buffalo, New York. Data were reported in sample delivery group (SDG) 480-135564-1. A summary of samples included in this review is contained in Table 1. Samples reviewed in this report were analyzed for the following U.S. Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996), USEPA wastewater (USEPA, 1993), or Standard Methods (APHA, 1995):

- total metals (aluminum, calcium, chromium, iron, manganese, nickel, and sodium) by USEPA Method 6010B
- general chemistry analyses for total, carbonate, and bicarbonate alkalinity by SM 2320B, chloride and sulfate by USEPA Method E300, and total dissolved solids (TDS) by SM A2540C

The Draft Post Closure Plan (MACTEC, 2006) and the Massachusetts Department of Environmental Protection (MassDEP) Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) [MassDEP, 2010] were used as references during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington groundwater monitoring tasks. Final sample results are presented on data summaries in Table 2.

2.0 METALS

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
  Blanks
* Matrix Spike Analysis

* Field Duplicate Results
* Laboratory Control Sample
  Detection limits

***** = indicates that criteria were met for this parameter

2.1 Validation Observations and Actions

Blanks

A manganese detection was reported in the method blank associated with all samples. An action level was calculated at five times the blank concentration and compared to sample detections. Sample OC-SL-2 was qualified non-detect (U) and assigned reason code BL1.

Detection Limits

The reporting limit (RL) for aluminum (200 µg/L) is greater than the reporting limit of 100 µg/L specified in the Final Interim Response Steps Work Plan (IRSWP); however, the laboratory reports detections between the RL and the method detection limit (MDL) of 60 µg/L.

The RL for calcium (500 µg/L) is greater than the reporting limit of 400 µg/L specified in the IRSWP. Calcium was detected in all samples at concentration greater than the RL.

3.0 GENERAL CHEMISTRY – Carbonate and Bicarbonate Alkalinity, Chloride, Sulfate, and Total Dissolved Solids

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
* Matrix Spike Analysis
* Laboratory Duplicate Analysis
* Field Duplicate Analysis
* Laboratory Control Sample
  Detection limits

***** **=** indicates that criteria were met for this parameter

3.1 Validation Observations and Actions

Sample Preservation

The laboratory narrative states that each sample container submitted for alkalinity analysis was received with headspace. There is no requirement for zero headspace for sample collection in the alkalinity method. Alkalinity results are reported as presented by the laboratory.

Detection Limits

The RL for carbonate and bicarbonate alkalinity (5 mg/L) is greater than the reporting limit of 1 mg/L specified in the IRSWP. Bicarbonate alkalinity was reported at concentrations greater than the RL in all samples. Detections of carbonate alkalinity would be reported between the RL and the MDL of 0.79 mg/L.

The results are interpreted to be usable as reported by TestAmerica.

Chris Ricardi, NRCC-EAC Senior Chemist	12/14/18 Date
Michael Murphy Project Principal	12/19/18 Date

References:

American Public Health Association (APHA), 1995. "Standard Methods for Examination of Water and Wastewater"; 19th Edition; APHA, 1015 Fifteenth St., NW. Washington, D.C. 20005.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2006. “Draft Calcium Sulfate Landfill Post Closure Monitoring Plan”; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; December, 2006.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2008. “Final Interim Response Steps Work Plan”; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 8, 2008.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.

Massachusetts Department of Environmental Protection (MassDEP), 2010. "The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)"; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.

U.S. Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)", EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).

USEPA, 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 -December 1996.

TABLE 1
SAMPLE SUMMARY
DATA VALIDATION REPORT
MAY 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

					Method Class	Metals	Inorganics & Wet Chem		
					Analysis Method	SW6010	A2320	A2540C	E300
					Fraction	Total	Total	Total	Total
Lab SDG	**Media**	**Location**	**Field Sample ID**	**Field Sample Date**	**QC Code**	Count	Count	Count	Count
480-135564-1	SL-1D	OC-SL-1D	GW	5/7/2018	FS	7	3	1	2
480-135564-1	SL-2	OC-SL-2	GW	5/7/2018	FS	7	3	1	2
480-135564-1	SL-3	DUP SL-3	GW	5/7/2018	FD	7	3	1	2
480-135564-1	SL-3	OC-SL-3	GW	5/7/2018	FS	7	3	1	2
480-135564-1	SL-5	OC-SL-5	GW	5/7/2018	FS	7	3	1	2
480-135564-1	SL-6	OC-SL-6	GW	5/7/2018	FS	7	3	1	2

Notes:
FS = Field Sample
FD = Field Duplicate
GW = Groundwater

Created by: KMS 12/11/18
Checked by: JPP 12/12/18

TABLE 2
FINAL RESULTS SUMMARY
DATA VALIDATION REPORT
MAY 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

			Location	SL-1D		SL-2		SL-3		SL-3		SL-5		SL-6	
			Lab SDG	480-135564-1		480-135564-1		480-135564-1		480-135564-1		480-135564-1		480-135564-1	
			Sample Date	5/7/2018		5/7/2018		5/7/2018		5/7/2018		5/7/2018		5/7/2018	
			Sample ID	OC-SL-1D		OC-SL-2		DUP SL-3		OC-SL-3		OC-SL-5		OC-SL-6	
			QC Code	FS		FS		FD		FS		FS		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010	T	Aluminum	ug/l	300		180	J	83	J	95	J	120	J	200	U
SW6010	T	Calcium	ug/l	33,000		18,000		130,000		130,000		490,000		530,000	
SW6010	T	Chromium	ug/l	5	U	5	U	5	U	5	U	7.9		5	U
SW6010	T	Iron	ug/l	290		800		28,000		28000		300		30	J
SW6010	T	Manganese	ug/l	19		3	U	3,100		3100		140		100	
SW6010	T	Nickel	ug/l	10	U	10	U	10	U	10	U	4.3	J	10	U
SW6010	T	Sodium	ug/l	57,000		2,300		6,100		6,300		6,400		7,500	
A2320	T	Bicarbonate Alkalinity, as CaCO3	mg/l	38		14		240		240		98		210	
A2320	T	Carbonate Alkalinity, as CaCO3	mg/l	5	U	5	U	5	U	5	U	5	U	5	U
A2320	T	Total Alkalinity, as CaCO3	mg/l	38		14		240		240		98		210	
A2540C	T	Total Dissolved Solids	mg/l	280		58		470		460		1700		1900	
E300	T	Chloride	mg/l	97		2.8		4.9		4.4		3.3		3.3	
E300	T	Sulfate	mg/l	47		32		160		150		1200		1200	

Notes:
FS = Field Sample
FD = Field Duplicate
U = Not detected, value is the reporting limit
J = Value is estimated
mg/L = milligrams per liter
ug/L = micrograms per liter
T = total

Created by: KMS 12/12/18
Checked by: JPP 12/12/18

TABLE 3
DATA VALIDATION ACTION SUMMARY
DATA VALIDATION REPORT
MAY 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

Lab Sample Delivery Group	Analysis Method	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units	Lab ID
480-135564-1	SW6010	480-135564-4	OC-SL-2	Manganese	1.5	J B	3	U	BL1	ug/l	TALBFLO

Units:
mg/l = milligrams per liter
ug/l = micrograms per liter

Validation Qualifiers:
U = Not detected, value is the reporting limit
J = Value is estimated

Validation Reason Codes:
BL1 = method blank qualifier

Created by: KMS 12/12/18
Checked by: JPP 12/12/18

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-135564-1
Client Project/Site: Olin Chemical Calcium Sulfate Landfill

For:
Olin Corporation
PO BOX 248
Charleston, Tennessee 37310-0248

Attn: Mr. James Cashwell

Authorized for release by:
5/29/2018 9:32:56 AM

Becky Mason, Project Manager II
(413)572-4000
becky.mason@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

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.

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Definitions/Glossary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

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.
B	Compound was found in the blank and sample.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

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)

Job ID: 480-135564-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-135564-1

Receipt
The samples were received on 5/9/2018 1:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.3º C.

HPLC/IC
Method 300.0: The following samples were diluted to bring the concentration of target analytes within the calibration range: OC-SL-6 (480-135564-1), OC-SL-5 (480-135564-2), OC-SL-3 (480-135564-3), OC-SL-1D (480-135564-5) and DUP SL-3 (480-135564-6). 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 6010: At the request of the client, an abbreviated MCP analyte list was reported for this job.

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

General Chemistry
Method SM 2320B: The following samples were received with headspace in the sample container. OC-SL-6 (480-135564-1), OC-SL-5 (480-135564-2), OC-SL-3 (480-135564-3), OC-SL-2 (480-135564-4), OC-SL-1D (480-135564-5) and DUP SL-3 (480-135564-6).

Method SM 2540C: The following samples were diluted due to the nature of the sample matrix: OC-SL-6 (480-135564-1) and OC-SL-5 (480-135564-2). 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.

MassDEP Analytical Protocol Certification Form

Laboratory Name: **TestAmerica Buffalo** Project #: **480-135564-1**

Project Location: **Wilmington MA** RTN:

This form provides certifications for the data set for the following Laboratory Sample ID Number(s):

480-135564-1[1-6]

Matrices: ■ Groundwater/Surface Water ☐ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocols (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	Mass DEP VPH CAM IV A ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	Mass DEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	Mass DEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ■	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9012 / 9014/ 4500CN Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐	

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding time.	■ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	■ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	■ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	■ Yes ☐ No
E	a. VPH, EPH and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	■ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	■ Yes ☐ No[1]

***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WCS-07-350**

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	■ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s) ?	☐ Yes ■ No[1]

[1] All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: Position: Project Manager

Printed Name: Becky Mason Date: 5/29/18 9:31

This form has been electronically signed and approved

Detection Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-6 — Lab Sample ID: 480-135564-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	530000		500	100	ug/L	1		6010	Total/NA
Manganese	100	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	7500		1000	320	ug/L	1		6010	Total/NA
Iron	30	J	50	19	ug/L	1		6010	Total/NA
Chloride	3.3		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	1200		40	7.0	mg/L	20		300.0	Total/NA
Alkalinity, Total	210		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	210		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1900		20	8.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-5 — Lab Sample ID: 480-135564-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chromium	7.9		5.0	1.0	ug/L	1		6010	Total/NA
Nickel	4.3	J	10	1.3	ug/L	1		6010	Total/NA
Aluminum	120	J	200	60	ug/L	1		6010	Total/NA
Calcium	490000		500	100	ug/L	1		6010	Total/NA
Manganese	140	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	6400		1000	320	ug/L	1		6010	Total/NA
Iron	300		50	19	ug/L	1		6010	Total/NA
Chloride	3.3		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	1200		40	7.0	mg/L	20		300.0	Total/NA
Alkalinity, Total	98		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	98		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1700		20	8.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-3 — Lab Sample ID: 480-135564-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	95	J	200	60	ug/L	1		6010	Total/NA
Calcium	130000		500	100	ug/L	1		6010	Total/NA
Manganese	3100	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	6300		1000	320	ug/L	1		6010	Total/NA
Iron	28000		50	19	ug/L	1		6010	Total/NA
Chloride	4.4		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	150		10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	240		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	240		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	460		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-2 — Lab Sample ID: 480-135564-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	180	J	200	60	ug/L	1		6010	Total/NA
Calcium	18000		500	100	ug/L	1		6010	Total/NA
Manganese	1.5	J B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	2300		1000	320	ug/L	1		6010	Total/NA
Iron	800		50	19	ug/L	1		6010	Total/NA
Chloride	2.8		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	32		2.0	0.35	mg/L	1		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-2 (Continued) — Lab Sample ID: 480-135564-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Alkalinity, Total	14		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	14		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	58		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-1D — Lab Sample ID: 480-135564-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	300		200	60	ug/L	1		6010	Total/NA
Calcium	33000		500	100	ug/L	1		6010	Total/NA
Manganese	19	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	57000		1000	320	ug/L	1		6010	Total/NA
Iron	290		50	19	ug/L	1		6010	Total/NA
Chloride	97		1.0	0.56	mg/L	2		300.0	Total/NA
Sulfate	47		4.0	0.70	mg/L	2		300.0	Total/NA
Alkalinity, Total	38		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	38		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	280		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: DUP SL-3 — Lab Sample ID: 480-135564-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	83	J	200	60	ug/L	1		6010	Total/NA
Calcium	130000		500	100	ug/L	1		6010	Total/NA
Manganese	3100	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	6100		1000	320	ug/L	1		6010	Total/NA
Iron	28000		50	19	ug/L	1		6010	Total/NA
Chloride	4.9		1.0	0.56	mg/L	2		300.0	Total/NA
Sulfate	160		4.0	0.70	mg/L	2		300.0	Total/NA
Alkalinity, Total	240		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	240		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	470		10	4.0	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-6

Lab Sample ID: 480-135564-1
Date Collected: 05/07/18 08:25
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 01:30	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 01:30	1
Aluminum	ND		200	60	ug/L		05/09/18 10:08	05/10/18 01:30	1
Calcium	**530000**		500	100	ug/L		05/09/18 10:08	05/10/18 01:30	1
Manganese	**100**	**B**	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 01:30	1
Sodium	**7500**		1000	320	ug/L		05/09/18 10:08	05/10/18 01:30	1
Iron	**30**	**J**	50	19	ug/L		05/09/18 10:08	05/10/18 01:30	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.3**		2.5	1.4	mg/L			05/10/18 17:50	5
Sulfate	**1200**		40	7.0	mg/L			05/11/18 19:11	20
Alkalinity, Total	**210**		5.0	0.79	mg/L			05/14/18 16:14	1
Alkalinity, Bicarbonate	**210**		5.0	0.79	mg/L			05/14/18 16:14	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:14	1
Total Dissolved Solids	**1900**		20	8.0	mg/L			05/11/18 12:41	1

