SKB Environmental Cloquet Landfill Inc.

2018 Coal Combustion Residuals Annual Monitoring Report

SKB Environmental Cloquet Landfill
761 Minnesota State Highway 45
Cloquet, Minnesota
Permit SW-399

January 30, 2019

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Date: January 31, 2019 License Number: 25086

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Acronyms

BTV	Background Threshold Values
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
COC	Chemicals of Concern
GES	Groundwater & Environmental Services, Inc.
mg/l	milligrams per liter
MPCA	Minnesota Pollution Control Agency
NGVD	National Geodetic Vertical Datum
pci/l	picoCuries per liter
QA/QC	Quality assurance/quality control
Report	Coal Combusion Residuals Annual Monitoring Report
SAP	Sampling Analysis Plan
SKB Cloquet Landfill	SKB Environmental Cloquet Landfill
SSI	statistically significant increase
USL	Upper Simultaneous Limit

1 Introduction

The *Coal Combustion Residuals Annual Groundwater Monitoring Report* (Report) was prepared to summarize the results of the 2018 groundwater monitoring events and associated analysis for Appendix III to Part 257 at the SKB Environmental Cloquet Landfill (SKB Cloquet Landfill). The SKB Cloquet Landfill initiated operations under Minnesota Pollution Control Agency (MPCA) Site Permit Number SW-399 in 2011. The SKB Cloquet Landfill is located in Cloquet, Carlton County, Minnesota (**Figure 1**).

Per CFR 40.257.90 – 257.98, 2 groundwater monitoring events were conducted at the SKB Cloquet Landfill in the spring and fall of 2018. Analytical results from the groundwater monitoring events are compared and evaluated to Background Threshold Values (BTVs) established for the SKB Cloquet Landfill.

1.1 Scope of Work

The following scope of work was conducted for the 2018 CCR groundwater monitoring events.

- Conduct 2 gauging and sampling events of the site's 7 monitoring wells.
- Measure static water elevations for each monitoring well to the nearest 0.01 feet from surveyed reference point.
- Record the volume of water removed from each monitoring well (in gallons) and total well volumes removed before sampling.
- Record field parameter stabilization results from each monitoring well.
- Conduct a statistical evaluation of groundwater sampling analytical data using ProUCL 5.0.00 (Singh, 2013) to determine background threshold values (BTVs) for each analyte.
- Select tolerance or prediction interval procedure for future statistical analysis of groundwater monitoring data.
- Prepare a CCR Annual Groundwater Monitoring Report summarizing the groundwater sampling and statistical evaluation.

2 Site Background

2.1 Site Location and Description

The facility is located on a 59-acre parcel of land in Section 25, Township 49 North, Range 17 West, city of Cloquet, Carlton County, Minnesota. With reference to roadways, the facility is located south of Interstate 35 and west of Minnesota State Highway 45. The facility entrance is off Minnesota State Highway 45. The site location is depicted on **Figure 1** and **Figure 2** presents a Site Plan Map.

The nearest body of water is the St. Louis River, which is approximately 0.25 miles east of the facility. The facility's current maximum elevation is approximately 1,234 feet above the National Geodetic Vertical Datum of 1929 (NGVD 29) on top of the existing legacy demolition landfill. The lowest elevation is the old sand pit floor (Ulland Brothers sand pit) in the southwest corner of the property, which is approximately 1,143 feet (NGVD 29). Stormwater flows either to depressions around the site or to a temporary stormwater basin on the east side of Phase 1. The site is sandy and stormwater is allowed to infiltrate the ground at each of the stormwater ponding locations.

3 Monitoring Network Systems and Sampling Schedule

The groundwater monitoring network at SKB Cloquet Landfill was designed based on the analysis of local and regional hydrologic conditions. Currently the system consists of 7 monitoring wells. The monitoring wells used as data collection points have been divided into 2 groups for the purpose of this report:

- Upgradient Monitoring Point. The upgradient monitoring point consists of monitoring well P-1.
- Downgradient Monitoring Points. The downgradient monitoring points consist of monitoring wells downgradient of the compliance boundary. The downgradient monitoring wells are P-2, P-3, P-4R, P-5, P-6 and P-7.

For the CCR evaluation, a total of 2 groundwater monitoring events were conducted in 2018 on the following dates:

- April 27, 2018
- October 19, 2018

4 Groundwater Sampling Methodology

For the SKB Cloquet Landfill CCR sampling events, static groundwater elevations were measured to the nearest 0.01 feet in each monitoring well with a water interface probe prior to groundwater sample collection. Using a well dedicated, pneumatic low-flow bladder pump, each well was purged and field stabilization parameters including temperature, pH, dissolved oxygen, conductance, and redox potential were measured.

Groundwater samples were placed in laboratory-prepared containers and labeled with the following information:

- Unique sample number
- Site name
- Name of sampler
- Time and date

Immediately following collection, samples were placed on ice in a field cooler and shipped with a chain of custody form to a Test America, Inc. (Test America) of Amherst, New York.

Groundwater samples obtained during the 2 sampling events in 2018 were analyzed for parameters specified in Appendix III to Part 257 and are noted below:

Appendix III

General Chemistry

- Chloride (Method 300.0)
- Fluoride (Method 300.0)
- Sulfate as SO_4 (Method 300.0)
- pH (Standard Method 4500 H+ B)
- Total Dissolved Solids (Standard Method 2540C)

Metals

- Boron (Method 200.7 Rev. 4.4)
- Calcium (Method 200.7 Rev. 4.4)

Quality assurance/quality control (QA/QC) samples including duplicate, field, and equipment samples were collected during each sampling event.

5 Groundwater Monitoring Results

5.1 Groundwater Elevation Data

Groundwater elevations recorded during the groundwater events are presented in **Table 1**. Groundwater contours maps were generated for the April 27 and October 19, 2018 monitoring events. Groundwater flow direction was calculated to be to the east (**Figures 3** and **4**).

5.2 Groundwater Analytical Data

Groundwater analytical results for the CCR monitoring events are presented in **Table 2**. A summary of the stabilization parameter tests performed for each well prior to sampling are provided in **Table 3** and copies of field sampling data sheets are in **Appendix A**. Laboratory analytical reports are included in **Appendix B**.

The calculated BTVs for the SKB Cloquet Landfill are provided in **Table 4**. Comparing the 2018 sampling results to the BTVs shows no exceedances of the COCs over BTVs.

6 Statistical Evaluation of Data

This groundwater statistical evaluation for landfill monitoring is conducted in accordance with CFR 40.257.93(f)(3). Specifically, current concentrations were compared to the interwell upper simultaneous limits (USLs) in order to determine if a potential statistically significant increase (SSI) exists at downgradient wells.

The background dataset was determined for each well using analytical results ranging from Spring 2017 to the most recent sampling events in October of 2018.

Statistical evaluation of the 2017 - 2018 CCR groundwater monitoring data determined background concentrations and included:

1) Establishing final background datasets for each chemical of concern (COC) including outlier testing.

2) Deriving statistical, upper bound estimates of the background population for each COC using the final background datasets.

To establish final background datasets for each COC, descriptive statistics, outlier analysis and comparative statistical analysis performed on the background datasets confirmed the data in the background dataset for a given COC as representative of the 'true' background population. Descriptive statistics include the number of samples, the number of detections, the detection frequency, the maximum and minimum detected concentrations, the mean, and the standard deviation of the background data, all of which provide a preliminary examination of data.

Outlier analyses identified potential outliers not representative of the true background population. Including real outliers in a dataset can potentially lead to Type I or Type II errors (USEPA, 2009). Rosner's Outlier Test was performed on background datasets containing four (4) detected values or more (USEPA, 2009). Based on an alpha of 0.05, statistically significant outliers were removed from the background dataset in order to improve the power of the prediction limit (USEPA, 2009). The resulting background dataset for each well and COC is tabulated in **Attachment C**.

For the final background datasets after outlier analyses, summary statistics calculated the number of samples, number of detections, detection frequency, maximum and minimum detected concentrations, mean concentration, and the standard deviation. The final datasets calculations of the underlying distributions employing Shapiro-Wilks (e.g., normal, lognormal, gamma) using ProUCL 5.0.00 (Singh, 2013) before statistical limits were estimated allowed determination of the appropriate estimates that best describe the background datasets.

The following statistical limits for potential use as a background level (Background Threshold Values (BTVs)) were calculated using ProUCL 5.0.00 (Singh, 2013) for each COC when five or more detections were present:

- 95% upper simultaneous limit (USL)

The 95% USL was selected as the proposed BTVs as:

1) Many of the background datasets contain limited sample sizes and, therefore, are unlikely to represent the full range of natural ambient concentrations in the vicinity of the site.

2) This statistic should result in lower Type I error rates (i.e., false positives) and can be used to compare many observations.

If there were no detected results, the highest detection limit was proposed as the BTV. The calculated BTVs are included in **Table 4**. The statistical evaluation data is included in **Appendix C**.

7 Conclusions

The groundwater data collected in the 2017 – 2018 sampling events were statistically tested following the concepts outlined in this report to form a background data set. Interwell USLs were developed for Chloride, Fluoride, Sulfate as SO_4, Total Dissolved Solids, Boron, Calcium and in 7 monitoring wells (P-1, P-2, P-3, P-4R, P-5, P-6 and P-7). Upper and lower threshold values were developed for pH using USL and box plot statistics (**Appendix C**). The resulting USLs were compared to the current concentrations for each COC and well pair. Compliance is determined by comparing the currently detected concentrations to the calculated USL. No exceedances of BTV values were reported.

8 Report Summary

Per CFR 40.257.90 – 257.98, 2 monitoring events were conducted at the SKB Cloquet Landfill in 2018. Groundwater samples were analyzed for parameters indicated in Appendix III to Part 257. Groundwater samples were collected from the monitoring network's 7 monitoring wells located at the SKB Cloquet Landfill during the 2 monitoring events. Groundwater elevation information from the monthly monitoring data indicates an easterly groundwater flow beneath the landfill.

No exceedances were reported above the interwell BTVs calculated.

9 Recommendations

CCR groundwater monitoring events will be conducted in the spring and fall of 2019. Groundwater samples will be analyzed for detection monitoring parameters specified in Appendix III to Part 257. An evaluation of groundwater analytical results after each monitoring event will be completed to determine if a significant increase over BTVs (**Table 4**) for one or more parameter listed in Appendix III to Part 257 has occurred at any monitoring well. The evaluation will be performed using a tolerance or prediction interval procedure (CFR 40.257.93(f)(3)). The level of each constituent in the monitoring well will be compared to an established BTV generated as the USL. Any single constituent that exceeds the BTV is considered to be an exceedance. Confirmation sampling will determine whether the BTV exceedance is statistically significant.

A 2019 Annual Groundwater Monitoring Report will be prepared and include sampling results from the 2019 CCR groundwater monitoring events and an evaluation of the analytical results as they pertained to BTVs.

References

Singh and Singh, 2013. *ProUCL Version 5.0.00 Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations,* United States Environmental Protection Agency

United States Environmental Protection Agency, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance.* Office of Resource Conservation and Recovery Program Implementation and Information Division, EPA 530/R-09-007, March 2009.

United States Geological Survey, 1979. *Water Resources of The St. Louis River Watershed, Northeastern Minnesota.*

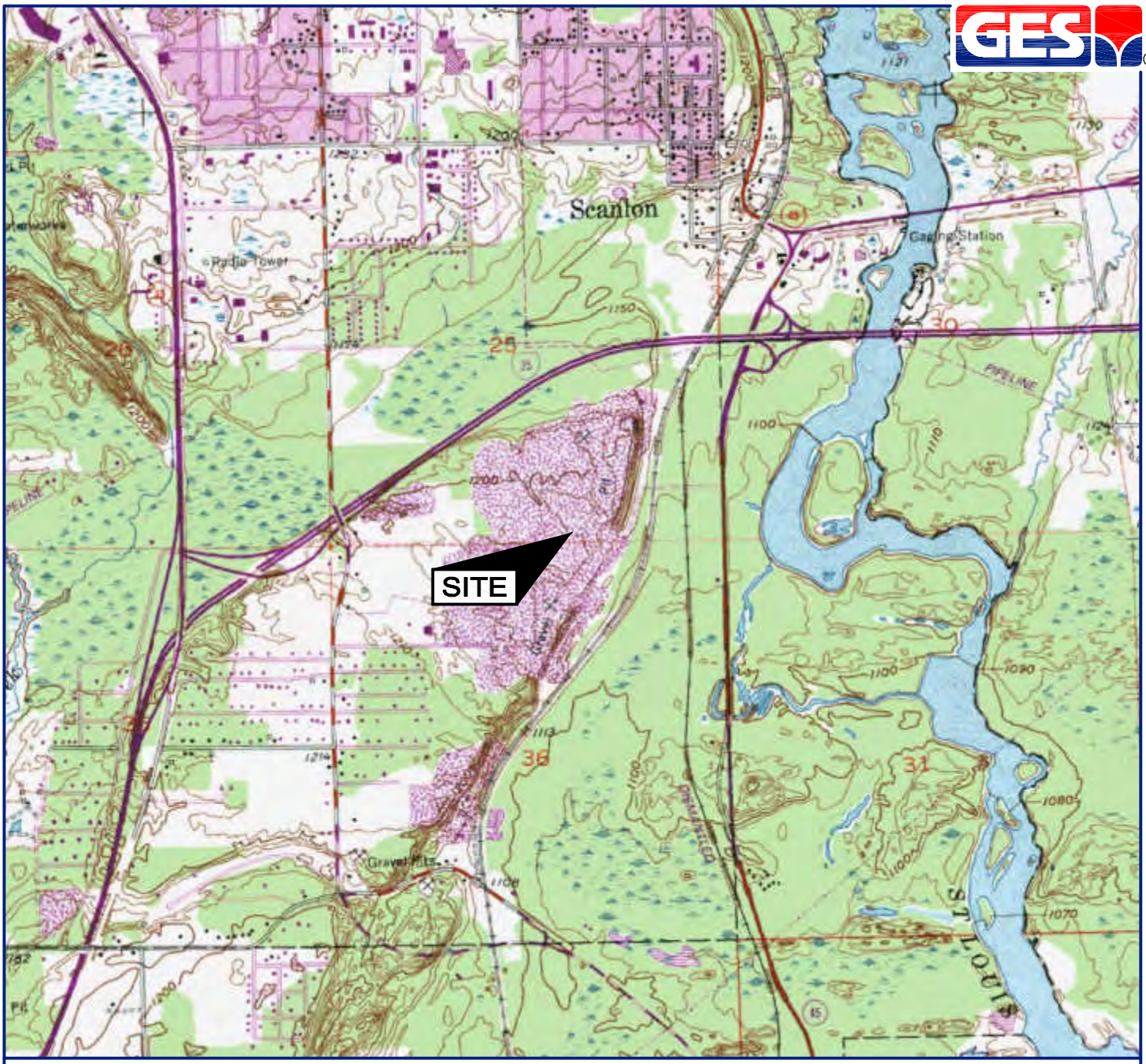
References

Singh and Singh, 2013. *ProUCL Version 5.0.00 Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations,* United States Environmental Protection Agency

United States Environmental Protection Agency, 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance.* Office of Resource Conservation and Recovery Program Implementation and Information Division, EPA 530/R-09-007, March 2009.