Client Sample ID: OC-SL-5

Lab Sample ID: 480-135564-2
Date Collected: 05/07/18 09:05
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	**7.9**		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 01:33	1
Nickel	**4.3**	**J**	10	1.3	ug/L		05/09/18 10:08	05/10/18 01:33	1
Aluminum	**120**	**J**	200	60	ug/L		05/09/18 10:08	05/10/18 01:33	1
Calcium	**490000**		500	100	ug/L		05/09/18 10:08	05/10/18 01:33	1
Manganese	**140**	**B**	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 01:33	1
Sodium	**6400**		1000	320	ug/L		05/09/18 10:08	05/10/18 01:33	1
Iron	**300**		50	19	ug/L		05/09/18 10:08	05/10/18 01:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.3**		2.5	1.4	mg/L			05/10/18 19:17	5
Sulfate	**1200**		40	7.0	mg/L			05/11/18 19:26	20
Alkalinity, Total	**98**		5.0	0.79	mg/L			05/14/18 16:21	1
Alkalinity, Bicarbonate	**98**		5.0	0.79	mg/L			05/14/18 16:21	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:21	1
Total Dissolved Solids	**1700**		20	8.0	mg/L			05/11/18 12:41	1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-135564-3
Date Collected: 05/07/18 09:45
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 01:37	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 01:37	1
Aluminum	**95**	**J**	200	60	ug/L		05/09/18 10:08	05/10/18 01:37	1
Calcium	**130000**		500	100	ug/L		05/09/18 10:08	05/10/18 01:37	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-135564-3
Date Collected: 05/07/18 09:45
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	3100	B	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 01:37	1
Sodium	6300		1000	320	ug/L		05/09/18 10:08	05/10/18 01:37	1
Iron	28000		50	19	ug/L		05/09/18 10:08	05/10/18 01:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.4		2.5	1.4	mg/L			05/09/18 22:32	5
Sulfate	150		10	1.7	mg/L			05/10/18 16:20	5
Alkalinity, Total	240		5.0	0.79	mg/L			05/14/18 16:28	1
Alkalinity, Bicarbonate	240		5.0	0.79	mg/L			05/14/18 16:28	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:28	1
Total Dissolved Solids	460		10	4.0	mg/L			05/11/18 12:41	1

Client Sample ID: OC-SL-2

Lab Sample ID: 480-135564-4
Date Collected: 05/07/18 10:50
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 02:07	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 02:07	1
Aluminum	180	J	200	60	ug/L		05/09/18 10:08	05/10/18 02:07	1
Calcium	18000		500	100	ug/L		05/09/18 10:08	05/10/18 02:07	1
Manganese	1.5	J B	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 02:07	1
Sodium	2300		1000	320	ug/L		05/09/18 10:08	05/10/18 02:07	1
Iron	800		50	19	ug/L		05/09/18 10:08	05/10/18 02:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2.8		0.50	0.28	mg/L			05/10/18 19:32	1
Sulfate	32		2.0	0.35	mg/L			05/10/18 19:32	1
Alkalinity, Total	14		5.0	0.79	mg/L			05/14/18 16:35	1
Alkalinity, Bicarbonate	14		5.0	0.79	mg/L			05/14/18 16:35	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:35	1
Total Dissolved Solids	58		10	4.0	mg/L			05/11/18 12:41	1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-135564-5
Date Collected: 05/07/18 11:30
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 02:11	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 02:11	1
Aluminum	300		200	60	ug/L		05/09/18 10:08	05/10/18 02:11	1
Calcium	33000		500	100	ug/L		05/09/18 10:08	05/10/18 02:11	1
Manganese	19	B	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 02:11	1
Sodium	57000		1000	320	ug/L		05/09/18 10:08	05/10/18 02:11	1
Iron	290		50	19	ug/L		05/09/18 10:08	05/10/18 02:11	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-135564-5
Date Collected: 05/07/18 11:30
Matrix: Water
Date Received: 05/09/18 01:30

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	97		1.0	0.56	mg/L			05/10/18 19:47	2
Sulfate	47		4.0	0.70	mg/L			05/10/18 19:47	2
Alkalinity, Total	38		5.0	0.79	mg/L			05/14/18 16:41	1
Alkalinity, Bicarbonate	38		5.0	0.79	mg/L			05/14/18 16:41	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:41	1
Total Dissolved Solids	280		10	4.0	mg/L			05/11/18 12:41	1

Client Sample ID: DUP SL-3

Lab Sample ID: 480-135564-6
Date Collected: 05/07/18 09:45
Matrix: Water
Date Received: 05/09/18 01:30

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 02:14	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 02:14	1
Aluminum	83	J	200	60	ug/L		05/09/18 10:08	05/10/18 02:14	1
Calcium	130000		500	100	ug/L		05/09/18 10:08	05/10/18 02:14	1
Manganese	3100	B	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 02:14	1
Sodium	6100		1000	320	ug/L		05/09/18 10:08	05/10/18 02:14	1
Iron	28000		50	19	ug/L		05/09/18 10:08	05/10/18 02:14	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	4.9		1.0	0.56	mg/L			05/10/18 20:01	2
Sulfate	160		4.0	0.70	mg/L			05/10/18 20:01	2
Alkalinity, Total	240		5.0	0.79	mg/L			05/14/18 16:49	1
Alkalinity, Bicarbonate	240		5.0	0.79	mg/L			05/14/18 16:49	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 16:49	1
Total Dissolved Solids	470		10	4.0	mg/L			05/11/18 12:41	1

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Method: 6010 - Metals (ICP)

Lab Sample ID: MB 480-413312/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413563 — **Prep Batch: 413312**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		05/09/18 10:08	05/10/18 01:07	1
Nickel	ND		10	1.3	ug/L		05/09/18 10:08	05/10/18 01:07	1
Aluminum	ND		200	60	ug/L		05/09/18 10:08	05/10/18 01:07	1
Calcium	ND		500	100	ug/L		05/09/18 10:08	05/10/18 01:07	1
Manganese	0.610	J	3.0	0.40	ug/L		05/09/18 10:08	05/10/18 01:07	1
Sodium	ND		1000	320	ug/L		05/09/18 10:08	05/10/18 01:07	1
Iron	ND		50	19	ug/L		05/09/18 10:08	05/10/18 01:07	1

Lab Sample ID: LCS 480-413312/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413563 — **Prep Batch: 413312**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	200	211		ug/L		105	80 - 120
Nickel	200	200		ug/L		100	80 - 120
Aluminum	10000	10200		ug/L		102	80 - 120
Calcium	10000	10500		ug/L		105	80 - 120
Manganese	200	208		ug/L		104	80 - 120
Sodium	10000	10300		ug/L		103	80 - 120
Iron	10000	10200		ug/L		102	80 - 120

Lab Sample ID: LCSD 480-413312/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413563 — **Prep Batch: 413312**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	200	211		ug/L		105	80 - 120	0	20
Nickel	200	201		ug/L		100	80 - 120	0	20
Aluminum	10000	10400		ug/L		104	80 - 120	1	20
Calcium	10000	10500		ug/L		105	80 - 120	0	20
Manganese	200	208		ug/L		104	80 - 120	0	20
Sodium	10000	10400		ug/L		104	80 - 120	1	20
Iron	10000	10100		ug/L		101	80 - 120	0	20

Lab Sample ID: 480-135564-3 MS — **Client Sample ID: OC-SL-3 MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413563 — **Prep Batch: 413312**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		200	202		ug/L		101	75 - 125
Nickel	ND		200	195		ug/L		98	75 - 125
Aluminum	95	J	10000	10100		ug/L		100	75 - 125
Calcium	130000		10000	139000	4	ug/L		80	75 - 125
Manganese	3100	B	200	3290	4	ug/L		74	75 - 125
Sodium	6300		10000	16300		ug/L		100	75 - 125
Iron	28000		10000	37000		ug/L		91	75 - 125

Method: 6010 - Metals (ICP) (Continued)

Lab Sample ID: 480-135564-3 MSD — **Client Sample ID: OC-SL-3 MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413563 — **Prep Batch: 413312**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		200	208		ug/L		104	75 - 125	3	20
Nickel	ND		200	202		ug/L		101	75 - 125	3	20
Aluminum	95	J	10000	10400		ug/L		104	75 - 125	4	20
Calcium	130000		10000	140000	4	ug/L		98	75 - 125	1	20
Manganese	3100	B	200	3020	4	ug/L		-59	75 - 125	8	20
Sodium	6300		10000	16400		ug/L		101	75 - 125	0	20
Iron	28000		10000	35900		ug/L		80	75 - 125	3	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-413434/53 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413434

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/09/18 21:43	1
Sulfate	ND	^	2.0	0.35	mg/L			05/09/18 21:43	1

Lab Sample ID: LCS 480-413434/52 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413434

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	51.1		mg/L		102	90 - 110
Sulfate	50.0	51.0	^	mg/L		102	90 - 110

Lab Sample ID: 480-135564-3 MS — **Client Sample ID: OC-SL-3 MS**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413434

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4.4		250	265		mg/L		104	81 - 120
Sulfate	150	^	250	400	^	mg/L		102	80 - 120

Lab Sample ID: 480-135564-3 MSD — **Client Sample ID: OC-SL-3 MSD**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413434

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	4.4		250	266		mg/L		105	81 - 120	0	20
Sulfate	150	^	250	406	^	mg/L		104	80 - 120	1	20

Lab Sample ID: MB 480-413612/29 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413612

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/10/18 19:03	1
Sulfate	ND		2.0	0.35	mg/L			05/10/18 19:03	1

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Lab Sample ID: MB 480-413612/5 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413612

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/10/18 12:49	1
Sulfate	ND		2.0	0.35	mg/L			05/10/18 12:49	1

Lab Sample ID: LCS 480-413612/28 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413612

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.4		mg/L		101	90 - 110
Sulfate	50.0	51.2		mg/L		102	90 - 110

Lab Sample ID: LCS 480-413612/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413612

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.5		mg/L		99	90 - 110
Sulfate	50.0	49.9		mg/L		100	90 - 110

Lab Sample ID: 480-135564-1 MS — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413612

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	3.3		250	265		mg/L		105	81 - 120
Sulfate	1100	E	250	1370	E 4	mg/L		96	80 - 120

Lab Sample ID: MB 480-413620/5 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413620

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/10/18 12:27	1
Sulfate	ND		2.0	0.35	mg/L			05/10/18 12:27	1

Lab Sample ID: LCS 480-413620/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413620

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.8		mg/L		100	90 - 110
Sulfate	50.0	51.1		mg/L		102	90 - 110

Lab Sample ID: MB 480-413855/29 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413855

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			05/11/18 18:57	1
Sulfate	ND		2.0	0.35	mg/L			05/11/18 18:57	1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 480-413855/28 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413855

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.6		mg/L		101	90 - 110
Sulfate	50.0	50.8		mg/L		102	90 - 110

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 480-414301/30 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 414301

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			05/14/18 14:54	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			05/14/18 14:54	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			05/14/18 14:54	1

Lab Sample ID: LCS 480-414301/31 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 414301

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	98.6		mg/L		99	90 - 110

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

Lab Sample ID: MB 480-413872/1 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413872

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			05/11/18 12:41	1

Lab Sample ID: LCS 480-413872/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 413872

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	512	471		mg/L		92	85 - 115

QC Association Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Metals

Prep Batch: 413312

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	3005A	
480-135564-2	OC-SL-5	Total/NA	Water	3005A	
480-135564-3	OC-SL-3	Total/NA	Water	3005A	
480-135564-4	OC-SL-2	Total/NA	Water	3005A	
480-135564-5	OC-SL-1D	Total/NA	Water	3005A	
480-135564-6	DUP SL-3	Total/NA	Water	3005A	
MB 480-413312/1-A	Method Blank	Total/NA	Water	3005A	
LCS 480-413312/2-A	Lab Control Sample	Total/NA	Water	3005A	
LCSD 480-413312/3-A	Lab Control Sample Dup	Total/NA	Water	3005A	
480-135564-3 MS	OC-SL-3 MS	Total/NA	Water	3005A	
480-135564-3 MSD	OC-SL-3 MSD	Total/NA	Water	3005A	

Analysis Batch: 413563

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	6010	413312
480-135564-2	OC-SL-5	Total/NA	Water	6010	413312
480-135564-3	OC-SL-3	Total/NA	Water	6010	413312
480-135564-4	OC-SL-2	Total/NA	Water	6010	413312
480-135564-5	OC-SL-1D	Total/NA	Water	6010	413312
480-135564-6	DUP SL-3	Total/NA	Water	6010	413312
MB 480-413312/1-A	Method Blank	Total/NA	Water	6010	413312
LCS 480-413312/2-A	Lab Control Sample	Total/NA	Water	6010	413312
LCSD 480-413312/3-A	Lab Control Sample Dup	Total/NA	Water	6010	413312
480-135564-3 MS	OC-SL-3 MS	Total/NA	Water	6010	413312
480-135564-3 MSD	OC-SL-3 MSD	Total/NA	Water	6010	413312

General Chemistry

Analysis Batch: 413434

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-3	OC-SL-3	Total/NA	Water	300.0	
MB 480-413434/53	Method Blank	Total/NA	Water	300.0	
LCS 480-413434/52	Lab Control Sample	Total/NA	Water	300.0	
480-135564-3 MS	OC-SL-3 MS	Total/NA	Water	300.0	
480-135564-3 MSD	OC-SL-3 MSD	Total/NA	Water	300.0	

Analysis Batch: 413612

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	300.0	
480-135564-2	OC-SL-5	Total/NA	Water	300.0	
480-135564-4	OC-SL-2	Total/NA	Water	300.0	
480-135564-5	OC-SL-1D	Total/NA	Water	300.0	
480-135564-6	DUP SL-3	Total/NA	Water	300.0	
MB 480-413612/29	Method Blank	Total/NA	Water	300.0	
MB 480-413612/5	Method Blank	Total/NA	Water	300.0	
LCS 480-413612/28	Lab Control Sample	Total/NA	Water	300.0	
LCS 480-413612/4	Lab Control Sample	Total/NA	Water	300.0	
480-135564-1 MS	OC-SL-6	Total/NA	Water	300.0	

General Chemistry (Continued)

Analysis Batch: 413620

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-3	OC-SL-3	Total/NA	Water	300.0	
MB 480-413620/5	Method Blank	Total/NA	Water	300.0	
LCS 480-413620/4	Lab Control Sample	Total/NA	Water	300.0	

Analysis Batch: 413855

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	300.0	
480-135564-2	OC-SL-5	Total/NA	Water	300.0	
MB 480-413855/29	Method Blank	Total/NA	Water	300.0	
LCS 480-413855/28	Lab Control Sample	Total/NA	Water	300.0	

Analysis Batch: 413872

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	SM 2540C	
480-135564-2	OC-SL-5	Total/NA	Water	SM 2540C	
480-135564-3	OC-SL-3	Total/NA	Water	SM 2540C	
480-135564-4	OC-SL-2	Total/NA	Water	SM 2540C	
480-135564-5	OC-SL-1D	Total/NA	Water	SM 2540C	
480-135564-6	DUP SL-3	Total/NA	Water	SM 2540C	
MB 480-413872/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-413872/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 414301

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135564-1	OC-SL-6	Total/NA	Water	SM 2320B	
480-135564-2	OC-SL-5	Total/NA	Water	SM 2320B	
480-135564-3	OC-SL-3	Total/NA	Water	SM 2320B	
480-135564-4	OC-SL-2	Total/NA	Water	SM 2320B	
480-135564-5	OC-SL-1D	Total/NA	Water	SM 2320B	
480-135564-6	DUP SL-3	Total/NA	Water	SM 2320B	
MB 480-414301/30	Method Blank	Total/NA	Water	SM 2320B	
LCS 480-414301/31	Lab Control Sample	Total/NA	Water	SM 2320B	

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-6 — Lab Sample ID: 480-135564-1

Date Collected: 05/07/18 08:25 — **Matrix: Water**
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 01:30	LMH	TAL BUF
Total/NA	Analysis	300.0		5	413612	05/10/18 17:50	CLA	TAL BUF
Total/NA	Analysis	300.0		20	413855	05/11/18 19:11	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:14	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Client Sample ID: OC-SL-5 — Lab Sample ID: 480-135564-2

Date Collected: 05/07/18 09:05 — **Matrix: Water**
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 01:33	LMH	TAL BUF
Total/NA	Analysis	300.0		5	413612	05/10/18 19:17	CLA	TAL BUF
Total/NA	Analysis	300.0		20	413855	05/11/18 19:26	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:21	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Client Sample ID: OC-SL-3 — Lab Sample ID: 480-135564-3

Date Collected: 05/07/18 09:45 — **Matrix: Water**
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 01:37	LMH	TAL BUF
Total/NA	Analysis	300.0		5	413434	05/09/18 22:32	CLA	TAL BUF
Total/NA	Analysis	300.0		5	413620	05/10/18 16:20	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:28	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Client Sample ID: OC-SL-2 — Lab Sample ID: 480-135564-4

Date Collected: 05/07/18 10:50 — **Matrix: Water**
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 02:07	LMH	TAL BUF
Total/NA	Analysis	300.0		1	413612	05/10/18 19:32	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:35	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-135564-5

Date Collected: 05/07/18 11:30
Matrix: Water
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 02:11	LMH	TAL BUF
Total/NA	Analysis	300.0		2	413612	05/10/18 19:47	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:41	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Client Sample ID: DUP SL-3

Lab Sample ID: 480-135564-6

Date Collected: 05/07/18 09:45
Matrix: Water
Date Received: 05/09/18 01:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			413312	05/09/18 10:08	KMP	TAL BUF
Total/NA	Analysis	6010		1	413563	05/10/18 02:14	LMH	TAL BUF
Total/NA	Analysis	300.0		2	413612	05/10/18 20:01	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	414301	05/14/18 16:49	DSC	TAL BUF
Total/NA	Analysis	SM 2540C		1	413872	05/11/18 12:41	SLM	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Accreditation/Certification Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-18 *

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
6010	3005A	Water	Aluminum
6010	3005A	Water	Calcium
6010	3005A	Water	Chromium
6010	3005A	Water	Iron
6010	3005A	Water	Manganese
6010	3005A	Water	Nickel
6010	3005A	Water	Sodium

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Method	Method Description	Protocol	Laboratory
6010	Metals (ICP)	SW846	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2320B	Alkalinity	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
3005A	Preparation, Total Metals	SW846	TAL BUF

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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 BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-135564-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-135564-1	OC-SL-6	Water	05/07/18 08:25	05/09/18 01:30
480-135564-2	OC-SL-5	Water	05/07/18 09:05	05/09/18 01:30
480-135564-3	OC-SL-3	Water	05/07/18 09:45	05/09/18 01:30
480-135564-4	OC-SL-2	Water	05/07/18 10:50	05/09/18 01:30
480-135564-5	OC-SL-1D	Water	05/07/18 11:30	05/09/18 01:30
480-135564-6	DUP SL-3	Water	05/07/18 09:45	05/09/18 01:30

Login Sample Receipt Checklist

Client: Olin Corporation

Job Number: 480-135564-1

Login Number: 135564

List Source: TestAmerica Buffalo

List Number: 1

Creator: Williams, Christopher S

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	OLIN
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

360325-Boston

Chain of Custody Record

360325-Boston

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: BRIAN GUICHARD	Lab PM: Mason, Becky C	Carrier	COC No: 480-112446-22984.1
Client Contact: Mr. Brian Guichard	Phone: 978 658 6141	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

480-135564 COC

Analysis Reques

Preservation Codes:
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)
Other:

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	6010MCP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	5-7-18	8:25	G	Water			1	1		1	1	4	
OC-SL-5		9:05		Water			1	1		1	1	4	
OC-SL-3		9:45		Water			1	1		1	1	4	
OC-SL-2		10:50		Water			1	1		1	1	4	
OC-SL-1D		11:30		Water			1	1		1	1	4	
DUP SL-3		9:45		Water			1	1		1	1	4	
SL-3 MS		9:45		Water			1	1		1	1	4	
SL-3 MSD		9:45		Water			1	1		1	1	4	
				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	Date/Time	Company	Received by	Date/Time	Company
[signature]	5-8-18		[signature]	5-8-18 1200	TA
[signature]	5-8-18 1800		[signature]	5-9-18 0130	TAD

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2.3 #1

Ver: 08/04/2016

To: Chinny Esakkiperumal
From: Chris Ricardi
Date: February 6, 2019
Subject: Calcium Sulfate Landfill Semiannual Monitoring – December 2018

DATA VALIDATION REPORT
DECEMBER 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

TestAmerica Laboratories Data Set 480-146398-1

1.0 INTRODUCTION

Groundwater samples were collected from the Olin Chemical Superfund Site on December 6, 2018. Samples were analyzed by TestAmerica Laboratories in Buffalo, New York. Data were reported in sample delivery group (SDG) 480-146398-1. A summary of samples included in this review is contained in Table 1. Samples reviewed in this report were analyzed for the following U.S. Environmental Protection Agency (USEPA) SW-846 (USEPA, 1996), USEPA wastewater (USEPA, 1993), or Standard Methods (APHA, 1995):

- total metals (aluminum, calcium, chromium, iron, manganese, nickel, and sodium) by USEPA Method 6010
- general chemistry analyses for total alkalinity, carbonate alkalinity, and bicarbonate alkalinity by SM 2320B, chloride and sulfate by USEPA Method E300, and total dissolved solids (TDS) by SM 2540C

The Draft Post Closure Plan (MACTEC, 2006) and the Massachusetts Department of Environmental Protection (MassDEP) Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) [MassDEP, 2010] were used as references during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington groundwater monitoring tasks. Final sample results are presented on data summaries in Table 2.

2.0 METALS

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
* Matrix Spike Analysis
  Field Duplicate Results

* Laboratory Control Sample
  Detection limits

***** = indicates that criteria were met for this parameter

2.1 Validation Observations and Actions

Field Duplicate Results

Sample OC-SL-6 reported iron as not detected while its field duplicate, DUP-SL-6, reported a detection of iron above the reporting limit. Iron results in samples OC-SL-6 and DUP-SL-6 were qualified estimated (J/UJ).

Detection Limits

The reporting limit (RL) for aluminum (200 µg/L) is greater than the RL of 100 µg/L specified in the Final Interim Response Steps Work Plan (IRSWP); however, the laboratory reports detections between the RL and the method detection limit (MDL) of 60 µg/L.

The RL for calcium (500 µg/L) is greater than the RL of 400 µg/L specified in the IRSWP. Calcium was detected in all samples at concentration greater than the RL.

3.0 GENERAL CHEMISTRY – Total Alkalinity, Carbonate Alkalinity, and Bicarbonate Alkalinity, Chloride, Sulfate, and TDS

The data were evaluated based on the following parameters:

* Data Completeness
* Holding Time
* Blanks
* Matrix Spike Analysis
* Laboratory Duplicate Analysis
* Field Duplicate Analysis
* Laboratory Control Sample
  Detection limits
  Miscellaneous

***** = indicates that criteria were met for this parameter

3.1 Validation Observations and Actions

Detection Limits

The RL for total alkalinity, carbonate alkalinity, and bicarbonate alkalinity (5 mg/L) is greater than the RL of 1 mg/L specified in the IRSWP. Total alkalinity and bicarbonate alkalinity were

reported at concentrations greater than the RL in all samples. Detections of carbonate alkalinity would be reported between the RL and the MDL of 0.79 mg/L.

Miscellaneous

The laboratory narrative states that each sample container submitted for alkalinity analysis was received with headspace. There is no requirement for zero headspace for sample collection in the alkalinity method. Alkalinity results are reported as presented by the laboratory.

The results are interpreted to be usable as reported by TestAmerica.

Chris Ricardi, NRCC-EAC
Senior Chemist

2/6/19
Date

Michael Murphy
Project Principal

2/6/19
Date

References:

American Public Health Association (APHA), 1995. "Standard Methods for Examination of Water and Wastewater"; 19th Edition; APHA, 1015 Fifteenth St., NW. Washington, D.C. 20005.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2006. "Draft Calcium Sulfate Landfill Post Closure Monitoring Plan"; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; December, 2006.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2008. "Final Interim Response Steps Work Plan"; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 8, 2008.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2009. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; August 14, 2009.

Massachusetts Department of Environmental Protection (MassDEP), 2010. "The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)"; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.

U.S. Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)", EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).

USEPA, 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 -December 1996.

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TABLE 2
FINAL RESULTS SUMMARY
DATA VALIDATION REPORT
DECEMBER 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

			Location	SL-1D		SL-2		SL-3		SL-5		SL-6		SL-6	
			Lab SDG	480-146398-1		480-146398-1		480-146398-1		480-146398-1		480-146398-1		480-146398-1	
			Sample Date	12/6/2018		12/6/2018		12/6/2018		12/6/2018		12/6/2018		12/6/2018	
			Sample ID	OC-SL-1D		OC-SL-2		OC-SL-3		OC-SL-5		DUP-SL-6		OC-SL-6	
			QC Code	FS		FS		FS		FS		FD		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
SW6010	T	Aluminum	ug/l	180	J	79	J	200	U	200	U	200	U	60	J
SW6010	T	Calcium	ug/l	21,000		26,000		170,000		520,000		350,000		380,000	
SW6010	T	Chromium	ug/l	5	U	5	U	5	U	5	U	5	U	5	U
SW6010	T	Iron	ug/l	160		400		44,000		63		180	J	50	UJ
SW6010	T	Manganese	ug/l	11		1.2	J	3,900		170		3400		3,200	
SW6010	T	Nickel	ug/l	10	U	10	U	10	U	4	J	10	U	10	U
SW6010	T	Sodium	ug/l	52,000		4,700		8,600		8,900		9,200		9,800	
A2320	T	Bicarbonate Alkalinity, as CaCO3	mg/l	33		26		280		130		160		160	
A2320	T	Carbonate Alkalinity, as CaCO3	mg/l	5	U	5	U	5	U	5	U	5	U	5	U
A2320	T	Total Alkalinity, as CaCO3	mg/l	33		26		280		130		160		160	
A2540C	T	Total Dissolved Solids	mg/l	210		110		660		1900		1300		1300	
E300	T	Chloride	mg/l	73		2.6		5		3.1	J	3.2		3.2	
E300	T	Sulfate	mg/l	30		43		200		1000		720		780	

Notes:
FS = Field Sample
FD = Field Duplicate
U = Not detected, value is the reporting limit
J = Value is estimated
mg/L = milligrams per liter
ug/L = micrograms per liter
T = total

Created by: KMS 2/1/19
Checked by: BBL 2/1/19

TABLE 3
DATA VALIDATION ACTION SUMMARY
DATA VALIDATION REPORT
DECEMBER 2018 CALCIUM SULFATE LANDFILL GROUNDWATER
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS

Lab Sample Delivery Group	Analysis Method	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units	Lab ID
480-146398-1	SW6010	480-146398-1	OC-SL-6	Iron	50	U	50	UJ	FD	ug/l	TALBFLO
480-146398-1	SW6010	480-146398-6	DUP-SL-6	Iron	180		180	J	FD	ug/l	TALBFLO

Units:
ug/l = micrograms per liter

Validation Qualifiers:
U = Not detected, value is the reporting limit
J = Value is estimated

Validation Reason Codes:
FD = field duplicate limit exceeded

Created by: KMS 2/1/19
Checked by: BBL 2/1/19

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-146398-1
Client Project/Site: Olin Chemical Calcium Sulfate Landfill

For:
Olin Corporation
PO BOX 248
Charleston, Tennessee 37310-0248

Attn: Mr. James Cashwell

Authorized for release by:
12/21/2018 2:02:33 PM

Becky Mason, Project Manager II
(413)572-4000
becky.mason@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

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.