United States Geological Survey, 1979. *Water Resources of The St. Louis River Watershed, Northeastern Minnesota.*

Figures

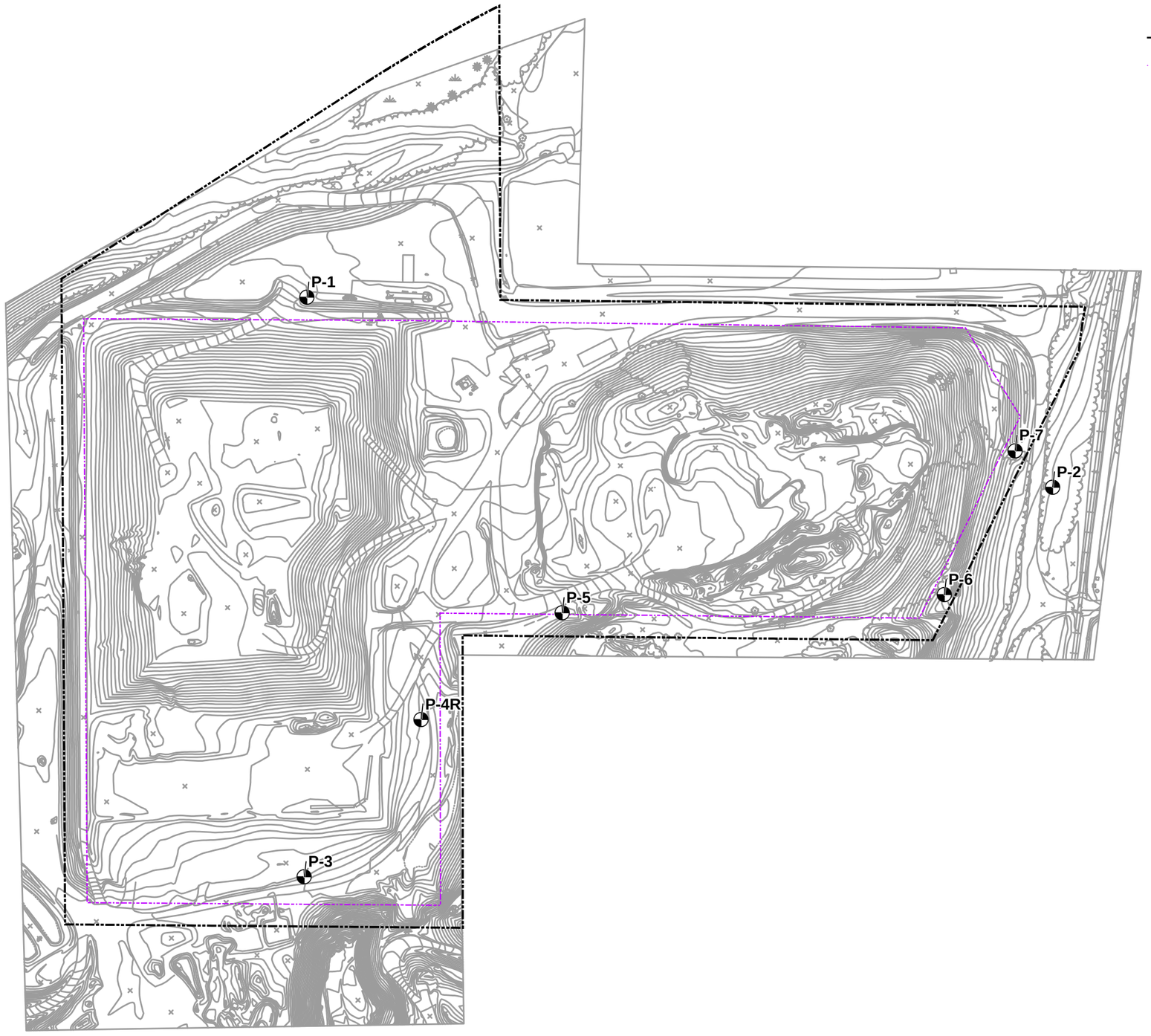


SOURCE: USGS 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE 1993
CLOQUET, MINNESOTA
CONTOUR INTERVAL = 10'

QUADRANGLE LOCATION

DRAFTED BY: W.G.S. (N.J.)	SITE LOCATION MAP
CHECKED BY:	SKB ENVIRONMENTAL SHAMROCK ENVIRONMENTAL LANDFILL 761 MINNESOTA STATE HIGHWAY 45 CLOQUET, MINNESOTA
REVIEWED BY:	Groundwater & Environmental Services, Inc. 1285 CORPORATE CENTER DRIVE, SUITE 120, EAGAN, MN 55121
NORTH	SCALE IN FEET: 0 – 2000 / DATE: 1-8-14 / FIGURE: 1

M:\Graphics\3500-Minnesota\SKB Environmental\Cloquet\Cloquet SLM.dwg, Layout1, WShea



Legend

- MONITORING WELL
- PROPERTY BOUNDARY
- PROPOSED WASTE LIMITS

Site Map

SKB Environmental
Cloquet Landfill
761 Minnesota State Highway 45
Cloquet, Minnesota

Drawn
AMW
Designed
AMW
Approved
DMC

Date
1/10/19
Figure
2

N

Scale In Feet (Approximate)

0 250

GES®
Groundwater & Environmental Services, Inc.

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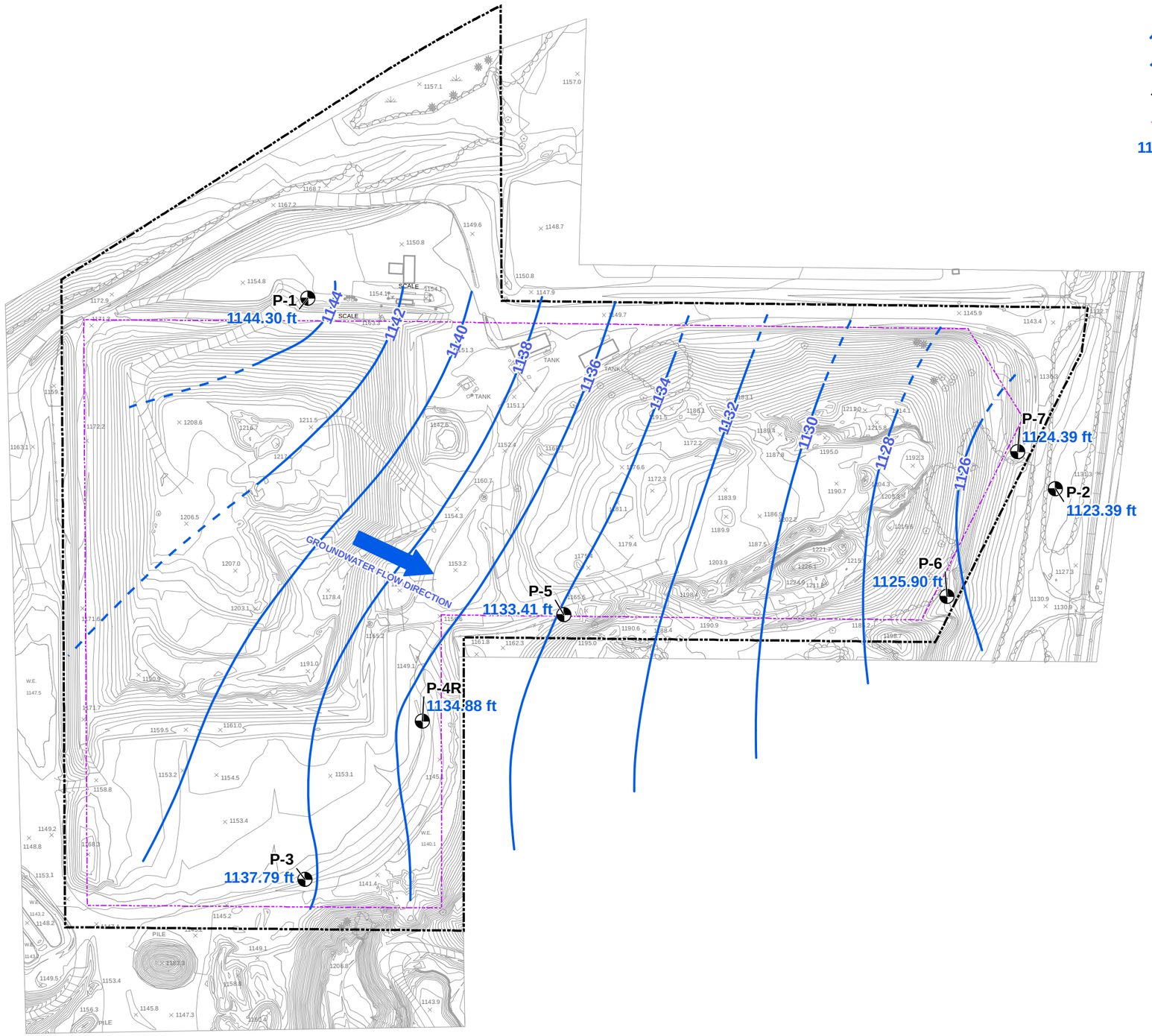

Legend

- MONITORING WELL
- GROUNDWATER ELEVATION ISOCONTOUR (ft MSL)
- INFERRED GROUNDWATER ELEVATION ISOCONTOUR (ft MSL)
- PROPERTY BOUNDARY
- PROPOSED WASTE LIMITS
- 1127.45 MEASURED GROUNDWATER ELEVATION (ft MSL)

GROUNDWATER ELEVATION MAP
APRIL 27, 2018

SKB ENVIRONMENTAL
CLOQUET LANDFILL
761 MINNESOTA STATE HIGHWAY 45
CLOQUET, MINNESOTA

Drawn: JTL	Date: 5-2-18
Designed: JTL	Figure: 3
Approved: DMC	

N W E S

Scale In Feet (Approximate)
0 250

Groundwater & Environmental Services, Inc.