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Definitions/Glossary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

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.
B	Compound was found in the blank and sample.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

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.

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)

Job ID: 480-146398-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-146398-1

Receipt
The samples were received on 12/7/2018 1:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.7º C.

HPLC/IC
Method 300.0, SM 4110B: The following samples were diluted to bring the concentration of target analytes within the calibration range: OC-SL-6 (480-146398-1), OC-SL-5 (480-146398-2) and DUP-SL-6 (480-146398-6). 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 6010: At the request of the client, an abbreviated MCP analyte list was reported for this job.

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

General Chemistry
Method SM 2320B: The following samples were received with headspace in the sample container. This sample container was received with headspace. OC-SL-6 (480-146398-1), OC-SL-6 (480-146398-1[MS]), OC-SL-6 (480-146398-1[MSD]), OC-SL-5 (480-146398-2), OC-SL-3 (480-146398-3), OC-SL-2 (480-146398-4), OC-SL-1D (480-146398-5) and DUP-SL-6 (480-146398-6).

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

Detection Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-6 — Lab Sample ID: 480-146398-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	60	J	200	60	ug/L	1		6010	Total/NA
Calcium	380000		500	100	ug/L	1		6010	Total/NA
Manganese	3200	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	9800		1000	320	ug/L	1		6010	Total/NA
Chloride	3.2		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	780		100	17	mg/L	50		300.0	Total/NA
Alkalinity, Total	160		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	160		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1300		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-5 — Lab Sample ID: 480-146398-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nickel	4.0	J	10	1.3	ug/L	1		6010	Total/NA
Calcium	520000		500	100	ug/L	1		6010	Total/NA
Manganese	170	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	8900		1000	320	ug/L	1		6010	Total/NA
Iron	63		50	19	ug/L	1		6010	Total/NA
Chloride	3.1	J	5.0	2.8	mg/L	10		300.0	Total/NA
Sulfate	1000		40	7.0	mg/L	20		300.0	Total/NA
Alkalinity, Total	130		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	130		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1900		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-3 — Lab Sample ID: 480-146398-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	170000		500	100	ug/L	1		6010	Total/NA
Manganese	3900	B	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	8600		1000	320	ug/L	1		6010	Total/NA
Iron	44000		50	19	ug/L	1		6010	Total/NA
Chloride	5.0		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	200		10	1.7	mg/L	5		300.0	Total/NA
Alkalinity, Total	280		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	280		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	660		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: OC-SL-2 — Lab Sample ID: 480-146398-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	79	J	200	60	ug/L	1		6010	Total/NA
Calcium	26000		500	100	ug/L	1		6010	Total/NA
Manganese	1.2	J	3.0	0.40	ug/L	1		6010	Total/NA
Sodium	4700		1000	320	ug/L	1		6010	Total/NA
Iron	400		50	19	ug/L	1		6010	Total/NA
Chloride	2.6		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	43		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	26		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	26		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	110		10	4.0	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-1D — Lab Sample ID: 480-146398-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	180	J	200	60	ug/L	1		6010	Total/NA
Calcium	21000		500	100	ug/L	1		6010	Total/NA
Manganese	11		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	52000		1000	320	ug/L	1		6010	Total/NA
Iron	160		50	19	ug/L	1		6010	Total/NA
Chloride	73		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	30		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	33		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	33		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	210		10	4.0	mg/L	1		SM 2540C	Total/NA

Client Sample ID: DUP-SL-6 — Lab Sample ID: 480-146398-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	350000		500	100	ug/L	1		6010	Total/NA
Manganese	3400		3.0	0.40	ug/L	1		6010	Total/NA
Sodium	9200		1000	320	ug/L	1		6010	Total/NA
Iron	180		50	19	ug/L	1		6010	Total/NA
Chloride	3.2		2.5	1.4	mg/L	5		300.0	Total/NA
Sulfate	720		40	7.0	mg/L	20		300.0	Total/NA
Alkalinity, Total	160		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	160		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Total Dissolved Solids	1300		10	4.0	mg/L	1		SM 2540C	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-6

Lab Sample ID: 480-146398-1
Matrix: Water
Date Collected: 12/06/18 07:55
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/12/18 10:20	12/17/18 13:13	1
Nickel	ND		10	1.3	ug/L		12/12/18 10:20	12/17/18 13:13	1
Aluminum	**60**	**J**	200	60	ug/L		12/12/18 10:20	12/17/18 13:13	1
Calcium	**380000**		500	100	ug/L		12/12/18 10:20	12/17/18 13:13	1
Manganese	**3200**	**B**	3.0	0.40	ug/L		12/12/18 10:20	12/17/18 13:13	1
Sodium	**9800**		1000	320	ug/L		12/12/18 10:20	12/17/18 13:13	1
Iron	ND		50	19	ug/L		12/12/18 10:20	12/17/18 13:13	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.2**		2.5	1.4	mg/L			12/11/18 14:40	5
Sulfate	**780**		100	17	mg/L			12/12/18 10:54	50
Alkalinity, Total	**160**		5.0	0.79	mg/L			12/18/18 16:04	1
Alkalinity, Bicarbonate	**160**		5.0	0.79	mg/L			12/18/18 16:04	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:04	1
Total Dissolved Solids	**1300**		10	4.0	mg/L			12/10/18 11:59	1

Client Sample ID: OC-SL-5

Lab Sample ID: 480-146398-2
Matrix: Water
Date Collected: 12/06/18 09:00
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/12/18 10:20	12/17/18 13:43	1
Nickel	**4.0**	**J**	10	1.3	ug/L		12/12/18 10:20	12/17/18 13:43	1
Aluminum	ND		200	60	ug/L		12/12/18 10:20	12/17/18 13:43	1
Calcium	**520000**		500	100	ug/L		12/12/18 10:20	12/17/18 13:43	1
Manganese	**170**	**B**	3.0	0.40	ug/L		12/12/18 10:20	12/17/18 13:43	1
Sodium	**8900**		1000	320	ug/L		12/12/18 10:20	12/17/18 13:43	1
Iron	**63**		50	19	ug/L		12/12/18 10:20	12/17/18 13:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**3.1**	**J**	5.0	2.8	mg/L			12/11/18 15:45	10
Sulfate	**1000**		40	7.0	mg/L			12/12/18 10:29	20
Alkalinity, Total	**130**		5.0	0.79	mg/L			12/18/18 16:16	1
Alkalinity, Bicarbonate	**130**		5.0	0.79	mg/L			12/18/18 16:16	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:16	1
Total Dissolved Solids	**1900**		10	4.0	mg/L			12/10/18 11:59	1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-146398-3
Matrix: Water
Date Collected: 12/06/18 09:40
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/12/18 10:20	12/17/18 13:47	1
Nickel	ND		10	1.3	ug/L		12/12/18 10:20	12/17/18 13:47	1
Aluminum	ND		200	60	ug/L		12/12/18 10:20	12/17/18 13:47	1
Calcium	**170000**		500	100	ug/L		12/12/18 10:20	12/17/18 13:47	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-3

Lab Sample ID: 480-146398-3
Date Collected: 12/06/18 09:40
Matrix: Water
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Manganese	3900	B	3.0	0.40	ug/L		12/12/18 10:20	12/17/18 13:47	1
Sodium	8600		1000	320	ug/L		12/12/18 10:20	12/17/18 13:47	1
Iron	44000		50	19	ug/L		12/12/18 10:20	12/17/18 13:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	5.0		2.5	1.4	mg/L			12/11/18 15:53	5
Sulfate	200		10	1.7	mg/L			12/11/18 15:53	5
Alkalinity, Total	280		5.0	0.79	mg/L			12/18/18 16:23	1
Alkalinity, Bicarbonate	280		5.0	0.79	mg/L			12/18/18 16:23	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:23	1
Total Dissolved Solids	660		10	4.0	mg/L			12/10/18 11:59	1

Client Sample ID: OC-SL-2

Lab Sample ID: 480-146398-4
Date Collected: 12/06/18 10:25
Matrix: Water
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/11/18 15:20	12/17/18 14:21	1
Nickel	ND		10	1.3	ug/L		12/11/18 15:20	12/17/18 14:21	1
Aluminum	79	J	200	60	ug/L		12/11/18 15:20	12/17/18 14:21	1
Calcium	26000		500	100	ug/L		12/11/18 15:20	12/17/18 14:21	1
Manganese	1.2	J	3.0	0.40	ug/L		12/11/18 15:20	12/17/18 14:21	1
Sodium	4700		1000	320	ug/L		12/11/18 15:20	12/17/18 14:21	1
Iron	400		50	19	ug/L		12/11/18 15:20	12/17/18 14:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	2.6		0.50	0.28	mg/L			12/11/18 16:02	1
Sulfate	43		2.0	0.35	mg/L			12/11/18 16:02	1
Alkalinity, Total	26		5.0	0.79	mg/L			12/18/18 16:28	1
Alkalinity, Bicarbonate	26		5.0	0.79	mg/L			12/18/18 16:28	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:28	1
Total Dissolved Solids	110		10	4.0	mg/L			12/11/18 08:50	1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-146398-5
Date Collected: 12/06/18 11:00
Matrix: Water
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/11/18 15:20	12/17/18 14:25	1
Nickel	ND		10	1.3	ug/L		12/11/18 15:20	12/17/18 14:25	1
Aluminum	180	J	200	60	ug/L		12/11/18 15:20	12/17/18 14:25	1
Calcium	21000		500	100	ug/L		12/11/18 15:20	12/17/18 14:25	1
Manganese	11		3.0	0.40	ug/L		12/11/18 15:20	12/17/18 14:25	1
Sodium	52000		1000	320	ug/L		12/11/18 15:20	12/17/18 14:25	1
Iron	160		50	19	ug/L		12/11/18 15:20	12/17/18 14:25	1

Client Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-146398-5

Date Collected: 12/06/18 11:00
Matrix: Water
Date Received: 12/07/18 01:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	73		0.50	0.28	mg/L			12/11/18 16:10	1
Sulfate	30		2.0	0.35	mg/L			12/11/18 16:10	1
Alkalinity, Total	33		5.0	0.79	mg/L			12/18/18 16:34	1
Alkalinity, Bicarbonate	33		5.0	0.79	mg/L			12/18/18 16:34	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:34	1
Total Dissolved Solids	210		10	4.0	mg/L			12/11/18 08:50	1

Client Sample ID: DUP-SL-6

Lab Sample ID: 480-146398-6

Date Collected: 12/06/18 07:55
Matrix: Water
Date Received: 12/07/18 01:00

Method: 6010 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/11/18 15:20	12/17/18 14:28	1
Nickel	ND		10	1.3	ug/L		12/11/18 15:20	12/17/18 14:28	1
Aluminum	ND		200	60	ug/L		12/11/18 15:20	12/17/18 14:28	1
Calcium	350000		500	100	ug/L		12/11/18 15:20	12/17/18 14:28	1
Manganese	3400		3.0	0.40	ug/L		12/11/18 15:20	12/17/18 14:28	1
Sodium	9200		1000	320	ug/L		12/11/18 15:20	12/17/18 14:28	1
Iron	180		50	19	ug/L		12/11/18 15:20	12/17/18 14:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	3.2		2.5	1.4	mg/L			12/11/18 16:18	5
Sulfate	720		40	7.0	mg/L			12/12/18 10:37	20
Alkalinity, Total	160		5.0	0.79	mg/L			12/18/18 16:40	1
Alkalinity, Bicarbonate	160		5.0	0.79	mg/L			12/18/18 16:40	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 16:40	1
Total Dissolved Solids	1300		10	4.0	mg/L			12/11/18 08:50	1

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Method: 6010 - Metals (ICP)

Lab Sample ID: MB 480-449968/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451324 — **Prep Batch: 449968**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/11/18 15:20	12/17/18 14:14	1
Nickel	ND		10	1.3	ug/L		12/11/18 15:20	12/17/18 14:14	1
Aluminum	ND		200	60	ug/L		12/11/18 15:20	12/17/18 14:14	1
Calcium	ND		500	100	ug/L		12/11/18 15:20	12/17/18 14:14	1
Manganese	ND		3.0	0.40	ug/L		12/11/18 15:20	12/17/18 14:14	1
Sodium	ND		1000	320	ug/L		12/11/18 15:20	12/17/18 14:14	1
Iron	ND		50	19	ug/L		12/11/18 15:20	12/17/18 14:14	1

Lab Sample ID: LCS 480-449968/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451324 — **Prep Batch: 449968**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	200	198		ug/L		99	80 - 120
Nickel	200	201		ug/L		100	80 - 120
Aluminum	10000	9310		ug/L		93	80 - 120
Calcium	10000	10000		ug/L		100	80 - 120
Manganese	200	197		ug/L		99	80 - 120
Sodium	10000	9130		ug/L		91	80 - 120
Iron	10000	9750		ug/L		97	80 - 120

Lab Sample ID: LCSD 480-449968/23-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451324 — **Prep Batch: 449968**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	200	203		ug/L		101	80 - 120	3	20
Nickel	200	200		ug/L		100	80 - 120	0	20
Aluminum	10000	9390		ug/L		94	80 - 120	1	20
Calcium	10000	9990		ug/L		100	80 - 120	0	20
Manganese	200	197		ug/L		99	80 - 120	0	20
Sodium	10000	9380		ug/L		94	80 - 120	3	20
Iron	10000	9790		ug/L		98	80 - 120	0	20

Lab Sample ID: MB 480-450270/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451253 — **Prep Batch: 450270**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		5.0	1.0	ug/L		12/12/18 10:20	12/17/18 12:36	1
Nickel	ND		10	1.3	ug/L		12/12/18 10:20	12/17/18 12:36	1
Aluminum	ND		200	60	ug/L		12/12/18 10:20	12/17/18 12:36	1
Calcium	ND		500	100	ug/L		12/12/18 10:20	12/17/18 12:36	1
Manganese	0.710	J	3.0	0.40	ug/L		12/12/18 10:20	12/17/18 12:36	1
Sodium	ND		1000	320	ug/L		12/12/18 10:20	12/17/18 12:36	1
Iron	ND		50	19	ug/L		12/12/18 10:20	12/17/18 12:36	1

Method: 6010 - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-450270/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451253 — **Prep Batch: 450270**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	200	198		ug/L		99	80 - 120
Nickel	200	198		ug/L		99	80 - 120
Aluminum	10000	9670		ug/L		97	80 - 120
Calcium	10000	9870		ug/L		99	80 - 120
Manganese	200	194		ug/L		97	80 - 120
Sodium	10000	9380		ug/L		94	80 - 120
Iron	10000	9870		ug/L		99	80 - 120

Lab Sample ID: LCSD 480-450270/22-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451253 — **Prep Batch: 450270**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	200	204		ug/L		102	80 - 120	3	20
Nickel	200	205		ug/L		103	80 - 120	3	20
Aluminum	10000	9970		ug/L		100	80 - 120	3	20
Calcium	10000	10200		ug/L		102	80 - 120	4	20
Manganese	200	199		ug/L		99	80 - 120	2	20
Sodium	10000	9520		ug/L		95	80 - 120	2	20
Iron	10000	10000		ug/L		100	80 - 120	2	20

Lab Sample ID: 480-146398-1 MS — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451253 — **Prep Batch: 450270**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	ND		200	203		ug/L		101	75 - 125
Nickel	ND		200	210		ug/L		105	75 - 125
Aluminum	60	J	10000	8300		ug/L		82	75 - 125
Calcium	380000		10000	390000	4	ug/L		149	75 - 125
Manganese	3200	B	200	3440	4	ug/L		103	75 - 125
Sodium	9800		10000	18000		ug/L		82	75 - 125
Iron	ND		10000	10200		ug/L		102	75 - 125

Lab Sample ID: 480-146398-1 MSD — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451253 — **Prep Batch: 450270**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	ND		200	201		ug/L		101	75 - 125	1	20
Nickel	ND		200	206		ug/L		103	75 - 125	2	20
Aluminum	60	J	10000	9440		ug/L		94	75 - 125	13	20
Calcium	380000		10000	387000	4	ug/L		118	75 - 125	1	20
Manganese	3200	B	200	3430	4	ug/L		96	75 - 125	0	20
Sodium	9800		10000	19000		ug/L		92	75 - 125	6	20
Iron	ND		10000	9990		ug/L		100	75 - 125	2	20

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-450161/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450161

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			12/11/18 13:51	1
Sulfate	ND		2.0	0.35	mg/L			12/11/18 13:51	1

Lab Sample ID: LCS 480-450161/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450161

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.3		mg/L		99	90 - 110
Sulfate	50.0	47.6		mg/L		95	90 - 110

Lab Sample ID: 480-146398-1 MS — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450161

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	3.2		250	248		mg/L		98	81 - 120

Lab Sample ID: 480-146398-1 MSD — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450161

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	3.2		250	251		mg/L		99	81 - 120	1	20

Lab Sample ID: MB 480-450398/4 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450398

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			12/12/18 10:05	1
Sulfate	ND		2.0	0.35	mg/L			12/12/18 10:05	1

Lab Sample ID: LCS 480-450398/3 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450398

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	48.5		mg/L		97	90 - 110
Sulfate	50.0	47.6		mg/L		95	90 - 110

Lab Sample ID: 480-146398-1 MS — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450398

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	780		2500	3130		mg/L		94	80 - 120

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 480-146398-1 MSD — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 450398

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	780		2500	3150		mg/L		95	80 - 120	1	20

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 480-451656/30 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			12/18/18 17:05	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			12/18/18 17:05	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 17:05	1

Lab Sample ID: MB 480-451656/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			12/18/18 14:02	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			12/18/18 14:02	1
Alkalinity, Carbonate	ND		5.0	0.79	mg/L			12/18/18 14:02	1

Lab Sample ID: LCS 480-451656/31 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	92.0		mg/L		92	90 - 110

Lab Sample ID: LCS 480-451656/8 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	91.1		mg/L		91	90 - 110

Lab Sample ID: 480-146398-1 MS — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	160		100	230		mg/L		66	60 - 140

Lab Sample ID: 480-146398-1 MSD — **Client Sample ID: OC-SL-6**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 451656

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity, Total	160		100	231		mg/L		68	60 - 140	1	20

QC Sample Results

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

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

Lab Sample ID: MB 480-449947/1
Matrix: Water
Analysis Batch: 449947

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	ND		10	4.0	mg/L			12/10/18 11:59	1

Lab Sample ID: LCS 480-449947/2
Matrix: Water
Analysis Batch: 449947

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			500	506		mg/L		101	85 - 115		

Lab Sample ID: 480-146398-3 DU
Matrix: Water
Analysis Batch: 449947

Client Sample ID: OC-SL-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	660			660		mg/L				0	10

Lab Sample ID: MB 480-450135/1
Matrix: Water
Analysis Batch: 450135

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	ND		10	4.0	mg/L			12/11/18 08:50	1

Lab Sample ID: LCS 480-450135/2
Matrix: Water
Analysis Batch: 450135

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			500	481		mg/L		96	85 - 115		

QC Association Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Metals

Prep Batch: 449968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-4	OC-SL-2	Total/NA	Water	3005A	
480-146398-5	OC-SL-1D	Total/NA	Water	3005A	
480-146398-6	DUP-SL-6	Total/NA	Water	3005A	
MB 480-449968/1-A	Method Blank	Total/NA	Water	3005A	
LCS 480-449968/2-A	Lab Control Sample	Total/NA	Water	3005A	
LCSD 480-449968/23-A	Lab Control Sample Dup	Total/NA	Water	3005A	

Prep Batch: 450270

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	3005A	
480-146398-2	OC-SL-5	Total/NA	Water	3005A	
480-146398-3	OC-SL-3	Total/NA	Water	3005A	
MB 480-450270/1-A	Method Blank	Total/NA	Water	3005A	
LCS 480-450270/2-A	Lab Control Sample	Total/NA	Water	3005A	
LCSD 480-450270/22-A	Lab Control Sample Dup	Total/NA	Water	3005A	
480-146398-1 MS	OC-SL-6	Total/NA	Water	3005A	
480-146398-1 MSD	OC-SL-6	Total/NA	Water	3005A	

Analysis Batch: 451253

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	6010	450270
480-146398-2	OC-SL-5	Total/NA	Water	6010	450270
480-146398-3	OC-SL-3	Total/NA	Water	6010	450270
MB 480-450270/1-A	Method Blank	Total/NA	Water	6010	450270
LCS 480-450270/2-A	Lab Control Sample	Total/NA	Water	6010	450270
LCSD 480-450270/22-A	Lab Control Sample Dup	Total/NA	Water	6010	450270
480-146398-1 MS	OC-SL-6	Total/NA	Water	6010	450270
480-146398-1 MSD	OC-SL-6	Total/NA	Water	6010	450270

Analysis Batch: 451324

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-4	OC-SL-2	Total/NA	Water	6010	449968
480-146398-5	OC-SL-1D	Total/NA	Water	6010	449968
480-146398-6	DUP-SL-6	Total/NA	Water	6010	449968
MB 480-449968/1-A	Method Blank	Total/NA	Water	6010	449968
LCS 480-449968/2-A	Lab Control Sample	Total/NA	Water	6010	449968
LCSD 480-449968/23-A	Lab Control Sample Dup	Total/NA	Water	6010	449968

General Chemistry

Analysis Batch: 449947

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	SM 2540C	
480-146398-2	OC-SL-5	Total/NA	Water	SM 2540C	
480-146398-3	OC-SL-3	Total/NA	Water	SM 2540C	
MB 480-449947/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-449947/2	Lab Control Sample	Total/NA	Water	SM 2540C	
480-146398-3 DU	OC-SL-3	Total/NA	Water	SM 2540C	

General Chemistry (Continued)

Analysis Batch: 450135

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-4	OC-SL-2	Total/NA	Water	SM 2540C	
480-146398-5	OC-SL-1D	Total/NA	Water	SM 2540C	
480-146398-6	DUP-SL-6	Total/NA	Water	SM 2540C	
MB 480-450135/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-450135/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 450161

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	300.0	
480-146398-2	OC-SL-5	Total/NA	Water	300.0	
480-146398-3	OC-SL-3	Total/NA	Water	300.0	
480-146398-4	OC-SL-2	Total/NA	Water	300.0	
480-146398-5	OC-SL-1D	Total/NA	Water	300.0	
480-146398-6	DUP-SL-6	Total/NA	Water	300.0	
MB 480-450161/4	Method Blank	Total/NA	Water	300.0	
LCS 480-450161/3	Lab Control Sample	Total/NA	Water	300.0	
480-146398-1 MS	OC-SL-6	Total/NA	Water	300.0	
480-146398-1 MSD	OC-SL-6	Total/NA	Water	300.0	

Analysis Batch: 450398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	300.0	
480-146398-2	OC-SL-5	Total/NA	Water	300.0	
480-146398-6	DUP-SL-6	Total/NA	Water	300.0	
MB 480-450398/4	Method Blank	Total/NA	Water	300.0	
LCS 480-450398/3	Lab Control Sample	Total/NA	Water	300.0	
480-146398-1 MS	OC-SL-6	Total/NA	Water	300.0	
480-146398-1 MSD	OC-SL-6	Total/NA	Water	300.0	

Analysis Batch: 451656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-146398-1	OC-SL-6	Total/NA	Water	SM 2320B	
480-146398-2	OC-SL-5	Total/NA	Water	SM 2320B	
480-146398-3	OC-SL-3	Total/NA	Water	SM 2320B	
480-146398-4	OC-SL-2	Total/NA	Water	SM 2320B	
480-146398-5	OC-SL-1D	Total/NA	Water	SM 2320B	
480-146398-6	DUP-SL-6	Total/NA	Water	SM 2320B	
MB 480-451656/30	Method Blank	Total/NA	Water	SM 2320B	
MB 480-451656/7	Method Blank	Total/NA	Water	SM 2320B	
LCS 480-451656/31	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 480-451656/8	Lab Control Sample	Total/NA	Water	SM 2320B	
480-146398-1 MS	OC-SL-6	Total/NA	Water	SM 2320B	
480-146398-1 MSD	OC-SL-6	Total/NA	Water	SM 2320B	

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-6

Lab Sample ID: 480-146398-1
Date Collected: 12/06/18 07:55
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			450270	12/12/18 10:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451253	12/17/18 13:13	AMH	TAL BUF
Total/NA	Analysis	300.0		5	450161	12/11/18 14:40	CLA	TAL BUF
Total/NA	Analysis	300.0		50	450398	12/12/18 10:54	EMD	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:04	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	449947	12/10/18 11:59	RAF	TAL BUF

Client Sample ID: OC-SL-5

Lab Sample ID: 480-146398-2
Date Collected: 12/06/18 09:00
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			450270	12/12/18 10:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451253	12/17/18 13:43	AMH	TAL BUF
Total/NA	Analysis	300.0		10	450161	12/11/18 15:45	CLA	TAL BUF
Total/NA	Analysis	300.0		20	450398	12/12/18 10:29	EMD	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:16	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	449947	12/10/18 11:59	RAF	TAL BUF

Client Sample ID: OC-SL-3

Lab Sample ID: 480-146398-3
Date Collected: 12/06/18 09:40
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			450270	12/12/18 10:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451253	12/17/18 13:47	AMH	TAL BUF
Total/NA	Analysis	300.0		5	450161	12/11/18 15:53	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:23	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	449947	12/10/18 11:59	RAF	TAL BUF