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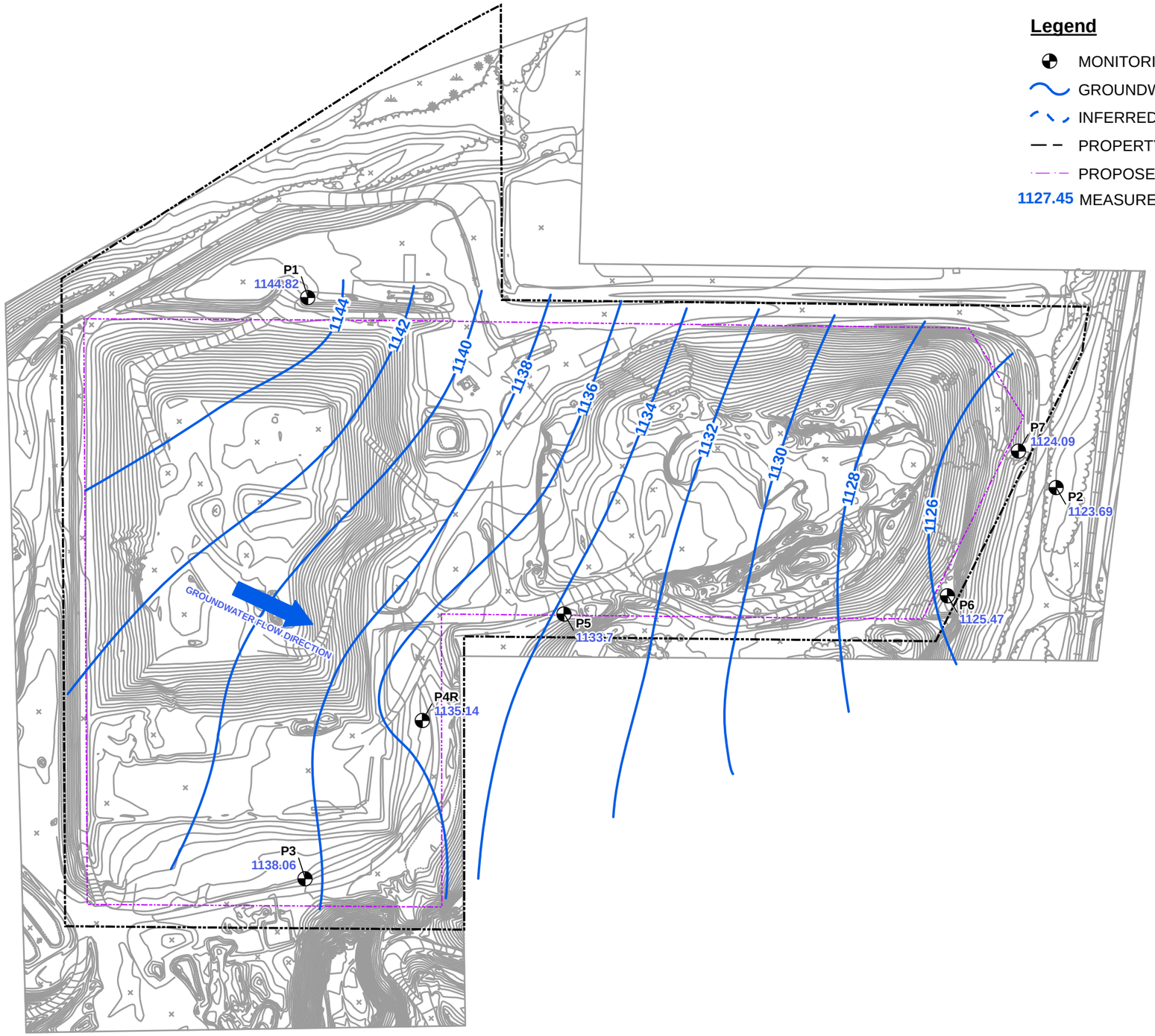

Legend

- MONITORING WELL
- GROUNDWATER ELEVATION ISOCONTOUR (ft MSL)
- INFERRED GROUNDWATER ELEVATION ISOCONTOUR (ft MSL)
- PROPERTY BOUNDARY
- PROPOSED WASTE LIMITS
- 1127.45 MEASURED GROUNDWATER ELEVATION (ft MSL)

Groundwater Elevation Map
October 19, 2018

SKB Environmental
Cloquet Landfill
761 Minnesota State Highway 45
Cloquet, Minnesota

Drawn **AMW**
Designed **AMW**
Approved **DMC**

Date **12/21/18**
Figure **4**

Scale In Feet (Approximate)
0 250

Groundwater & Environmental Services, Inc.

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Tables

CCR 2018 Annual Monitoring Report
SKB Cloquet Landfill
761 Minnesota State Highway 45
Cloquet, Minnesota

Table 1

Groundwater Elevations

Date	P-1	P-2	P-3	P-4R	P-5	P-6	P-7
04/27/2018	1144.30	1123.39	1137.79	1134.88	1133.41	1125.90	1124.39
10/19/2018	1144.82	1123.69	1138.06	1135.14	1133.70	1125.47	1124.09

CCR 2018 Annual Groundwater Monitoring Report
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Cloquet, Minnesota

Table 2

Well Stabilization Data

Well ID	Measurement Date	Field pH	Field Specific Conductivity umhos/cm	Field Temp dec c	Purge Rate ml/min
P-1	4/27/18 8:30	7.82	1282	8.00	1000
P-1	4/27/18 8:35	6.88	1300	7.10	1000
P-1	4/27/18 8:40	6.84	1296	7.10	1000
P-1	4/27/18 8:45	6.82	1294	7.10	1000
P-1	10/19/18 9:30	8.15	1230	12.65	1000
P-1	10/19/18 9:35	6.41	1260	6.41	1000
P-1	10/19/18 9:40	6.27	1300	6.27	1000
P-1	10/19/18 9:45	6.25	1300	6.25	1000
P-2	4/27/18 16:25	7.05	898	2.90	1000
P-2	4/27/18 16:30	6.90	818	2.90	1000
P-2	4/27/18 16:35	6.85	774	2.90	1000
P-2	4/27/18 16:40	6.85	773	2.90	1000
P-2	10/19/18 14:45	6.90	809	10.81	1000
P-2	10/19/18 14:50	6.29	711	10.63	1000
P-2	10/19/18 14:55	6.23	658	10.61	1000
P-2	10/19/18 15:00	6.23	654	10.62	1000
P-3	4/27/18 11:25	7.92	845	3.90	1000
P-3	4/27/18 11:30	7.47	859	3.50	1000
P-3	4/27/18 11:35	7.40	873	3.50	1000
P-3	4/27/18 11:40	7.39	876	3.40	1000
P-3	10/19/18 10:10	6.95	772	12.15	1000
P-3	10/19/18 10:15	6.87	774	12.27	1000
P-3	10/19/18 10:20	6.89	780	12.32	1000
P-3	10/19/18 10:25	6.89	782	12.35	1000
P-4R	4/27/18 12:50	8.05	391	3.70	1000
P-4R	4/27/18 12:55	7.91	436	3.70	1000
P-4R	4/27/18 13:00	7.80	505	3.80	1000
P-4R	4/27/18 13:05	7.80	502	3.80	1000
P-4R	10/19/18 11:30	7.06	1070	12.88	1000
P-4R	10/19/18 11:35	6.80	1100	12.41	1000
P-4R	10/19/18 11:40	6.80	1100	12.41	1000
P-4R	10/19/18 11:45	6.80	1100	12.41	1000
P-5	4/27/18 13:45	6.86	1496	9.70	1000
P-5	4/27/18 13:50	6.74	1496	5.40	1000
P-5	4/27/18 13:55	6.74	1496	4.90	1000
P-5	4/27/18 14:00	6.74	1496	4.70	1000
P-5	10/19/18 12:15	6.62	1429	12.17	1000
P-5	10/19/18 12:20	6.41	1680	10.19	1000
P-5	10/19/18 12:25	6.38	1680	9.85	1000
P-5	10/19/18 12:30	6.37	1680	9.50	1000
P-6	4/27/18 14:45	7.57	1318	7.70	1000
P-6	4/27/18 14:50	6.88	1267	8.50	1000
P-6	4/27/18 14:55	6.85	1266	8.50	1000
P-6	4/27/18 15:00	6.85	1265	8.50	1000

CCR 2018 Annual Groundwater Monitoring Report
SKB Cloquet Landfill
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Cloquet, Minnesota

Table 2

Well Stabilization Data

Well ID	Measurement Date	Field pH	Field Specific Conductivity umhos/cm	Field Temp dec c	Purge Rate ml/min
P-6	10/19/18 13:30	6.79	1330	10.40	1000
P-6	10/19/18 13:35	6.53	1250	9.36	1000
P-6	10/19/18 13:40	6.51	1270	9.29	1000
P-6	10/19/18 13:45	6.51	1270	9.26	1000
P-7	4/27/18 15:40	7.52	1264	5.90	1000
P-7	4/27/18 15:45	6.95	1247	6.60	1000
P-7	4/27/18 15:50	6.95	1246	6.70	1000
P-7	4/27/18 15:55	6.95	1245	6.80	1000
P-7	10/19/18 14:10	6.71	1440	10.06	1000
P-7	10/19/18 14:15	6.60	1470	9.79	1000
P-7	10/19/18 14:20	6.60	1470	9.77	1000
P-7	10/19/18 14:25	6.61	1470	9.76	1000

Table 3

Groundwater Analytical Data

Location	Date	Parameter	Result	Units	CAS #
P-1	04/27/2018	Boron	0.051	mg/l	7440-42-8
P-1	10/19/2018	Boron	0.057	mg/l	7440-42-8
P-1	04/27/2018	Calcium	157	mg/l	7440-70-2
P-1	10/19/2018	Calcium	146	mg/l	7440-70-2
P-1	04/27/2018	Chloride	217	mg/l	16887-00-6
P-1	10/19/2018	Chloride	143	mg/l	16887-00-6
P-1	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-1	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-1	04/27/2018	pH	6.8	pH UNITS	PH
P-1	10/19/2018	pH	6.8	pH UNITS	PH
P-1	04/27/2018	Sulfate as SO4	37.8	mg/l	14808-79-8
P-1	10/19/2018	Sulfate as SO4	28.8	mg/l	14808-79-8
P-1	04/27/2018	Total Dissolved Solids	832	mg/l	TDS
P-1	10/19/2018	Total Dissolved Solids	725	mg/l	TDS
P-2	04/27/2018	Boron	0.048	mg/l	7440-42-8
P-2	10/19/2018	Boron	0.051	mg/l	7440-42-8
P-2	04/27/2018	Calcium	86.4	mg/l	7440-70-2
P-2	10/19/2018	Calcium	71.4	mg/l	7440-70-2
P-2	04/27/2018	Chloride	130	mg/l	16887-00-6
P-2	10/19/2018	Chloride	89.8	mg/l	16887-00-6
P-2	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-2	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-2	04/27/2018	pH	6.6	pH UNITS	PH
P-2	10/19/2018	pH	6.5	pH UNITS	PH
P-2	04/27/2018	Sulfate as SO4	19.9	mg/l	14808-79-8
P-2	10/19/2018	Sulfate as SO4	19.5	mg/l	14808-79-8
P-2	04/27/2018	Total Dissolved Solids	480	mg/l	TDS
P-2	10/19/2018	Total Dissolved Solids	468	mg/l	TDS
P-3	04/27/2018	Boron	0.034	mg/l	7440-42-8
P-3	10/19/2018	Boron	0.037	mg/l	7440-42-8
P-3	04/27/2018	Calcium	108	mg/l	7440-70-2
P-3	10/19/2018	Calcium	92.7	mg/l	7440-70-2
P-3	04/27/2018	Chloride	63.5	mg/l	16887-00-6
P-3	10/19/2018	Chloride	50.6	mg/l	16887-00-6
P-3	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-3	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-3	04/27/2018	pH	7.3	pH UNITS	PH
P-3	10/19/2018	pH	7.1	pH UNITS	PH
P-3	04/27/2018	Sulfate as SO4	70.8	mg/l	14808-79-8
P-3	10/19/2018	Sulfate as SO4	38.5	mg/l	14808-79-8
P-3	04/27/2018	Total Dissolved Solids	465	mg/l	TDS
P-3	10/19/2018	Total Dissolved Solids	438	mg/l	TDS
P-4R	04/27/2018	Boron	0.051	mg/l	7440-42-8
P-4R	10/19/2018	Boron	0.065	mg/l	7440-42-8
P-4R	04/27/2018	Calcium	66.7	mg/l	7440-70-2
P-4R	10/19/2018	Calcium	123	mg/l	7440-70-2

Table 3

Groundwater Analytical Data

Location	Date	Parameter	Result	Units	CAS #
P-4R	04/27/2018	Chloride	37.4	mg/l	16887-00-6
P-4R	10/19/2018	Chloride	118	mg/l	16887-00-6
P-4R	04/27/2018	Fluoride	0.13	mg/l	16984-48-8
P-4R	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-4R	04/27/2018	pH	7.7	pH UNITS	PH
P-4R	10/19/2018	pH	7.2	pH UNITS	PH
P-4R	04/27/2018	Sulfate as SO4	23.6	mg/l	14808-79-8
P-4R	10/19/2018	Sulfate as SO4	54.2	mg/l	14808-79-8
P-4R	04/27/2018	Total Dissolved Solids	222	mg/l	TDS
P-4R	10/19/2018	Total Dissolved Solids	597	mg/l	TDS
P-5	04/27/2018	Boron	0.050	mg/l	7440-42-8
P-5	10/19/2018	Boron	0.043	mg/l	7440-42-8
P-5	04/27/2018	Calcium	170	mg/l	7440-70-2
P-5	10/19/2018	Calcium	166	mg/l	7440-70-2
P-5	04/27/2018	Chloride	185	mg/l	16887-00-6
P-5	10/19/2018	Chloride	202	mg/l	16887-00-6
P-5	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-5	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-5	04/27/2018	pH	6.8	pH UNITS	PH
P-5	10/19/2018	pH	6.8	pH UNITS	PH
P-5	04/27/2018	Sulfate as SO4	49.4	mg/l	14808-79-8
P-5	10/19/2018	Sulfate as SO4	31.5	mg/l	14808-79-8
P-5	04/27/2018	Total Dissolved Solids	851	mg/l	TDS
P-5	10/19/2018	Total Dissolved Solids	930	mg/l	TDS
P-6	04/27/2018	Boron	0.36	mg/l	7440-42-8
P-6	10/19/2018	Boron	0.19	mg/l	7440-42-8
P-6	04/27/2018	Calcium	156	mg/l	7440-70-2
P-6	10/19/2018	Calcium	152	mg/l	7440-70-2
P-6	04/27/2018	Chloride	105	mg/l	16887-00-6
P-6	10/19/2018	Chloride	80.2	mg/l	16887-00-6
P-6	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-6	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-6	04/27/2018	pH	6.9	pH UNITS	PH
P-6	10/19/2018	pH	7.1	pH UNITS	PH
P-6	04/27/2018	Sulfate as SO4	161	mg/l	14808-79-8
P-6	10/19/2018	Sulfate as SO4	70.4	mg/l	14808-79-8
P-6	04/27/2018	Total Dissolved Solids	785	mg/l	TDS
P-6	10/19/2018	Total Dissolved Solids	734	mg/l	TDS
P-7	04/27/2018	Boron	0.13	mg/l	7440-42-8
P-7	10/19/2018	Boron	0.11	mg/l	7440-42-8
P-7	04/27/2018	Calcium	170	mg/l	7440-70-2
P-7	10/19/2018	Calcium	164	mg/l	7440-70-2
P-7	04/27/2018	Chloride	75.9	mg/l	16887-00-6
P-7	10/19/2018	Chloride	107	mg/l	16887-00-6
P-7	04/27/2018	Fluoride	< 0.25	mg/l	16984-48-8
P-7	10/19/2018	Fluoride	< 0.25	mg/l	16984-48-8