Client Sample ID: OC-SL-2

Lab Sample ID: 480-146398-4
Date Collected: 12/06/18 10:25
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			449968	12/11/18 15:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451324	12/17/18 14:21	AMH	TAL BUF
Total/NA	Analysis	300.0		1	450161	12/11/18 16:02	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:28	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	450135	12/11/18 08:50	RAF	TAL BUF

Lab Chronicle

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Client Sample ID: OC-SL-1D

Lab Sample ID: 480-146398-5

Date Collected: 12/06/18 11:00
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			449968	12/11/18 15:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451324	12/17/18 14:25	AMH	TAL BUF
Total/NA	Analysis	300.0		1	450161	12/11/18 16:10	CLA	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:34	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	450135	12/11/18 08:50	RAF	TAL BUF

Client Sample ID: DUP-SL-6

Lab Sample ID: 480-146398-6

Date Collected: 12/06/18 07:55
Matrix: Water
Date Received: 12/07/18 01:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			449968	12/11/18 15:20	VEG	TAL BUF
Total/NA	Analysis	6010		1	451324	12/17/18 14:28	AMH	TAL BUF
Total/NA	Analysis	300.0		5	450161	12/11/18 16:18	CLA	TAL BUF
Total/NA	Analysis	300.0		20	450398	12/12/18 10:37	EMD	TAL BUF
Total/NA	Analysis	SM 2320B		1	451656	12/18/18 16:40	KEB	TAL BUF
Total/NA	Analysis	SM 2540C		1	450135	12/11/18 08:50	RAF	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Accreditation/Certification Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
6010	3005A	Water	Aluminum
6010	3005A	Water	Calcium
6010	3005A	Water	Chromium
6010	3005A	Water	Iron
6010	3005A	Water	Manganese
6010	3005A	Water	Nickel
6010	3005A	Water	Sodium

Method Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Method	Method Description	Protocol	Laboratory
6010	Metals (ICP)	SW846	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2320B	Alkalinity	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
3005A	Preparation, Total Metals	SW846	TAL BUF

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

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 BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Olin Corporation
Project/Site: Olin Chemical Calcium Sulfate Landfill

TestAmerica Job ID: 480-146398-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-146398-1	OC-SL-6	Water	12/06/18 07:55	12/07/18 01:00
480-146398-2	OC-SL-5	Water	12/06/18 09:00	12/07/18 01:00
480-146398-3	OC-SL-3	Water	12/06/18 09:40	12/07/18 01:00
480-146398-4	OC-SL-2	Water	12/06/18 10:25	12/07/18 01:00
480-146398-5	OC-SL-1D	Water	12/06/18 11:00	12/07/18 01:00
480-146398-6	DUP-SL-6	Water	12/06/18 07:55	12/07/18 01:00

Login Sample Receipt Checklist

Client: Olin Corporation

Job Number: 480-146398-1

Login Number: 146398

List Source: TestAmerica Buffalo

List Number: 1

Creator: Wallace, Cameron

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
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 sample IDs on the containers 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	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

Chain of Custody Record

360325-Boston

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Brian Guichard	Lab PM: Mason, Becky C	Carrier Tracking No(s):	COC No: 480-116092-2
Client Contact: Mr. Brian Guichard	Phone: 9786586121	E-Mail: becky.mason@testamericainc.com		Page: Page 1 of 1
Company: Olin Corporation				Job #:
Address: 51 Eames street	Due Date Requested:			
City: Wilmington	TAT Requested (days):			
State, Zip: MA, 01887				
Phone: 423-336-4012(Tel)	PO #: REWI0025			
Email: beguichard@olin.com	WO #:			
Project Name: Olin Calcium Sulfate Landfill	Project #: 48006612			
Site: Massachusetts	SSOW#:			

480-146398 COC

Preservation

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 - Hexa...
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)

Other:

Analysis Requested

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)	300.0_28D - Sulfate and Chloride	6010MCP - Total Metals Al/Ca/Cr/Fe/Mn/Na/Ni	~~6010MCP - Dissolved Metals Al/Ca/Cr/Fe/Mn/Na/Ni~~	2540C_Calcd - Solids, Total Dissolved (TDS)	2320B - Bicarbonate and carbonate Alkalinity	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D	D	N	N		
OC-SL-6	12-6-18	7:55	G	Water			1	1		1	1	4	
OC-SL-5		9:00	G	Water			1	1		1	1	4	
OC-SL-3		9:40	G	Water			1	1		1	1	4	
OC-SL-2		10:25	G	Water			1	1		1	1	4	
OC-SL-1D		11:00	G	Water			1	1		1	1	4	
DUP SL-6		7:55	G	Water			1	1		1	1	4	
SL-6 MS		7:55	G	Water			1	1		1	1	4	
SL-6 MSD		7:55	G	Water			1	1		1	1	4	
				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:

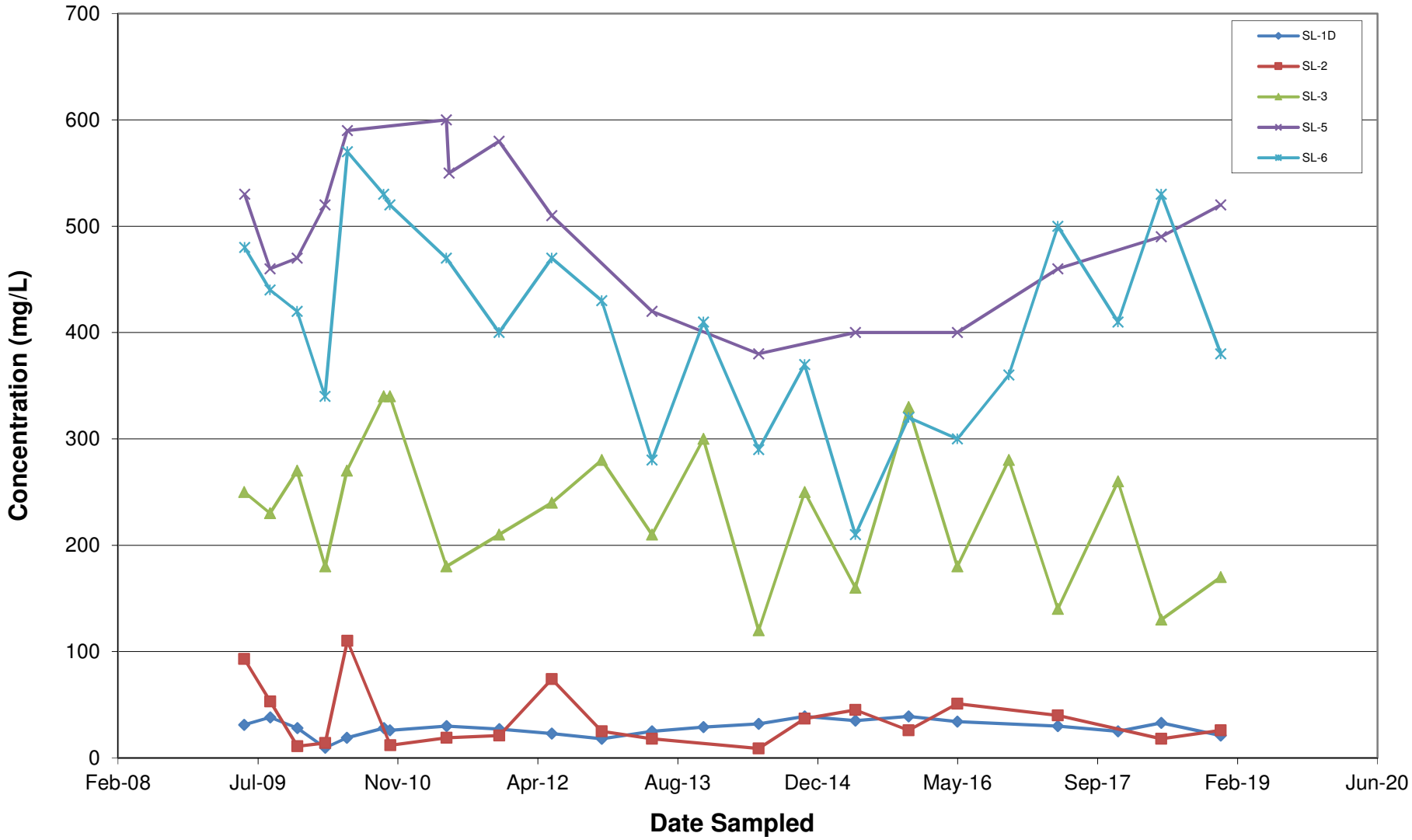
Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]			[signature]	12-6-18 1400	[signature]
[signature]	12-6-18 1800	[signature]	Jordan Valcarone	12-07-18 0100	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.7 #1

Ver: 08/04/2016

APPENDIX D
DATA TREND PLOTS



Olin Chemical Superfund Site
Wilmington, Massachusetts

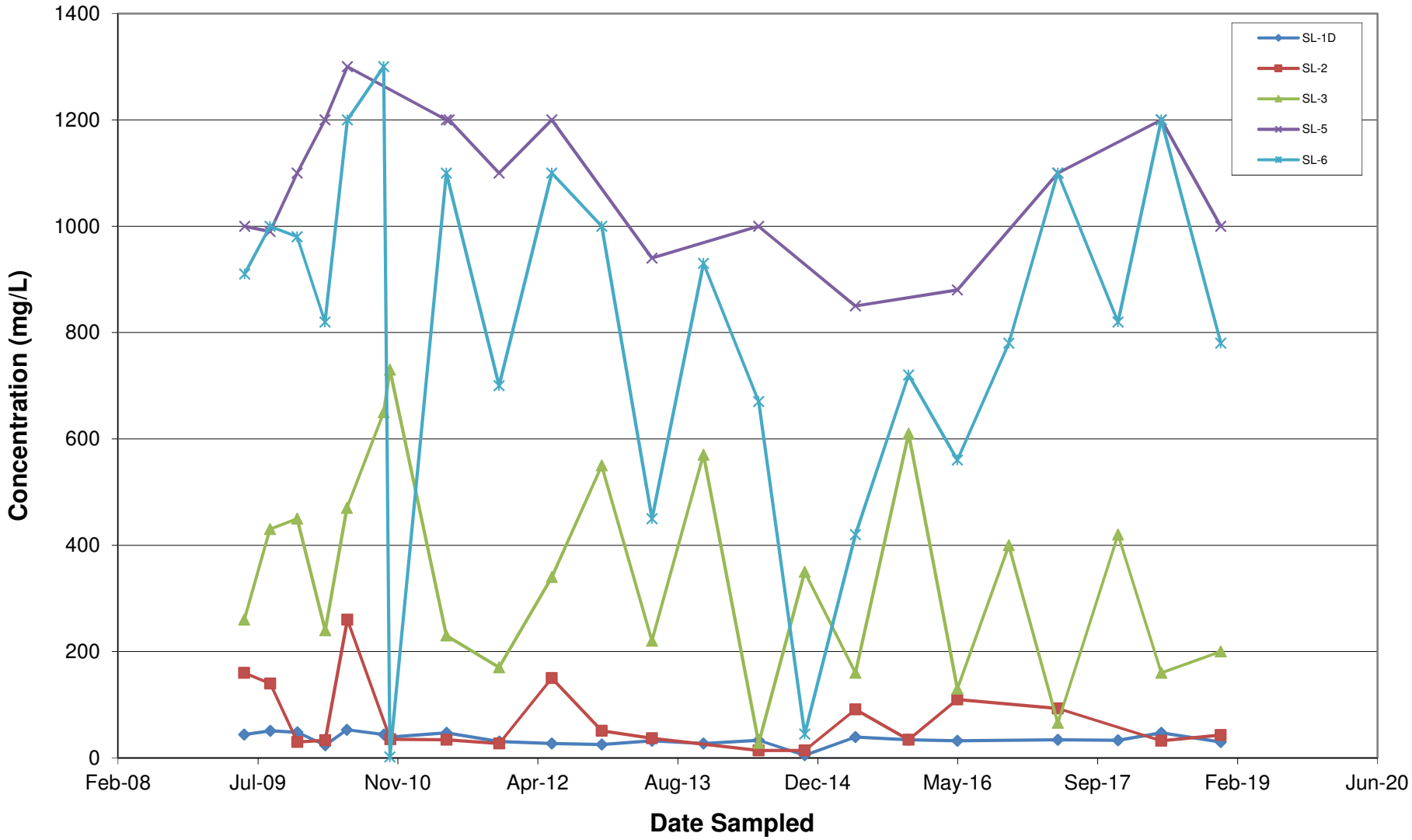
wood.