Table 3

Groundwater Analytical Data

Location	Date	Parameter	Result	Units	CAS #
P-7	04/27/2018	pH	7.0	pH UNITS	PH
P-7	10/19/2018	pH	7.2	pH UNITS	PH
P-7	04/27/2018	Sulfate as SO4	39.6	mg/l	14808-79-8
P-7	10/19/2018	Sulfate as SO4	32.2	mg/l	14808-79-8
P-7	04/27/2018	Total Dissolved Solids	728	mg/l	TDS
P-7	10/19/2018	Total Dissolved Solids	784	mg/l	TDS

Table 4

Background Threshold Values

Appendix III to Part 257

Parameter	Background Threshold Value (BTV)	Units	CAS #
Boron	0.370	mg/l	7440-42-8
Calcium	273	mg/l	7440-70-2
Chloride	495.5	mg/l	16887-00-6
Fluoride	0.500	mg/l	15984-48-8
pH	lower 6.4 upper 8.2	pH UNITS	PH
Sulfate as SO4	194.9	mg/l	14808-79-8
Total Dissolved Solids	1,930	mg/l	TDS

Appendix A – Field Data Sheets

Groundwater & Environmental Services, INC.
FIELD WORK REQUEST FORM

Project No.: 3501974/42/206 (GW) Date Prepared: April 24, 2018

Site: SKB Environmental
761 MN Highway 45
Cloquet, MN 55720

Site Contact: Kyle Backstrom (SKB) 218-451-1386
Available Time – 12 hrs
Field Representative: NS (Initial)
Field Work Coordinator: Brian Deering

Tasks:

Field

1. Gauge and sample wells concurrently. Gauging ahead of time is not required as they will all be gauged and sampled in 1 day. Sample in the following Order:
   a. P-1
   b. P-3 (Collect Duplicate Here)
   c. P-4R
   d. P-5
   e. P-6
   f. P-7
   g. P-2

2. Collect all monitoring well samples in the order above.
   a. Collect "Duplicate A" from P-3
3. All COC's must be QA'd by a project manager prior to submitting to a laboratory. Ensure all lab-ware is tightly sealed and properly labeled and that the COC matches the containers for each sample location. You can do this by sending a photo of the completed chain to me in email

Ensure all field specific data sheets are filled out in full. Use the previous monitoring event sheets as reference if you have questions on volumes, purge times, etc. These should be used as reference only and are not a steadfast rule for purging etc.

Office

1. scan all field notes into project folders
2. S&R form
3. upload pictures from camera

Date Completed: 4/27/18

Technician: NS (Initial)

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site:	SKB Cloquet	Tubing Diameter (ID):	2	inches
Project Number:	3501874	Depth to Water:	11.31	ft, TOC
Sampling Device:	Dedicated Bladder Pump	Depth to Bottom of Well:	17.7	ft, TOC
Date:	4/27/18	Feet of Water in Well:	6.39	ft
Well ID:	P-1	Volume of Water in Well:	1.04	gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (umhos/cm)	Temperature (°C)	Purge Rate (L/min)
1	11.31	7.82	1282	8.0	1
5	11.32	6.88	1300	7.1	1
10	11.32	6.84	1296	7.1	1
15	11.32	6.82	1294	7.1	1

Purge Start Time: 8:30 Purge End Time: 8:50 Total Volume Purged: 1.5 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: N. Schlegel

Weather Conditions: 37°F, cloudy, 5-10 mph E

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SKB Cloquet
Project Number: 350 1674
Sampling Device: Dedicated Bladder Pump
Date: 4/27/18
Well ID: P-2

Tubing Diameter (ID): 2 inches
Depth to Water: 8.40 ft, TOC
Depth to Bottom of Well: 10.4 ft, TOC
Feet of Water in Well: 2 ft
Volume of Water in Well: 0.33 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (umhos/cm)	Temperature (°F) °C	Purge Rate (L/min)
1	8.40	7.05	898	2.9	1
5	8.45	6.90	818	2.9	1
10	8.67	6.85	774	2.9	1
15	9.12	6.85	773	2.9	1

Purge Start Time: 16:26 Purge End Time: 16:48 Total Volume Purged: 0.5 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: N. Schlagel

Weather Conditions: 37°F, cloudy, 5–10 mph NE

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SLBS Cloquet
Project Number: 3501974
Sampling Device: Dedicated Bladder Pump
Date: 4/27/18
Well ID: P-3

Tubing Diameter (ID): 2 inches
Depth to Water: 8.29 ft, TOC
Depth to Bottom of Well: 12.95 ft, TOC
Feet of Water in Well: 4.66 ft
Volume of Water in Well: 0.76 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (µmhos / cm)	Temperature (°F) °C	Purge Rate (L/min)
1	8.29	7.92	845	3.4	1
5	8.30	7.47	959	3.5	1
10	8.30	7.40	873	3.5	1
15	8.30	7.39	876	3.4	1

Purge Start Time: 11:25 Purge End Time: 11:45 Total Volume Purged: 1.0 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: M. Schlye

Weather Conditions: 39°F, cloudy, 5-10 mph E

Comments: Duplicate collected

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site:	SLCB Lagoon		Tubing Diameter (ID):	2	inches
Project Number:	350194.4		Depth to Water:	7.01	ft, TOC
Sampling Device:	Dedicated Bladder Pump		Depth to Bottom of Well:	9.52	ft, TOC
Date:	4/27/18		Feet of Water in Well:	2.51	ft
Well ID:	P-4R		Volume of Water in Well:	0.41	gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (units / Uh)	Temperature (°F)	Purge Rate (L/min)
1	7.01	8.05	340.9	3.7	1
5	7.03	7.91	435.7	3.7	1
10	7.05	7.80	505	3.8	1
15	7.05	7.93	502	3.8	1

Purge Start Time: 12:50 Purge End Time: 13:10 Total Volume Purged: 0.5 gal

Approximate Purge Rate: 1 L/min. Purged/Sampled by: M. Schlagel

Weather Conditions: 39°F, cloudy, 5-10 mph E

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site:	SLB Cloquet	Tubing Diameter (ID):	2	inches
Project Number:	350197LH	Depth to Water:	32.83	ft, TOC
Sampling Device:	Dedicated Bladder Pump	Depth to Bottom of Well:	37.3	ft, TOC
Date:	4/27/18	Feet of Water in Well:	4.47	ft
Well ID:	P-5	Volume of Water in Well:	0.73	gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (umho / cm)	Temperature (°F) °C	Purge Rate (L/min)
1	32.83	6.86	1496	9.7	1
5	32.84	6.74	1496	5.4	1
10	32.85	6.74	1495	4.9	1
15	32.85	6.74	1494	4.7	1

Purge Start Time: 13:48 Purge End Time: 14:08 Total Volume Purged: 1.0 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: M. Schlagel

Weather Conditions: 37°, cloudy, 5-10 mph E

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: GKB Claycraft
Project Number: 350/974
Sampling Device: Dedicated Bladder Pump
Date: 4/27/18
Well ID: P-6

Tubing Diameter (ID): 1 inches
Depth to Water: 29.53 ft, TOC
Depth to Bottom of Well: 36.2 ft, TOC
Feet of Water in Well: 6.67 ft
Volume of Water in Well: 1.1 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (µmhos/cm)	Temperature (°C)	Purge Rate (L/min)
1	29.53	7.57	1319	7.7	1
3	29.54	6.93	1267	8.3	1
10	29.55	6.95	1266	8.5	1
15	29.55	6.95	1265	8.5	1

Purge Start Time: 14:45 Purge End Time: 15:05 Total Volume Purged: 1.5 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: N. Schlyer

Weather Conditions: 36, cloudy, 5-10 mph E

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SKB Cloquet
Project Number: 3501974
Sampling Device: Dedicated Bladder Pump
Date: 4/27/15
Well ID: P-7

Tubing Diameter (ID): 2 inches
Depth to Water: 15.00 ft, TOC
Depth to Bottom of Well: 19.6 ft, TOC
Feet of Water in Well: 4.60 ft
Volume of Water in Well: 0.75 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (units / cm)	Temperature (°F) °C	Purge Rate (L/min)
1	15.00	7.52	1264	5.9	1
5	15.27	6.93	1247	6.6	1
10	16.02	6.95	1246	6.7	1
15	16.46	6.95	1245	6.8	1

Purge Start Time: 15:40 Purge End Time: 16:00 Total Volume Purged: 1.0 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: M. Schlegel

Weather Conditions: 37°F, cloudy, 5-10 NE

Comments:

Groundwater & Environmental Services, INC.
FIELD WORK REQUEST FORM

Project No.: 3501974/43/206 (GW) Date Prepared: October 16, 2018

Site: SKB Environmental
761 MN Highway 45
Cloquet, MN 55720

Site Contact: Kyle Backstrom (SKB) 218-451-1386
Available Time – 12 hrs
Field Representative: ___/LS___ (Initial)
Field Work Coordinator: Brian Deering

Tasks:

Field

1. Gauge and sample wells concurrently. Gauging ahead of time is not required as they will all be gauged and sampled in 1 day. Sample in the following Order:
   a. P-1
   b. P-3 (Collect Duplicate Here)
   c. P-4R
   d. P-5
   e. P-6
   f. P-7
   g. P-2

2. Collect all monitoring well samples in the order above.
   a. Collect "Duplicate A" from P-3
3. All COC's must be QA'd by a project manager prior to submitting to a laboratory. Ensure all lab-ware is tightly sealed and properly labeled and that the COC matches the containers for each sample location. You can do this by sending a photo of the completed chain to me in email

Ensure all field specific data sheets are filled out in full. Use the previous monitoring event sheets as reference if you have questions on volumes, purge times, etc. These should be used as reference only and are not a steadfast rule for purging etc.

Office

1. scan all field notes into project folders
2. S&R form
3. upload pictures from camera

Date Completed: 10/19/18

Technician: LS (Initial)

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SRB Hoagland
Project Number: 350197A
Sampling Device: Bladder Pump
Date: 10/19/18
Well ID: P1

Tubing Diameter (ID): 2 inches
Depth to Water: 10.79 ft, TOC
Depth to Bottom of Well: 17.1 ft, TOC
Feet of Water in Well: 6.31 ft
Volume of Water in Well: 1.13 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (u mho)	Temperature (°F) °C	Purge Rate (L/min)
1	10.80	8.15	1,230	12.65	1000
5	10.91	6.41	1,260	6.41	1000
10	10.92	6.27	1,300	6.27	1000
15	10.92	6.25	1,300	6.25	1000

Purge Start Time: 9:30 Purge End Time: 9:45 Total Volume Purged: 3.5 gal
Approximate Purge Rate: 1 L/min Purged/Sampled by: NS
Weather Conditions: 52°F, partly cloudy, SW 10-15 mph
Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: 1613 Locust
Project Number: 350197.4
Sampling Device: Bladder Pump
Date: 10/19/10
Well ID: P-3

Tubing Diameter (ID): 2 inches
Depth to Water: 8.02 ft, TOC
Depth to Bottom of Well: 12.95 ft, TOC
Feet of Water in Well: 4.93 ft
Volume of Water in Well: 0.80 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (uS/cm)	Temperature (°F) °C	Purge Rate (L/min)
1	8.03	6.95	772	12.15	1
5	8.05	6.87	774	12.27	1
10	8.05	6.89	780	12.32	1
15	8.05	6.89	782	12.35	1

Purge Start Time: 10:10 Purge End Time: 10:25 Total Volume Purged: 2.5 gal

Approximate Purge Rate: 1000 mL/min Purged/Sampled by: MS

Weather Conditions: 55°F, partly cloudy, SW 15 - 20 mph

Comments: Duplicate collected

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: ~~P-4R~~ SCB Lagoon
Project Number: 350197
Sampling Device: Bladder Pump
Date: 10/19/18
Well ID: P-4R

Tubing Diameter (ID): 2 inches
Depth to Water: 6.75 ft, TOC
Depth to Bottom of Well: 9.52 ft, TOC
Feet of Water in Well: 2.77 ft
Volume of Water in Well: 0.45 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (~~u~~ mhos)	Temperature (~~°F~~) °C	Purge Rate (L/min)
1	6.75	7.66	1,070	12.88	1
5	6.76	6.80	1,100	12.41	1
10	6.77	6.90	1,100	12.41	1
15	6.77	6.90	1,100	12.41	1