Calcium Sulfate Landfill
Calcium in Groundwater

Figure C-1

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Calcium CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

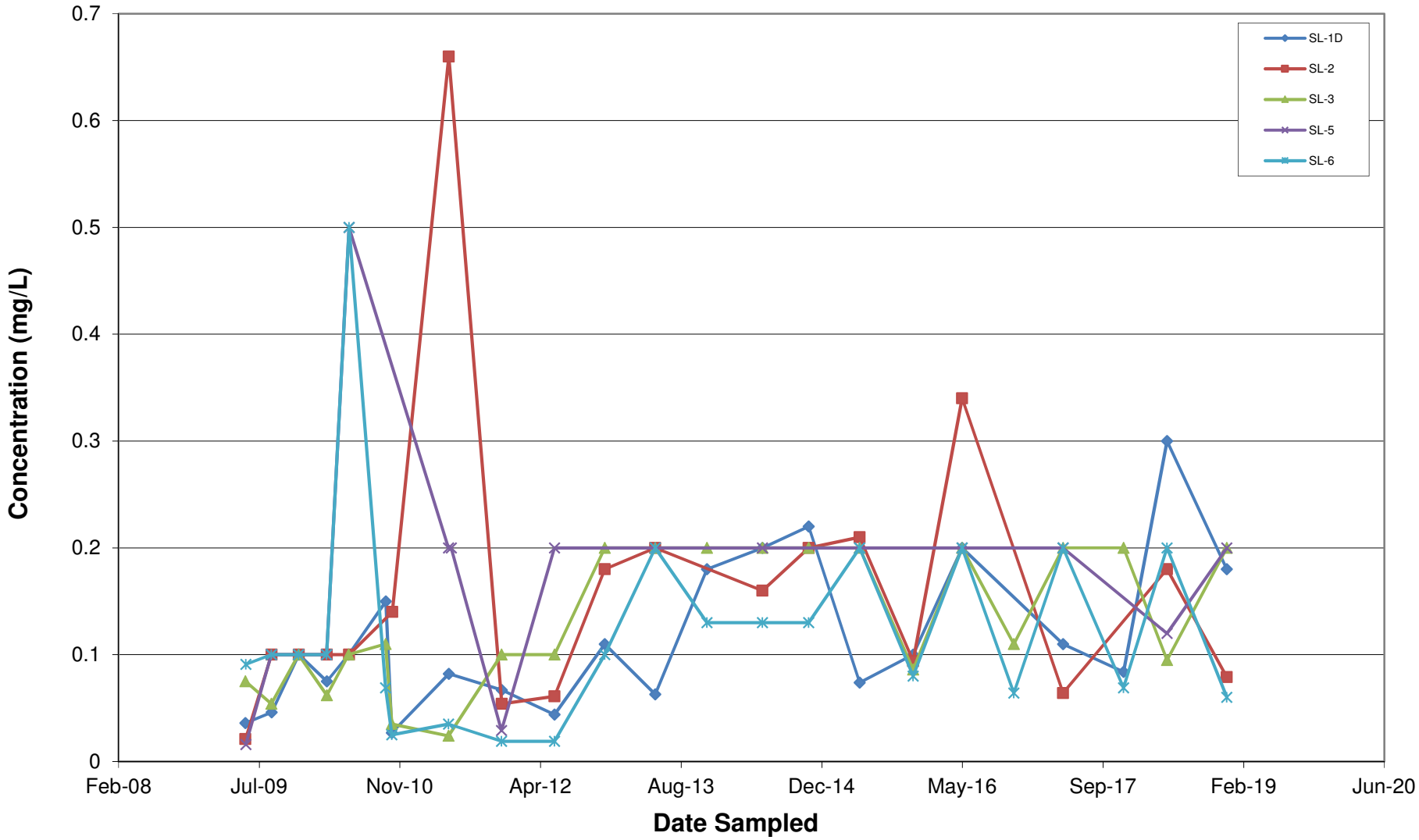
wood.

Calcium Sulfate Landfill
Sulfate in Groundwater

Figure C-2

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Sulfate CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

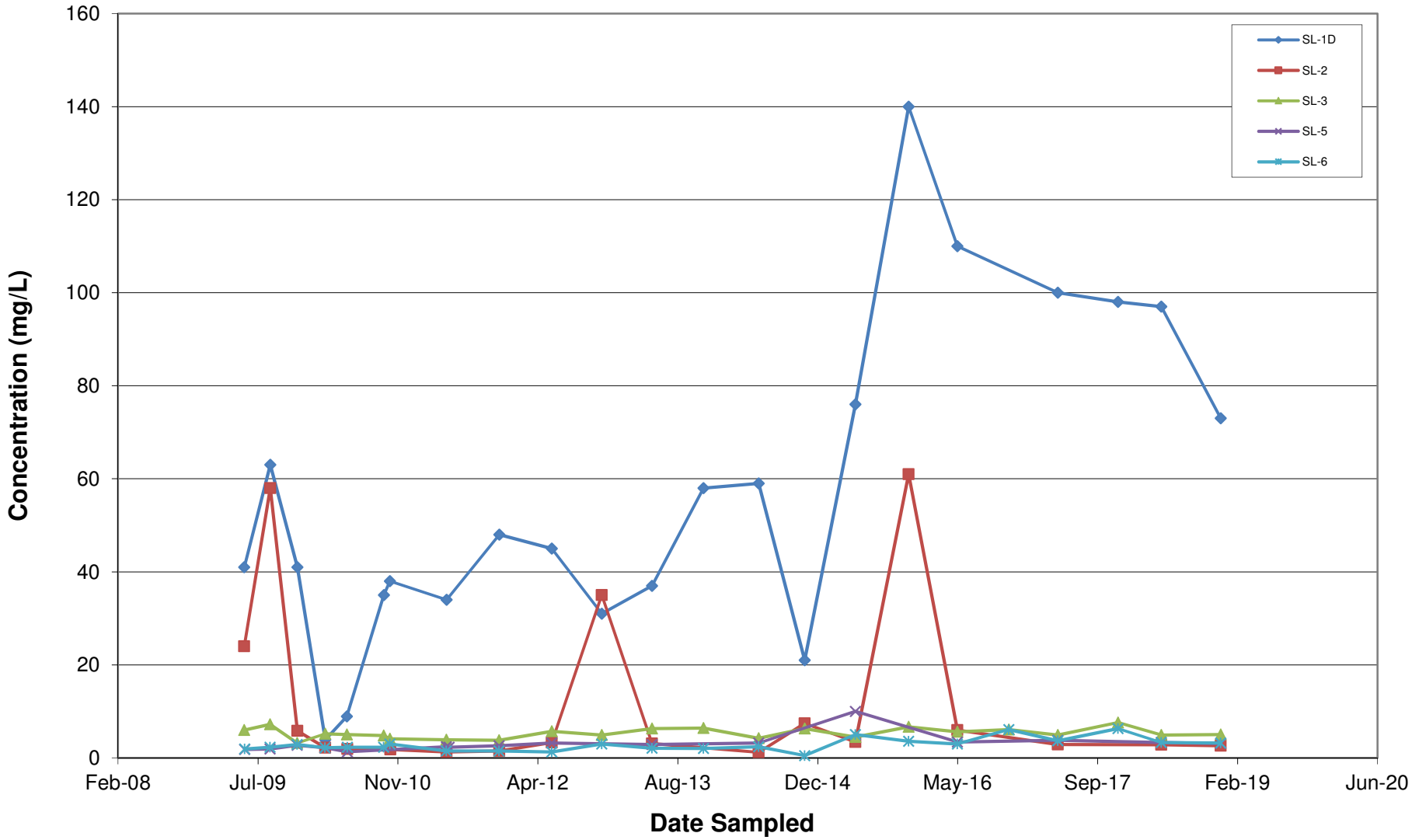
wood.

Calcium Sulfate Landfill
Aluminum in Groundwater

Figure C-3

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Aluminum CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

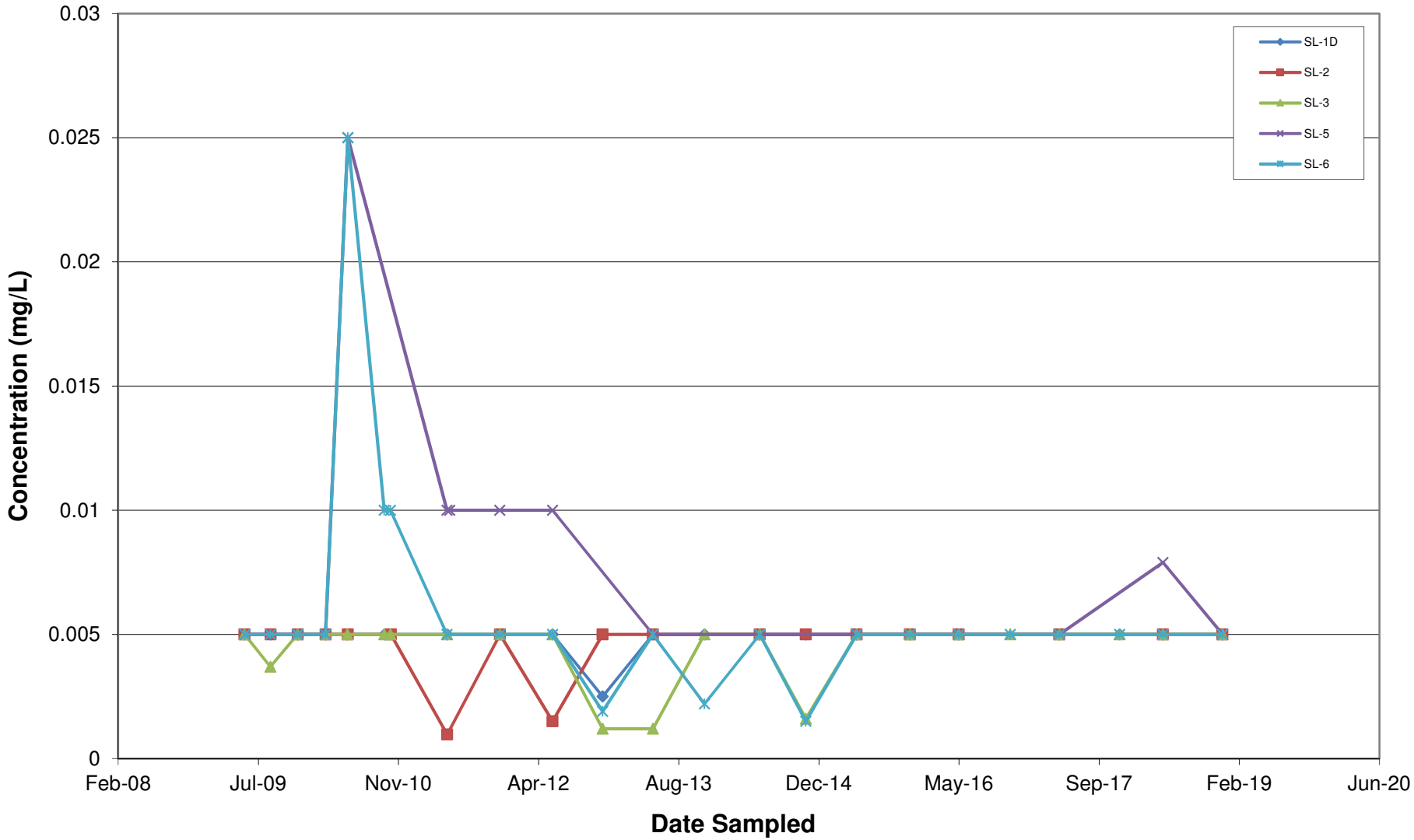
wood.

Calcium Sulfate Landfill
Chloride in Groundwater

Figure C-4

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Chloride CSL

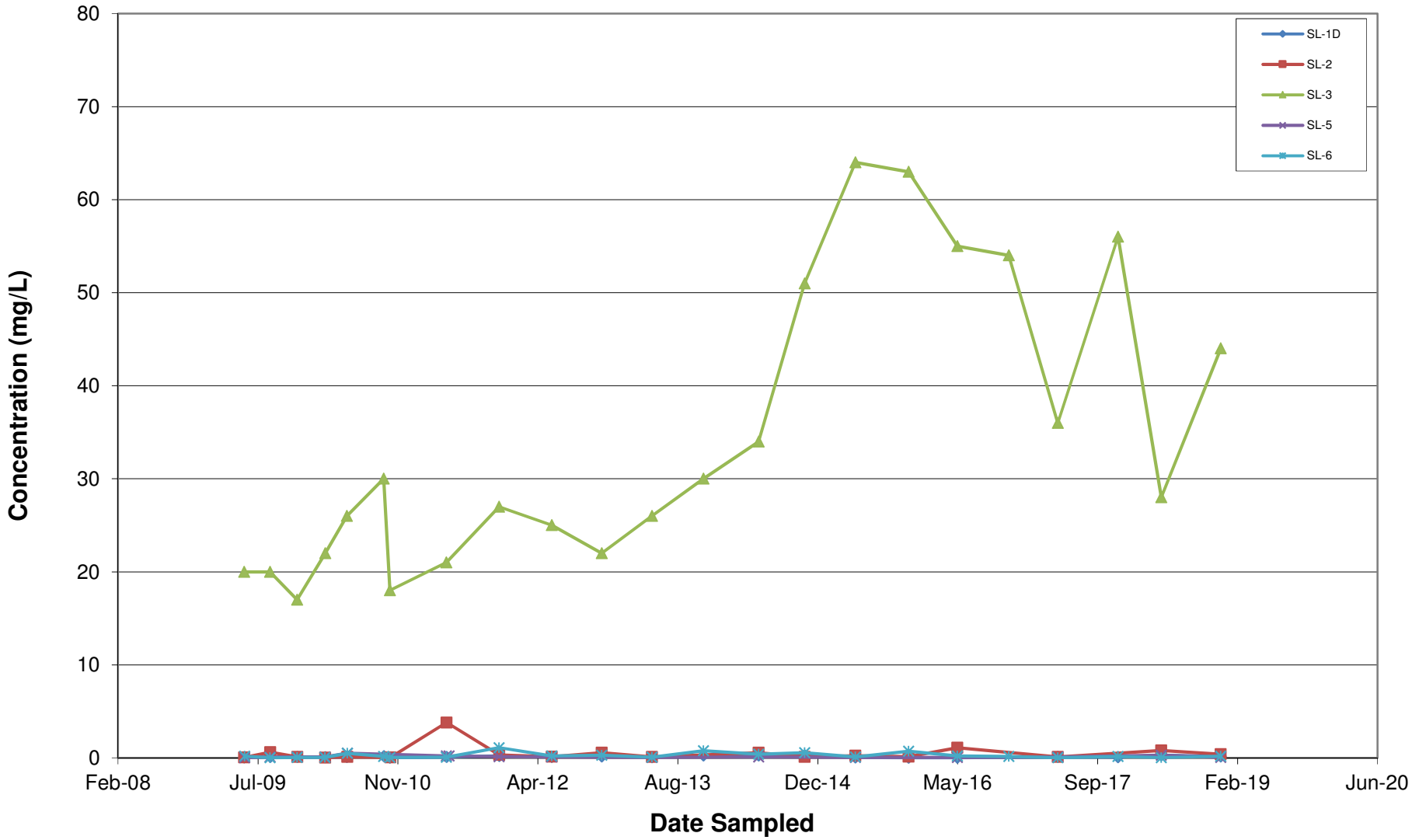
Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site Wilmington, Massachusetts	wood.	Calcium Sulfate Landfill **Chromium** in Groundwater Figure C-5