Purge Start Time: 11:30 Purge End Time: 11:45 Total Volume Purged: 1.5 gal
Approximate Purge Rate: 1 L/min Purged/Sampled by: MS
Weather Conditions: 57°F, ~~Sunny~~ cloudy, W 15 - 20 mph
Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SLB Lionville
Project Number: 350197
Sampling Device: Bladder pump
Date: 10/19/18
Well ID: P-5

Tubing Diameter (ID): 2 inches
Depth to Water: ft, TOC
Depth to Bottom of Well: 37.3 ft, TOC
Feet of Water in Well: 4.76 ft
Volume of Water in Well: 0.78 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (uS/cm)	Temperature (°F) °C	Purge Rate (L/min)
1	32.54	6.62	4425	12.17	1
5	32.56	6.41	4690	10.19	1
10	32.58	6.38	4600	9.95	1
15	32.58	6.37	4680	9.50	1

Purge Start Time: 12:15 Purge End Time: 12:30 Total Volume Purged: 2.5 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: MS

Weather Conditions: 57°F partly cloudy, NW 15 - 2 mph

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: CKB Unquit
Project Number: 3501973
Sampling Device: Bladder Pump
Date: 10/19/18
Well ID: P-6

Tubing Diameter (ID): 2 inches
Depth to Water: 29.96 ft, TOC
Depth to Bottom of Well: 36.2 ft, TOC
Feet of Water in Well: 6.24 ft
Volume of Water in Well: 1.02 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (µmhos)	Temperature (°F) °C	Purge Rate (L/min)
1	29.96	6.79	1,330	10.40	1
5	29.97	6.53	1,250	9.36	1
10	29.98	6.51	1,270	9.29	1
15	29.98	6.51	1,270	9.26	1

Purge Start Time: 13:30 Purge End Time: 13:45 Total Volume Purged: 3.1 gal
Approximate Purge Rate: 1 L/min Purged/Sampled by: MS
Weather Conditions: 57°F, pHfl, cloudy, W-20 mph
Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SKB Claquet
Project Number: 350192.4
Sampling Device: Bladder Pump
Date: 10/19/18
Well ID: P-7

Tubing Diameter (ID): 2 inches
Depth to Water: 15.36 ft, TOC
Depth to Bottom of Well: 19.6 ft, TOC
Feet of Water in Well: 4.24 ft
Volume of Water in Well: 0.70 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (uS/cm)	Temperature (°F) °C	Purge Rate (L/min)
1	15.36	6.71	1,440	10.06	1
5	16.02	6.60	1,470	9.79	1
10	16.94	6.60	1,470	9.77	1
15	17.46	6.61	1,470	9.76	1

Purge Start Time: 14:10 Purge End Time: 14:25 Total Volume Purged: 2.25 gal

Approximate Purge Rate: 1 L/min Purged/Sampled by: MS

Weather Conditions: 59 °F, partly cloudy, NW 20 mph

Comments:

WELL PURGING RECORD
LOW-FLOW SAMPLING METHOD

Site: SLB Cloquet
Project Number:
Sampling Device: Bladder Pump
Date: 10/19/16
Well ID: D-2

Tubing Diameter (ID): 2 inches
Depth to Water: 8.10 ft, TOC
Depth to Bottom of Well: 10.4 ft, TOC
Feet of Water in Well: 2.3 ft
Volume of Water in Well: 0.37 gal

Elapsed Time (min)	Depth to Water (ft, TOC)	pH (s.u.)	Specific Conductance (uS/cm)	Temperature (°F) °C	Purge Rate (L/min)
1	8.10	6.90	809	10.51	1
5	8.50	6.29	711	10.63	1
10	9.00	6.23	668	10.61	1
15	9.50	6.23	654	10.62	1

Purge Start Time: 14:45 Purge End Time: 15:00 Total Volume Purged: 1.25 gal
Approximate Purge Rate: 1 L/min Purged/Sampled by: M. S.
Weather Conditions: 60°F, partly cloudy, 20 mph NW
Comments:

Appendix B – Laboratory Analytical Reports

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: 480-135088-1
Client Project/Site: SKB Cloquet - CCR Groundwater
Sampling Event: CCR Groundwater
Revision: 1

For:
Waste Connections, Inc.
13425 Courthouse Blvd
Rosemount, Minnesota 55068

Attn: Nathaniel Beinemann

Authorized for release by:
1/28/2019 11:17:56 AM

Ryan VanDette, Project Manager II
(716)504-9830
ryan.vandette@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Qualifiers

Metals

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.

General Chemistry

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

Glossary

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

Job ID: 480-135088-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-135088-1

Comments
This report has been revised to report Appendix III metals only.

No additional comments.

Receipt
The samples were received on 4/28/2018 9:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 2.8º C and 3.0º C.

HPLC/IC
Method(s) 300.0: The following samples were diluted to bring the concentration of target analytes within the calibration range: P-1 (480-135088-1), P-2 (480-135088-2), P-5 (480-135088-5) and P-6 (480-135088-6). Elevated reporting limits (RLs) are provided.

Method(s) 300.0: The following samples were diluted due to the nature of the sample matrix based on historical results: P-3 (480-135088-3), P-7 (480-135088-7) and DUPLICATE` (480-135088-8). 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
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) 9040C, SM 4500 H+ B: This analysis is normally performed in the field and has a method-defined holding time of 15 minutes. The following samples has been qualified with the "HF" flag to indicate analysis was performed in the laboratory outside the 15 minute timeframe: P-1 (480-135088-1), P-2 (480-135088-2), P-3 (480-135088-3), P-4R (480-135088-4), P-5 (480-135088-5), P-6 (480-135088-6), P-7 (480-135088-7), DUPLICATE` (480-135088-8), FIELD BLANK (480-135088-9) and EQUIP BLANK (480-135088-10).

Method(s) SM 2540C: The results reported for the following sample do not concur with results previously reported for this site: (480-135071-C-1). Reanalysis was performed, and the result(s) confirmed.

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

Detection Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-1 — Lab Sample ID: 480-135088-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.051		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	157		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	217		2.5		mg/L	5		300.0	Total/NA
Sulfate	37.8		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	832		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.9	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-2 — Lab Sample ID: 480-135088-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.048		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	86.4		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	130		2.5		mg/L	5		300.0	Total/NA
Sulfate	19.9		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	480		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.6	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.7	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-3 — Lab Sample ID: 480-135088-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.034		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	108		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	63.5		2.5		mg/L	5		300.0	Total/NA
Sulfate	70.8		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	465		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.3	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	19.0	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-4R — Lab Sample ID: 480-135088-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.051		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	66.7		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	37.4		0.50		mg/L	1		300.0	Total/NA
Fluoride	0.13		0.050		mg/L	1		300.0	Total/NA
Sulfate	23.6		2.0		mg/L	1		300.0	Total/NA
Total Dissolved Solids	222		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.7	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.8	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-5 — Lab Sample ID: 480-135088-5

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-5 (Continued) — Lab Sample ID: 480-135088-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.050		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	170		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	185		2.5		mg/L	5		300.0	Total/NA
Sulfate	49.4		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	851		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.5	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-6 — Lab Sample ID: 480-135088-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.36		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	156		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	105		2.5		mg/L	5		300.0	Total/NA
Sulfate	161		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	785		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.9	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.5	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-7 — Lab Sample ID: 480-135088-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.13		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	170		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	75.9		2.5		mg/L	5		300.0	Total/NA
Sulfate	39.6		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	728		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.0	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.6	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: DUPLICATE` — Lab Sample ID: 480-135088-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.042		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	113		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	64.7		2.5		mg/L	5		300.0	Total/NA
Sulfate	71.4		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	518		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.4	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.9	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FIELD BLANK — Lab Sample ID: 480-135088-9

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.0	HF	0.1		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

Client Sample ID: FIELD BLANK (Continued)

Lab Sample ID: 480-135088-9

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Temperature	19.1	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: EQUIP BLANK

Lab Sample ID: 480-135088-10

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	5.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.8	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-1
Date Collected: 04/27/18 08:50
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-1
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.051		0.020		mg/L		05/04/18 08:30	05/08/18 01:11	1
Calcium	157		0.50		mg/L		05/04/18 08:30	05/08/18 01:11	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	217		2.5		mg/L			05/03/18 22:00	5
Fluoride	ND		0.25		mg/L			05/03/18 22:00	5
Sulfate	37.8		10.0		mg/L			05/03/18 22:00	5
Total Dissolved Solids	832		10.0		mg/L			05/04/18 14:52	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.8	HF	0.1		SU			05/03/18 13:53	1
Temperature	18.9	HF	0.001		Degrees C			05/03/18 13:53	1

Client Sample Results

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-2
Date Collected: 04/27/18 16:45
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-2
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.048		0.020		mg/L		05/04/18 08:30	05/08/18 01:15	1
Calcium	86.4		0.50		mg/L		05/04/18 08:30	05/08/18 01:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	130		2.5		mg/L			05/03/18 22:08	5
Fluoride	ND		0.25		mg/L			05/03/18 22:08	5
Sulfate	19.9		10.0		mg/L			05/03/18 22:08	5
Total Dissolved Solids	480		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.6	HF	0.1		SU			05/03/18 13:56	1
Temperature	18.7	HF	0.001		Degrees C			05/03/18 13:56	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-3
Date Collected: 04/27/18 11:45
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-3
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.034		0.020		mg/L		05/04/18 08:30	05/08/18 01:19	1
Calcium	108		0.50		mg/L		05/04/18 08:30	05/08/18 01:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	63.5		2.5		mg/L			05/03/18 22:16	5
Fluoride	ND		0.25		mg/L			05/03/18 22:16	5
Sulfate	70.8		10.0		mg/L			05/03/18 22:16	5
Total Dissolved Solids	465		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF	0.1		SU			05/03/18 13:59	1
Temperature	19.0	HF	0.001		Degrees C			05/03/18 13:59	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-4R
Date Collected: 04/27/18 13:10
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-4
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.051		0.020		mg/L		05/04/18 08:30	05/08/18 01:22	1
Calcium	66.7		0.50		mg/L		05/04/18 08:30	05/08/18 01:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	37.4		0.50		mg/L			05/07/18 21:35	1
Fluoride	0.13		0.050		mg/L			05/07/18 21:35	1
Sulfate	23.6		2.0		mg/L			05/07/18 21:35	1
Total Dissolved Solids	222		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.7	HF	0.1		SU			05/03/18 14:06	1
Temperature	18.8	HF	0.001		Degrees C			05/03/18 14:06	1

Client Sample ID: P-5

Date Collected: 04/27/18 14:05
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-5

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.050		0.020		mg/L		05/04/18 08:30	05/08/18 01:26	1
Calcium	170		0.50		mg/L		05/04/18 08:30	05/08/18 01:26	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	185		2.5		mg/L			05/03/18 22:32	5
Fluoride	ND		0.25		mg/L			05/03/18 22:32	5
Sulfate	49.4		10.0		mg/L			05/03/18 22:32	5
Total Dissolved Solids	851		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.8	HF	0.1		SU			05/03/18 14:10	1
Temperature	18.5	HF	0.001		Degrees C			05/03/18 14:10	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-6
Date Collected: 04/27/18 15:05
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-6
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.36		0.020		mg/L		05/04/18 08:30	05/08/18 01:30	1
Calcium	156		0.50		mg/L		05/04/18 08:30	05/08/18 01:30	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	105		2.5		mg/L			05/03/18 22:41	5
Fluoride	ND		0.25		mg/L			05/03/18 22:41	5
Sulfate	161		10.0		mg/L			05/03/18 22:41	5
Total Dissolved Solids	785		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.9	HF	0.1		SU			05/03/18 14:13	1
Temperature	18.5	HF	0.001		Degrees C			05/03/18 14:13	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-7
Date Collected: 04/27/18 16:00
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-7
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.13		0.020		mg/L		05/04/18 08:30	05/08/18 01:52	1
Calcium	170		0.50		mg/L		05/04/18 08:30	05/08/18 01:52	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	75.9		2.5		mg/L			05/03/18 22:49	5
Fluoride	ND		0.25		mg/L			05/03/18 22:49	5
Sulfate	39.6		10.0		mg/L			05/03/18 22:49	5
Total Dissolved Solids	728		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.0	HF	0.1		SU			05/03/18 14:16	1
Temperature	18.6	HF	0.001		Degrees C			05/03/18 14:16	1

Client Sample ID: DUPLICATE`

Date Collected: 04/27/18 00:00
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-8

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.042		0.020		mg/L		05/04/18 12:03	05/08/18 06:43	1
Calcium	113		0.50		mg/L		05/04/18 12:03	05/08/18 06:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	64.7		2.5		mg/L			05/03/18 23:38	5
Fluoride	ND		0.25		mg/L			05/03/18 23:38	5
Sulfate	71.4		10.0		mg/L			05/03/18 23:38	5
Total Dissolved Solids	518		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.4	HF	0.1		SU			05/03/18 14:20	1
Temperature	18.9	HF	0.001		Degrees C			05/03/18 14:20	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: FIELD BLANK
Date Collected: 04/27/18 17:00
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-9
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		05/04/18 08:30	05/08/18 01:55	1
Calcium	ND		0.50		mg/L		05/04/18 08:30	05/08/18 01:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			05/03/18 23:46	1
Fluoride	ND		0.050		mg/L			05/03/18 23:46	1
Sulfate	ND		2.0		mg/L			05/03/18 23:46	1
Total Dissolved Solids	ND		10.0		mg/L			05/04/18 19:41	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**6.0**	**HF**	0.1		SU			05/03/18 14:23	1
Temperature	**19.1**	**HF**	0.001		Degrees C			05/03/18 14:23	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: EQUIP BLANK

Date Collected: 04/27/18 17:05
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-10

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		05/04/18 08:30	05/08/18 01:59	1
Calcium	ND		0.50		mg/L		05/04/18 08:30	05/08/18 01:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			05/03/18 23:54	1
Fluoride	ND		0.050		mg/L			05/03/18 23:54	1
Sulfate	ND		2.0		mg/L			05/03/18 23:54	1
Total Dissolved Solids	ND		10.0		mg/L			05/04/18 18:34	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**5.8**	**HF**	0.1		SU			05/03/18 14:27	1
Temperature	**18.8**	**HF**	0.001		Degrees C			05/03/18 14:27	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 480-412419/1-A
Matrix: Water
Analysis Batch: 413119

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 412419

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		05/04/18 08:30	05/08/18 00:23	1
Calcium	ND		0.50		mg/L		05/04/18 08:30	05/08/18 00:23	1

Lab Sample ID: LCS 480-412419/2-A
Matrix: Water
Analysis Batch: 413119

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 412419

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.200	0.195		mg/L		97	85 - 115
Boron	0.200	0.195		mg/L		97	85 - 115
Calcium	10.0	9.93		mg/L		99	85 - 115
Chromium	0.200	0.196		mg/L		98	85 - 115
Lead	0.200	0.206		mg/L		103	85 - 115

Lab Sample ID: 480-135088-6 MS
Matrix: Water
Analysis Batch: 413119

Client Sample ID: P-6
Prep Type: Total/NA
Prep Batch: 412419

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.12		0.200	0.306		mg/L		94	70 - 130
Boron	0.36		0.200	0.548		mg/L		96	70 - 130
Calcium	156		10.0	164.1	4	mg/L		78	70 - 130
Chromium	ND		0.200	0.192		mg/L		96	70 - 130
Lead	ND		0.200	0.204		mg/L		102	70 - 130

Lab Sample ID: 480-135088-6 MSD
Matrix: Water
Analysis Batch: 413119

Client Sample ID: P-6
Prep Type: Total/NA
Prep Batch: 412419

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	0.12		0.200	0.315		mg/L		98	70 - 130	3	20
Boron	0.36		0.200	0.569		mg/L		107	70 - 130	4	20
Calcium	156		10.0	172.5	4	mg/L		161	70 - 130	5	20
Chromium	ND		0.200	0.197		mg/L		99	70 - 130	3	20
Lead	ND		0.200	0.210		mg/L		105	70 - 130	3	20

Lab Sample ID: MB 480-412440/1-A
Matrix: Water
Analysis Batch: 413104

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 412440

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		05/04/18 12:03	05/08/18 05:19	1
Calcium	ND		0.50		mg/L		05/04/18 12:03	05/08/18 05:19	1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-412440/2-A
Matrix: Water
Analysis Batch: 413104

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 412440

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.200	0.213		mg/L		106	85 - 115
Boron	0.200	0.214		mg/L		107	85 - 115
Calcium	10.0	10.70		mg/L		107	85 - 115
Chromium	0.200	0.214		mg/L		107	85 - 115
Lead	0.200	0.222		mg/L		111	85 - 115

Lab Sample ID: 480-135088-8 MS
Matrix: Water
Analysis Batch: 413104

Client Sample ID: DUPLICATE`
Prep Type: Total/NA
Prep Batch: 412440

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	0.15		0.200	0.347		mg/L		99	70 - 130
Boron	0.042		0.200	0.254		mg/L		106	70 - 130
Calcium	113		10.0	121.3	4	mg/L		85	70 - 130
Chromium	ND		0.200	0.209		mg/L		105	70 - 130
Lead	ND		0.200	0.219		mg/L		110	70 - 130

Lab Sample ID: 480-135088-8 MSD
Matrix: Water
Analysis Batch: 413104

Client Sample ID: DUPLICATE`
Prep Type: Total/NA
Prep Batch: 412440

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	0.15		0.200	0.357		mg/L		105	70 - 130	3	20
Boron	0.042		0.200	0.261		mg/L		110	70 - 130	3	20
Calcium	113		10.0	124.6	4	mg/L		118	70 - 130	3	20
Chromium	ND		0.200	0.212		mg/L		106	70 - 130	1	20
Lead	ND		0.200	0.225		mg/L		112	70 - 130	2	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-412370/28
Matrix: Water
Analysis Batch: 412370

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			05/03/18 20:14	1
Fluoride	ND		0.050		mg/L			05/03/18 20:14	1
Sulfate	ND		2.0		mg/L			05/03/18 20:14	1

Lab Sample ID: MB 480-412370/52
Matrix: Water
Analysis Batch: 412370

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			05/03/18 23:29	1
Fluoride	ND		0.050		mg/L			05/03/18 23:29	1
Sulfate	ND		2.0		mg/L			05/03/18 23:29	1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 480-412370/27
Matrix: Water
Analysis Batch: 412370

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	51.63		mg/L		103	90 - 110
Fluoride	5.00	5.19		mg/L		104	90 - 110
Sulfate	50.0	52.37		mg/L		105	90 - 110

Lab Sample ID: LCS 480-412370/51
Matrix: Water
Analysis Batch: 412370

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	51.69		mg/L		103	90 - 110
Fluoride	5.00	5.24		mg/L		105	90 - 110
Sulfate	50.0	52.27		mg/L		105	90 - 110

Lab Sample ID: 480-135088-7 MS
Matrix: Water
Analysis Batch: 412370

Client Sample ID: P-7
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	75.9		250	346.7		mg/L		108	81 - 120
Fluoride	ND		25.0	27.12		mg/L		108	82 - 120
Sulfate	39.6		250	314.4		mg/L		110	80 - 120

Lab Sample ID: MB 480-412943/28
Matrix: Water
Analysis Batch: 412943

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			05/07/18 21:21	1
Fluoride	ND		0.050		mg/L			05/07/18 21:21	1
Sulfate	ND		2.0		mg/L			05/07/18 21:21	1

Lab Sample ID: LCS 480-412943/27
Matrix: Water
Analysis Batch: 412943

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.40		mg/L		101	90 - 110
Fluoride	5.00	4.89		mg/L		98	90 - 110
Sulfate	50.0	50.48		mg/L		101	90 - 110

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

Lab Sample ID: MB 480-412670/1
Matrix: Water
Analysis Batch: 412670

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		10.0		mg/L			05/04/18 14:52	1

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

Lab Sample ID: LCS 480-412670/2
Matrix: Water
Analysis Batch: 412670

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	546	535.0		mg/L		98	85 - 115

Lab Sample ID: MB 480-412707/1
Matrix: Water
Analysis Batch: 412707

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		10.0		mg/L			05/04/18 18:34	1

Lab Sample ID: LCS 480-412707/2
Matrix: Water
Analysis Batch: 412707

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	546	544.0		mg/L		100	85 - 115

Lab Sample ID: 480-135088-10 DU
Matrix: Water
Analysis Batch: 412707

Client Sample ID: EQUIP BLANK
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	ND		ND		mg/L		NC	10

Lab Sample ID: MB 480-412716/1
Matrix: Water
Analysis Batch: 412716

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		10.0		mg/L			05/04/18 19:41	1

Lab Sample ID: LCS 480-412716/2
Matrix: Water
Analysis Batch: 412716

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	523	510.0		mg/L		98	85 - 115

Lab Sample ID: 480-135088-9 DU
Matrix: Water
Analysis Batch: 412716

Client Sample ID: FIELD BLANK
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	ND		ND		mg/L		NC	10

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 480-412456/1
Matrix: Water
Analysis Batch: 412456

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Metals

Prep Batch: 412419

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-1	P-1	Total/NA	Water	200.7	
480-135088-2	P-2	Total/NA	Water	200.7	
480-135088-3	P-3	Total/NA	Water	200.7	
480-135088-4	P-4R	Total/NA	Water	200.7	
480-135088-5	P-5	Total/NA	Water	200.7	
480-135088-6	P-6	Total/NA	Water	200.7	
480-135088-7	P-7	Total/NA	Water	200.7	
480-135088-9	FIELD BLANK	Total/NA	Water	200.7	
480-135088-10	EQUIP BLANK	Total/NA	Water	200.7	
MB 480-412419/1-A	Method Blank	Total/NA	Water	200.7	
LCS 480-412419/2-A	Lab Control Sample	Total/NA	Water	200.7	
480-135088-6 MS	P-6	Total/NA	Water	200.7	
480-135088-6 MSD	P-6	Total/NA	Water	200.7	

Prep Batch: 412440

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-8	DUPLICATE`	Total/NA	Water	200.7	
MB 480-412440/1-A	Method Blank	Total/NA	Water	200.7	
LCS 480-412440/2-A	Lab Control Sample	Total/NA	Water	200.7	
480-135088-8 MS	DUPLICATE`	Total/NA	Water	200.7	
480-135088-8 MSD	DUPLICATE`	Total/NA	Water	200.7	

Analysis Batch: 413104

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-8	DUPLICATE`	Total/NA	Water	200.7 Rev 4.4	412440
MB 480-412440/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	412440
LCS 480-412440/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	412440
480-135088-8 MS	DUPLICATE`	Total/NA	Water	200.7 Rev 4.4	412440
480-135088-8 MSD	DUPLICATE`	Total/NA	Water	200.7 Rev 4.4	412440

Analysis Batch: 413119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-1	P-1	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-2	P-2	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-3	P-3	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-4	P-4R	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-5	P-5	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-6	P-6	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-7	P-7	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-9	FIELD BLANK	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-10	EQUIP BLANK	Total/NA	Water	200.7 Rev 4.4	412419
MB 480-412419/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	412419
LCS 480-412419/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-6 MS	P-6	Total/NA	Water	200.7 Rev 4.4	412419
480-135088-6 MSD	P-6	Total/NA	Water	200.7 Rev 4.4	412419

General Chemistry

Analysis Batch: 412370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-1	P-1	Total/NA	Water	300.0	
480-135088-2	P-2	Total/NA	Water	300.0	
480-135088-3	P-3	Total/NA	Water	300.0	
480-135088-5	P-5	Total/NA	Water	300.0	
480-135088-6	P-6	Total/NA	Water	300.0	
480-135088-7	P-7	Total/NA	Water	300.0	
480-135088-8	DUPLICATE`	Total/NA	Water	300.0	
480-135088-9	FIELD BLANK	Total/NA	Water	300.0	
480-135088-10	EQUIP BLANK	Total/NA	Water	300.0	
MB 480-412370/28	Method Blank	Total/NA	Water	300.0	
MB 480-412370/52	Method Blank	Total/NA	Water	300.0	
LCS 480-412370/27	Lab Control Sample	Total/NA	Water	300.0	
LCS 480-412370/51	Lab Control Sample	Total/NA	Water	300.0	
480-135088-7 MS	P-7	Total/NA	Water	300.0	

Analysis Batch: 412456

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-1	P-1	Total/NA	Water	SM 4500 H+ B	
480-135088-2	P-2	Total/NA	Water	SM 4500 H+ B	
480-135088-3	P-3	Total/NA	Water	SM 4500 H+ B	
480-135088-4	P-4R	Total/NA	Water	SM 4500 H+ B	
480-135088-5	P-5	Total/NA	Water	SM 4500 H+ B	
480-135088-6	P-6	Total/NA	Water	SM 4500 H+ B	
480-135088-7	P-7	Total/NA	Water	SM 4500 H+ B	
480-135088-8	DUPLICATE`	Total/NA	Water	SM 4500 H+ B	
480-135088-9	FIELD BLANK	Total/NA	Water	SM 4500 H+ B	
480-135088-10	EQUIP BLANK	Total/NA	Water	SM 4500 H+ B	
LCS 480-412456/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 412670

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-1	P-1	Total/NA	Water	SM 2540C	
MB 480-412670/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-412670/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 412707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-2	P-2	Total/NA	Water	SM 2540C	
480-135088-3	P-3	Total/NA	Water	SM 2540C	
480-135088-4	P-4R	Total/NA	Water	SM 2540C	
480-135088-5	P-5	Total/NA	Water	SM 2540C	
480-135088-6	P-6	Total/NA	Water	SM 2540C	
480-135088-7	P-7	Total/NA	Water	SM 2540C	
480-135088-8	DUPLICATE`	Total/NA	Water	SM 2540C	
480-135088-10	EQUIP BLANK	Total/NA	Water	SM 2540C	
MB 480-412707/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-412707/2	Lab Control Sample	Total/NA	Water	SM 2540C	
480-135088-10 DU	EQUIP BLANK	Total/NA	Water	SM 2540C	

General Chemistry (Continued)

Analysis Batch: 412716

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-9	FIELD BLANK	Total/NA	Water	SM 2540C	
MB 480-412716/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-412716/2	Lab Control Sample	Total/NA	Water	SM 2540C	
480-135088-9 DU	FIELD BLANK	Total/NA	Water	SM 2540C	

Analysis Batch: 412943

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-135088-4	P-4R	Total/NA	Water	300.0	
MB 480-412943/28	Method Blank	Total/NA	Water	300.0	
LCS 480-412943/27	Lab Control Sample	Total/NA	Water	300.0	

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-1

Lab Sample ID: 480-135088-1

Date Collected: 04/27/18 08:50

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:11	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:00	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412670	05/04/18 14:52	SLM	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 13:53	DSC	TAL BUF