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Chromium CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

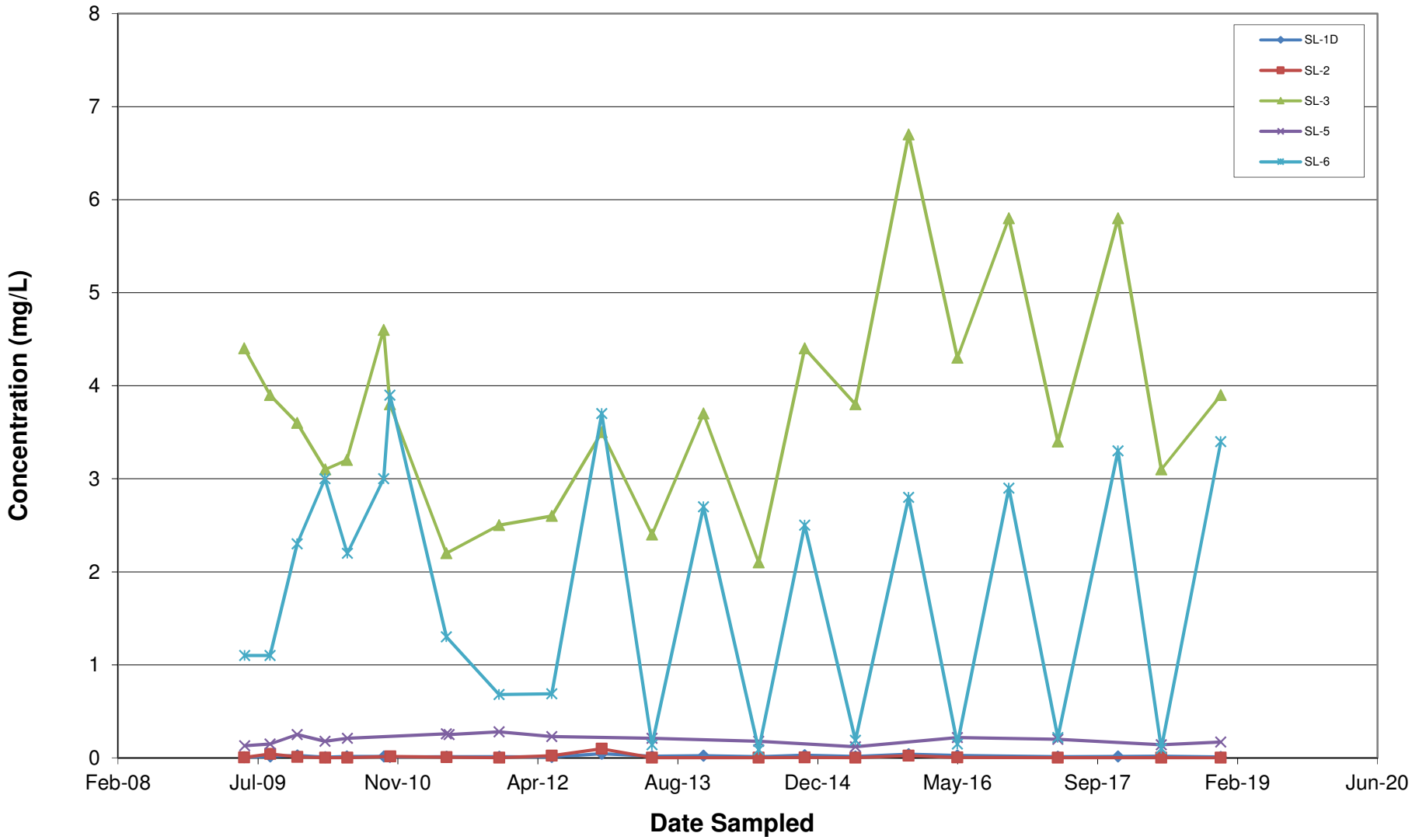
wood.

Calcium Sulfate Landfill
Iron in Groundwater

Figure C-6

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Iron CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

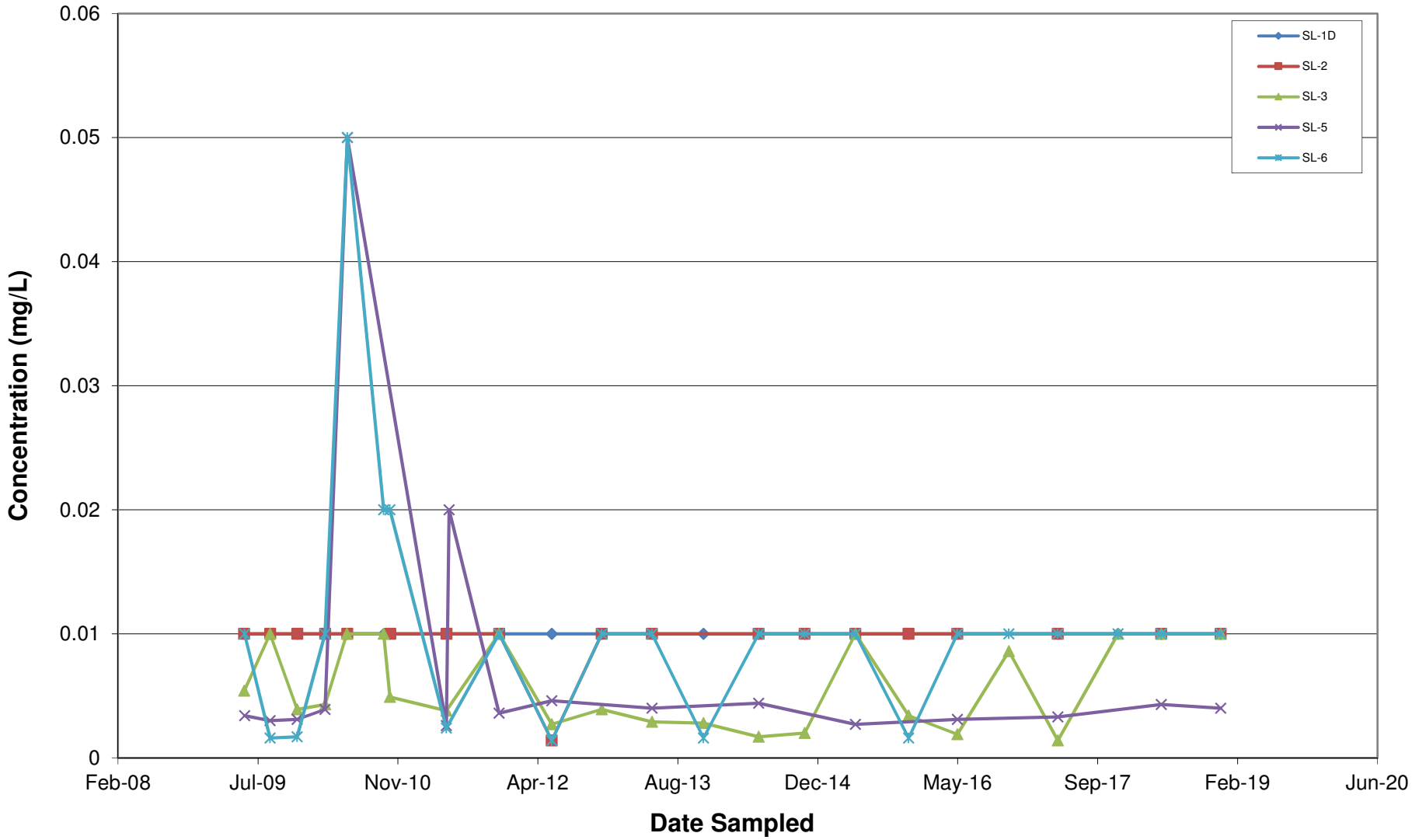
wood.

Calcium Sulfate Landfill
Manganese in Groundwater

Figure C-7

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Manganese CSL

Prepared by: SAI 02/06/2019
Checked by: CTM 02/08/2019



Olin Chemical Superfund Site
Wilmington, Massachusetts

wood.

Calcium Sulfate Landfill
Nickel in Groundwater

Figure C-8

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Nickel CSL

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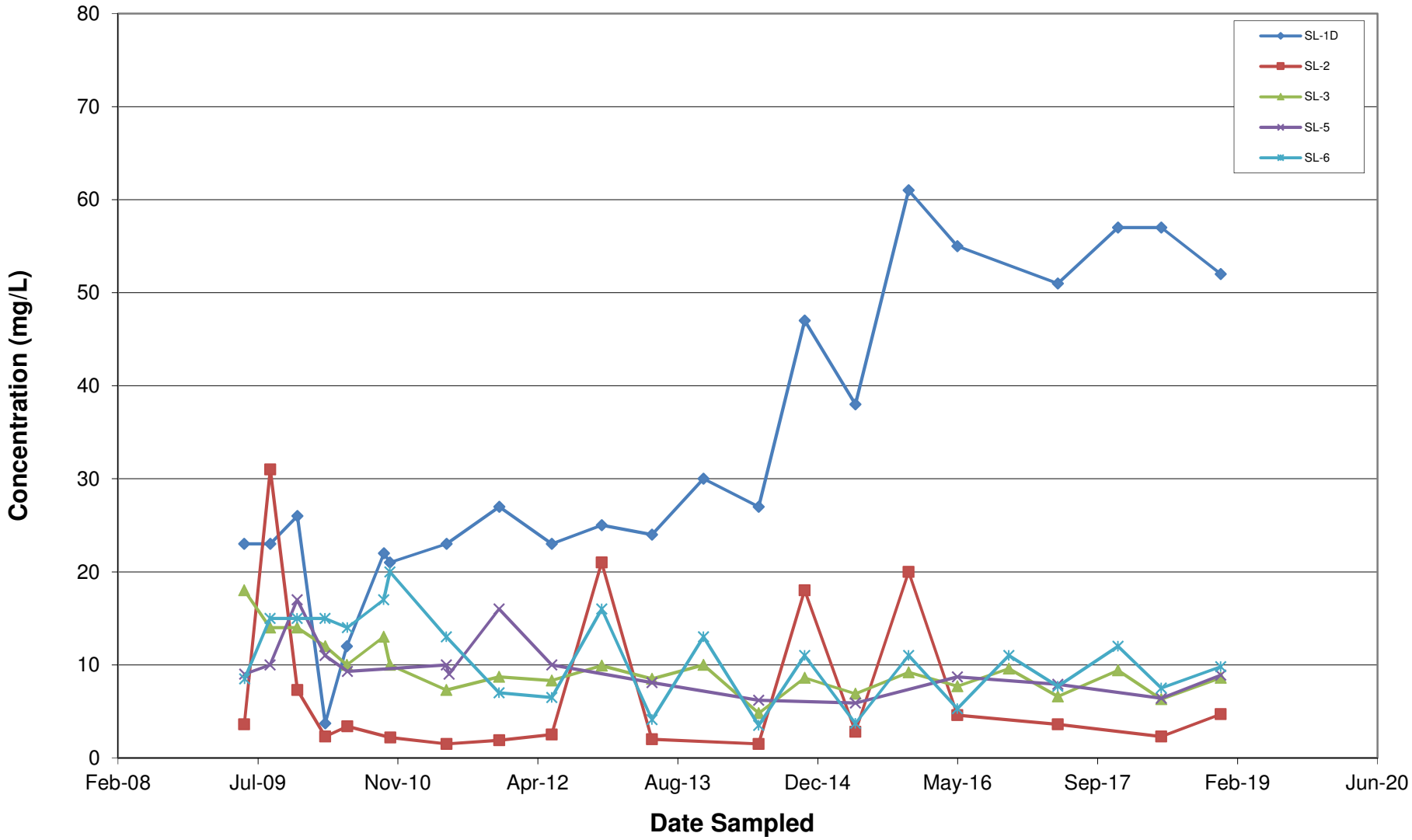

Olin Chemical Superfund Site Wilmington, Massachusetts	wood.	Calcium Sulfate Landfill **Sodium** in Groundwater Figure C-9

P:\old_Wakefield_Data\projects\OLIN\Wilmington\Calcium Sulfate Landfill\2018_CSL Report\Appendix D\
CSL-GW-Trends to Dec 2018.xls, Sodium CSL

Prepared by: SAI 02/06/2019
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