Client Sample ID: P-2

Lab Sample ID: 480-135088-2

Date Collected: 04/27/18 16:45

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:15	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:08	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 13:56	DSC	TAL BUF

Client Sample ID: P-3

Lab Sample ID: 480-135088-3

Date Collected: 04/27/18 11:45

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:19	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:16	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 13:59	DSC	TAL BUF

Client Sample ID: P-4R

Lab Sample ID: 480-135088-4

Date Collected: 04/27/18 13:10

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:22	LMH	TAL BUF
Total/NA	Analysis	300.0		1	412943	05/07/18 21:35	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:06	DSC	TAL BUF

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: P-5

Date Collected: 04/27/18 14:05
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:26	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:32	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:10	DSC	TAL BUF

Client Sample ID: P-6

Date Collected: 04/27/18 15:05
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:30	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:41	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:13	DSC	TAL BUF

Client Sample ID: P-7

Date Collected: 04/27/18 16:00
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:52	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 22:49	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:16	DSC	TAL BUF

Client Sample ID: DUPLICATE`

Date Collected: 04/27/18 00:00
Date Received: 04/28/18 09:10

Lab Sample ID: 480-135088-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412440	05/04/18 12:03	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413104	05/08/18 06:43	LMH	TAL BUF
Total/NA	Analysis	300.0		5	412370	05/03/18 23:38	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:20	DSC	TAL BUF

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Client Sample ID: FIELD BLANK

Lab Sample ID: 480-135088-9

Date Collected: 04/27/18 17:00

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:55	LMH	TAL BUF
Total/NA	Analysis	300.0		1	412370	05/03/18 23:46	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412716	05/04/18 19:41	CDC	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:23	DSC	TAL BUF

Client Sample ID: EQUIP BLANK

Lab Sample ID: 480-135088-10

Date Collected: 04/27/18 17:05

Matrix: Water

Date Received: 04/28/18 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			412419	05/04/18 08:30	EMB	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	413119	05/08/18 01:59	LMH	TAL BUF
Total/NA	Analysis	300.0		1	412370	05/03/18 23:54	RJS	TAL BUF
Total/NA	Analysis	SM 2540C		1	412707	05/04/18 18:34	MAB	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	412456	05/03/18 14:27	DSC	TAL BUF

Laboratory References:

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

Accreditation/Certification Summary

Client: Waste Connections, Inc. TestAmerica Job ID: 480-135088-1
Project/Site: SKB Cloquet - CCR Groundwater

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
Minnesota	NELAP	5	036-999-337	12-31-19

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
SM 4500 H+ B		Water	pH
SM 4500 H+ B		Water	Temperature

Method Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Method	Method Description	Protocol	Laboratory
200.7 Rev 4.4	Metals (ICP)	EPA	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 4500 H+ B	pH	SM	TAL BUF
200.7	Preparation, Total Metals	EPA	TAL BUF

Protocol References:

EPA = US Environmental Protection Agency

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"

Laboratory References:

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

Sample Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-135088-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-135088-1	P-1	Water	04/27/18 08:50	04/28/18 09:10
480-135088-2	P-2	Water	04/27/18 16:45	04/28/18 09:10
480-135088-3	P-3	Water	04/27/18 11:45	04/28/18 09:10
480-135088-4	P-4R	Water	04/27/18 13:10	04/28/18 09:10
480-135088-5	P-5	Water	04/27/18 14:05	04/28/18 09:10
480-135088-6	P-6	Water	04/27/18 15:05	04/28/18 09:10
480-135088-7	P-7	Water	04/27/18 16:00	04/28/18 09:10
480-135088-8	DUPLICATE`	Water	04/27/18 00:00	04/28/18 09:10
480-135088-9	FIELD BLANK	Water	04/27/18 17:00	04/28/18 09:10
480-135088-10	EQUIP BLANK	Water	04/27/18 17:05	04/28/18 09:10

TestAmerica Buffalo
10 Hazelwood Drive

Amherst, NY 14228-2223
phone 716.691.2600 fax 716.691.7991

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Ryan Van Dette	Site Contact: Nathaniel Belneman	Date: 4/27/19	COC No:
SKB Environmental	Tel/Fax:	Lab Contact:	Carrier:	1 of 1 COCs
13425 Courthouse Blvd	Analysis Turnaround Time			Sampler:
Rosemount, MN 55068	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
(651) 438-1500 Phone	TAT if different from Below _____			Walk-in Client:
(651) 438-1518 FAX	2 weeks			Lab Sampling:
Project Name: Cloquet 2018 Q2 CCR GW	1 week			
Site:	2 days			Job / SDG No.:
P O # 3078-18-00106	1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Metals (totals)*	Chloride	Fluoride	Sulfate	TDS	pH	Sample Specific Notes:
P-1	4/27/19	8:50	Grab	Water	5			X	X	X	X	X	X	
P-2		16:45	Grab	Water	5			X	X	X	X	X	X	
P-3		13:45	Grab	Water	5			X	X	X	X	X	X	
P-4R		13:10	Grab	Water	5			X	X	X	X	X	X	
P-5		14:05	Grab	Water	5			X	X	X	X	X	X	
P-6		15:05	Grab	Water	5			X	X	X	X	X	X	
P-7		16:00	Grab	Water	5			X	X	X	X	X	X	
DUPLICATE ~~WELL~~		—	Grab	Water	5			X	X	X	X	X	X	
Field Blank		17:00	Grab	Water	5			X	X	X	X	X	X	
Equip Blank	↓	17:05	Grab	Water	5			X	X	X	X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

*Metals - Boron, Calcium

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd: 3.0 Corr'd:	Therm ID No.: 14
Relinquished by:	Company: GES 20:00	Date/Time: 4/27/19	Received by:	Company:	Date/Time: 4/27/19 8:10
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.9, dated 2/2/2016

Login Sample Receipt Checklist

Client: Waste Connections, Inc.

Job Number: 480-135088-1
SDG Number:

Login Number: 135088
List Number: 1
Creator: Wallace, Cameron

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	GES
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

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ANALYTICAL REPORT

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

TestAmerica Job ID: 480-143861-1
Client Project/Site: SKB Cloquet - CCR Groundwater
Sampling Event: CCR Groundwater

For:
Waste Connections, Inc.
13425 Courthouse Blvd
Rosemount, Minnesota 55068

Attn: Nathaniel Beinemann

Authorized for release by:
11/14/2018 1:27:37 PM
Anthony Strollo, Project Management Assistant I
anthony.strollo@testamericainc.com

Designee for

Ryan VanDette, Project Manager II
(716)504-9830
ryan.vandette@testamericainc.com

Table of Contents

Definitions/Glossary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Qualifiers

Metals

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.

General Chemistry

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

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: 480-143861-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-143861-1

Comments
No additional comments.

Receipt
The samples were received on 10/20/2018 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 1.9º C, 2.2º C and 2.3º C.

Receipt Exceptions

Samples listed on coc that were not received. Samples were logged and methods were placed on hold pending client/pm resolution. DUPLICATE WELL (480-143861-8), FIELD BLANK (480-143861-9) and EQUIPMENT BLANK (480-143861-10)

added samples off hold to SRC

HPLC/IC
Method(s) 300.0: The following samples were diluted to bring the concentration of target analytes within the calibration range: P-1 (480-143861-1), P-2 (480-143861-2), P-3 (480-143861-3), P-4R (480-143861-4), P-5 (480-143861-5), P-6 (480-143861-6), P-7 (480-143861-7) and DUPLICATE WELL (480-143861-8). 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
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method(s) SM 4500 H+ B: This analysis is normally performed in the field and has a method-defined holding time of 15 minutes. The following samples has been qualified with the "HF" flag to indicate analysis was performed in the laboratory outside the 15 minute timeframe: P-1 (480-143861-1), P-2 (480-143861-2), P-3 (480-143861-3), P-4R (480-143861-4), P-5 (480-143861-5), P-6 (480-143861-6) and P-7 (480-143861-7).

Method(s) 9040C, SM 4500 H+ B: This analysis is normally performed in the field and has a method-defined holding time of 15 minutes. The following samples has been qualified with the "HF" flag to indicate analysis was performed in the laboratory outside the 15 minute timeframe: DUPLICATE WELL (480-143861-8), FIELD BLANK (480-143861-9), EQUIPMENT BLANK (480-143861-10) and (480-143861-F-8 DU).

Method(s) SM 2540C: Due to the matrix, the initial volume(s) used for the following sample deviated from the standard procedure: P-2 (480-143861-2). The reporting limits (RLs) have been adjusted proportionately.

Method(s) SM 2540C: The following samples were analyzed outside of analytical holding time due to laboratory error: DUPLICATE WELL (480-143861-8), FIELD BLANK (480-143861-9) and EQUIPMENT BLANK (480-143861-10).

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

Detection Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: P-1 — Lab Sample ID: 480-143861-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.057		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	146		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	143		2.5		mg/L	5		300.0	Total/NA
Sulfate	28.8		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	725		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	16.5	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-2 — Lab Sample ID: 480-143861-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.051		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	71.4		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	89.8		2.5		mg/L	5		300.0	Total/NA
Sulfate	19.5		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	468		20.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.5	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	16.1	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-3 — Lab Sample ID: 480-143861-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.037		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	92.7		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	50.6		2.5		mg/L	5		300.0	Total/NA
Sulfate	38.5		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	438		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.1	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	16.2	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-4R — Lab Sample ID: 480-143861-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.065		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	123		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	118		2.5		mg/L	5		300.0	Total/NA
Sulfate	54.2		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	597		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.2	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	16.7	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-5 — Lab Sample ID: 480-143861-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.043		0.020		mg/L	1		200.7 Rev 4.4	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

Client Sample ID: P-5 (Continued) — Lab Sample ID: 480-143861-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	166		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	202		2.5		mg/L	5		300.0	Total/NA
Sulfate	31.5		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	930		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	17.4	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-6 — Lab Sample ID: 480-143861-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.19		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	152		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	80.2		2.5		mg/L	5		300.0	Total/NA
Sulfate	70.4		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	734		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.1	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.1	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: P-7 — Lab Sample ID: 480-143861-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.11		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	164		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	107		2.5		mg/L	5		300.0	Total/NA
Sulfate	32.2		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	784		10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	7.2	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	18.2	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: DUPLICATE WELL — Lab Sample ID: 480-143861-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.036		0.020		mg/L	1		200.7 Rev 4.4	Total/NA
Calcium	88.2		0.50		mg/L	1		200.7 Rev 4.4	Total/NA
Chloride	49.2		2.5		mg/L	5		300.0	Total/NA
Sulfate	37.6		10.0		mg/L	5		300.0	Total/NA
Total Dissolved Solids	413	H	10.0		mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	8.0	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	19.8	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

Client Sample ID: FIELD BLANK — Lab Sample ID: 480-143861-9

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	6.8	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	19.8	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: EQUIPMENT BLANK — Lab Sample ID: 480-143861-10

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
pH	5.1	HF	0.1		SU	1		SM 4500 H+ B	Total/NA
Temperature	19.9	HF	0.001		Degrees C	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: P-1

Date Collected: 10/19/18 09:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-1

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.057		0.020		mg/L		10/24/18 12:06	10/25/18 11:15	1
Calcium	146		0.50		mg/L		10/24/18 12:06	10/25/18 11:15	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	143		2.5		mg/L			10/31/18 13:00	5
Fluoride	ND		0.25		mg/L			10/31/18 13:00	5
Sulfate	28.8		10.0		mg/L			10/31/18 13:00	5
Total Dissolved Solids	725		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.8	HF	0.1		SU			10/24/18 15:34	1
Temperature	16.5	HF	0.001		Degrees C			10/24/18 15:34	1

Client Sample Results

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: P-2
Date Collected: 10/19/18 15:00
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-2
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.051		0.020		mg/L		10/24/18 12:06	10/25/18 11:19	1
Calcium	71.4		0.50		mg/L		10/24/18 12:06	10/25/18 11:19	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	89.8		2.5		mg/L			10/31/18 13:08	5
Fluoride	ND		0.25		mg/L			10/31/18 13:08	5
Sulfate	19.5		10.0		mg/L			10/31/18 13:08	5
Total Dissolved Solids	468		20.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.5	HF	0.1		SU			10/24/18 15:36	1
Temperature	16.1	HF	0.001		Degrees C			10/24/18 15:36	1

Client Sample ID: P-3

Date Collected: 10/19/18 10:25
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-3

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**0.037**		0.020		mg/L		10/24/18 12:06	10/25/18 11:37	1
Calcium	**92.7**		0.50		mg/L		10/24/18 12:06	10/25/18 11:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**50.6**		2.5		mg/L			10/31/18 13:16	5
Fluoride	ND		0.25		mg/L			10/31/18 13:16	5
Sulfate	**38.5**		10.0		mg/L			10/31/18 13:16	5
Total Dissolved Solids	**438**		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.1**	**HF**	0.1		SU			10/24/18 15:39	1
Temperature	**16.2**	**HF**	0.001		Degrees C			10/24/18 15:39	1

Client Sample ID: P-4R

Date Collected: 10/19/18 11:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-4

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.065		0.020		mg/L		10/24/18 12:06	10/25/18 11:41	1
Calcium	123		0.50		mg/L		10/24/18 12:06	10/25/18 11:41	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	118		2.5		mg/L			10/31/18 13:24	5
Fluoride	ND		0.25		mg/L			10/31/18 13:24	5
Sulfate	54.2		10.0		mg/L			10/31/18 13:24	5
Total Dissolved Solids	597		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.2	HF	0.1		SU			10/24/18 15:42	1
Temperature	16.7	HF	0.001		Degrees C			10/24/18 15:42	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: P-5
Date Collected: 10/19/18 12:30
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-5
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.043		0.020		mg/L		10/24/18 12:06	10/25/18 11:45	1
Calcium	166		0.50		mg/L		10/24/18 12:06	10/25/18 11:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	202		2.5		mg/L			10/31/18 14:13	5
Fluoride	ND		0.25		mg/L			10/31/18 14:13	5
Sulfate	31.5		10.0		mg/L			10/31/18 14:13	5
Total Dissolved Solids	930		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.8	HF	0.1		SU			10/24/18 15:45	1
Temperature	17.4	HF	0.001		Degrees C			10/24/18 15:45	1

Client Sample ID: P-6

Date Collected: 10/19/18 13:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-6

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.19		0.020		mg/L		10/24/18 12:06	10/25/18 12:00	1
Calcium	152		0.50		mg/L		10/24/18 12:06	10/25/18 12:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	80.2		2.5		mg/L			10/31/18 14:21	5
Fluoride	ND		0.25		mg/L			10/31/18 14:21	5
Sulfate	70.4		10.0		mg/L			10/31/18 14:21	5
Total Dissolved Solids	734		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.1	HF	0.1		SU			10/24/18 15:49	1
Temperature	18.1	HF	0.001		Degrees C			10/24/18 15:49	1

Client Sample ID: P-7

Date Collected: 10/19/18 13:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-7

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.11		0.020		mg/L		10/24/18 12:06	10/25/18 12:04	1
Calcium	164		0.50		mg/L		10/24/18 12:06	10/25/18 12:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	107		2.5		mg/L			10/31/18 14:29	5
Fluoride	ND		0.25		mg/L			10/31/18 14:29	5
Sulfate	32.2		10.0		mg/L			10/31/18 14:29	5
Total Dissolved Solids	784		10.0		mg/L			10/25/18 22:38	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.2	HF	0.1		SU			10/24/18 15:55	1
Temperature	18.2	HF	0.001		Degrees C			10/24/18 15:55	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: DUPLICATE WELL
Date Collected: 10/19/18 00:00
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-8
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.036		0.020		mg/L		10/31/18 09:24	11/01/18 17:46	1
Calcium	88.2		0.50		mg/L		10/31/18 09:24	11/01/18 17:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	49.2		2.5		mg/L			10/31/18 14:37	5
Fluoride	ND		0.25		mg/L			10/31/18 14:37	5
Sulfate	37.6		10.0		mg/L			10/31/18 14:37	5
Total Dissolved Solids	413	H	10.0		mg/L			10/30/18 23:42	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	8.0	HF	0.1		SU			10/31/18 14:00	1
Temperature	19.8	HF	0.001		Degrees C			10/31/18 14:00	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: FIELD BLANK
Date Collected: 10/19/18 15:15
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-9
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		10/31/18 09:24	11/01/18 17:50	1
Calcium	ND		0.50		mg/L		10/31/18 09:24	11/01/18 17:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			10/31/18 14:46	1
Fluoride	ND		0.050		mg/L			10/31/18 14:46	1
Sulfate	ND		2.0		mg/L			10/31/18 14:46	1
Total Dissolved Solids	ND	H	10.0		mg/L			10/30/18 23:42	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**6.8**	**HF**	0.1		SU			10/31/18 14:00	1
Temperature	**19.8**	**HF**	0.001		Degrees C			10/31/18 14:00	1

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: EQUIPMENT BLANK

Date Collected: 10/19/18 15:20
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-10
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		10/31/18 09:24	11/01/18 17:53	1
Calcium	ND		0.50		mg/L		10/31/18 09:24	11/01/18 17:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			10/31/18 14:54	1
Fluoride	ND		0.050		mg/L			10/31/18 14:54	1
Sulfate	ND		2.0		mg/L			10/31/18 14:54	1
Total Dissolved Solids	ND	H	10.0		mg/L			10/30/18 23:42	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**5.1**	**HF**	0.1		SU			10/31/18 14:00	1
Temperature	**19.9**	**HF**	0.001		Degrees C			10/31/18 14:00	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 480-441244/1-A
Matrix: Water
Analysis Batch: 441718

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 441244

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		10/24/18 12:06	10/25/18 10:56	1
Calcium	ND		0.50		mg/L		10/24/18 12:06	10/25/18 10:56	1

Lab Sample ID: LCS 480-441244/2-A
Matrix: Water
Analysis Batch: 441718

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 441244

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.192		mg/L		96	85 - 115
Calcium	10.0	9.46		mg/L		95	85 - 115

Lab Sample ID: 480-143861-2 MS
Matrix: Water
Analysis Batch: 441718

Client Sample ID: P-2
Prep Type: Total/NA
Prep Batch: 441244

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.051		0.200	0.249		mg/L		99	70 - 130
Calcium	71.4		10.0	77.73	4	mg/L		64	70 - 130

Lab Sample ID: 480-143861-2 MSD
Matrix: Water
Analysis Batch: 441718

Client Sample ID: P-2
Prep Type: Total/NA
Prep Batch: 441244

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.051		0.200	0.250		mg/L		99	70 - 130	1	20
Calcium	71.4		10.0	78.91	4	mg/L		75	70 - 130	2	20

Lab Sample ID: MB 480-442609/1-A
Matrix: Water
Analysis Batch: 443196

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 442609

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020		mg/L		10/31/18 09:24	11/01/18 16:30	1
Calcium	ND		0.50		mg/L		10/31/18 09:24	11/01/18 16:30	1

Lab Sample ID: LCS 480-442609/2-A
Matrix: Water
Analysis Batch: 443196

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 442609

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.200		mg/L		100	85 - 115
Calcium	10.0	10.06		mg/L		101	85 - 115

Lab Sample ID: 480-143861-10 MS
Matrix: Water
Analysis Batch: 443196

Client Sample ID: EQUIPMENT BLANK
Prep Type: Total/NA
Prep Batch: 442609

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	ND		0.200	0.206		mg/L		103	70 - 130

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: 480-143861-10 MS
Matrix: Water
Analysis Batch: 443196

Client Sample ID: EQUIPMENT BLANK
Prep Type: Total/NA
Prep Batch: 442609

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	ND		10.0	9.73		mg/L		97	70 - 130

Lab Sample ID: 480-143861-10 MSD
Matrix: Water
Analysis Batch: 443196

Client Sample ID: EQUIPMENT BLANK
Prep Type: Total/NA
Prep Batch: 442609

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	ND		0.200	0.202		mg/L		101	70 - 130	2	20
Calcium	ND		10.0	9.53		mg/L		95	70 - 130	2	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-442735/28
Matrix: Water
Analysis Batch: 442735

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			10/31/18 14:05	1
Fluoride	ND		0.050		mg/L			10/31/18 14:05	1
Sulfate	ND		2.0		mg/L			10/31/18 14:05	1

Lab Sample ID: MB 480-442735/4
Matrix: Water
Analysis Batch: 442735

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50		mg/L			10/31/18 10:49	1
Fluoride	ND		0.050		mg/L			10/31/18 10:49	1
Sulfate	ND		2.0		mg/L			10/31/18 10:49	1

Lab Sample ID: LCS 480-442735/27
Matrix: Water
Analysis Batch: 442735

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.16		mg/L		98	90 - 110
Fluoride	5.00	4.77		mg/L		95	90 - 110
Sulfate	50.0	47.42		mg/L		95	90 - 110

Lab Sample ID: LCS 480-442735/3
Matrix: Water
Analysis Batch: 442735

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.39		mg/L		99	90 - 110
Fluoride	5.00	4.75		mg/L		95	90 - 110
Sulfate	50.0	48.95		mg/L		98	90 - 110

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 480-143861-4 MS
Matrix: Water
Analysis Batch: 442735

Client Sample ID: P-4R
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	118		250	352.3		mg/L		94	81 - 120
Fluoride	ND		25.0	23.33		mg/L		93	82 - 120
Sulfate	54.2		250	282.3		mg/L		91	80 - 120

Lab Sample ID: 480-143861-10 MS
Matrix: Water
Analysis Batch: 442735

Client Sample ID: EQUIPMENT BLANK
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	ND		50.0	48.22		mg/L		96	81 - 120
Fluoride	ND		5.00	4.67		mg/L		93	82 - 120
Sulfate	ND		50.0	47.66		mg/L		95	80 - 120

Lab Sample ID: 480-143861-10 MSD
Matrix: Water
Analysis Batch: 442735

Client Sample ID: EQUIPMENT BLANK
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	ND		50.0	48.09		mg/L		96	81 - 120	0	20
Fluoride	ND		5.00	4.71		mg/L		94	82 - 120	1	20
Sulfate	ND		50.0	46.80		mg/L		94	80 - 120	2	20

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

Lab Sample ID: MB 480-441815/1
Matrix: Water
Analysis Batch: 441815

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		10.0		mg/L			10/25/18 22:38	1

Lab Sample ID: LCS 480-441815/2
Matrix: Water
Analysis Batch: 441815

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	493.0		mg/L		99	85 - 115

Lab Sample ID: 480-143861-1 DU
Matrix: Water
Analysis Batch: 441815

Client Sample ID: P-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	725			707.0		mg/L				3	10

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

Lab Sample ID: MB 480-442665/1
Matrix: Water
Analysis Batch: 442665

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		10.0		mg/L			10/30/18 23:42	1

Lab Sample ID: LCS 480-442665/2
Matrix: Water
Analysis Batch: 442665

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	489.0		mg/L		98	85 - 115

Lab Sample ID: 480-143861-8 DU
Matrix: Water
Analysis Batch: 442665

Client Sample ID: DUPLICATE WELL
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	413	H	413.0		mg/L		0	10

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 480-441495/1
Matrix: Water
Analysis Batch: 441495

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Lab Sample ID: LCS 480-441495/23
Matrix: Water
Analysis Batch: 441495

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Lab Sample ID: 480-143861-7 DU
Matrix: Water
Analysis Batch: 441495

Client Sample ID: P-7
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.2	HF	7.2		SU		1	5
Temperature	18.2	HF	18.4		Degrees C		1	10

Lab Sample ID: LCS 480-442857/1
Matrix: Water
Analysis Batch: 442857

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	99 - 101

Method: SM 4500 H+ B - pH (Continued)

Lab Sample ID: 480-143861-8 DU
Matrix: Water
Analysis Batch: 442857

Client Sample ID: DUPLICATE WELL
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH	8.0	HF		8.0		SU				0.6	5
Temperature	19.8	HF		19.9		Degrees C				0.5	10

Metals

Prep Batch: 441244

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-1	P-1	Total/NA	Water	200.7	
480-143861-2	P-2	Total/NA	Water	200.7	
480-143861-3	P-3	Total/NA	Water	200.7	
480-143861-4	P-4R	Total/NA	Water	200.7	
480-143861-5	P-5	Total/NA	Water	200.7	
480-143861-6	P-6	Total/NA	Water	200.7	
480-143861-7	P-7	Total/NA	Water	200.7	
MB 480-441244/1-A	Method Blank	Total/NA	Water	200.7	
LCS 480-441244/2-A	Lab Control Sample	Total/NA	Water	200.7	
480-143861-2 MS	P-2	Total/NA	Water	200.7	
480-143861-2 MSD	P-2	Total/NA	Water	200.7	

Analysis Batch: 441718

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-1	P-1	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-2	P-2	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-3	P-3	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-4	P-4R	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-5	P-5	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-6	P-6	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-7	P-7	Total/NA	Water	200.7 Rev 4.4	441244
MB 480-441244/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	441244
LCS 480-441244/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-2 MS	P-2	Total/NA	Water	200.7 Rev 4.4	441244
480-143861-2 MSD	P-2	Total/NA	Water	200.7 Rev 4.4	441244

Prep Batch: 442609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-8	DUPLICATE WELL	Total/NA	Water	200.7	
480-143861-9	FIELD BLANK	Total/NA	Water	200.7	
480-143861-10	EQUIPMENT BLANK	Total/NA	Water	200.7	
MB 480-442609/1-A	Method Blank	Total/NA	Water	200.7	
LCS 480-442609/2-A	Lab Control Sample	Total/NA	Water	200.7	
480-143861-10 MS	EQUIPMENT BLANK	Total/NA	Water	200.7	
480-143861-10 MSD	EQUIPMENT BLANK	Total/NA	Water	200.7	

Analysis Batch: 443196

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-8	DUPLICATE WELL	Total/NA	Water	200.7 Rev 4.4	442609
480-143861-9	FIELD BLANK	Total/NA	Water	200.7 Rev 4.4	442609
480-143861-10	EQUIPMENT BLANK	Total/NA	Water	200.7 Rev 4.4	442609
MB 480-442609/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	442609
LCS 480-442609/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	442609
480-143861-10 MS	EQUIPMENT BLANK	Total/NA	Water	200.7 Rev 4.4	442609
480-143861-10 MSD	EQUIPMENT BLANK	Total/NA	Water	200.7 Rev 4.4	442609

General Chemistry

Analysis Batch: 441495

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-1	P-1	Total/NA	Water	SM 4500 H+ B	
480-143861-2	P-2	Total/NA	Water	SM 4500 H+ B	
480-143861-3	P-3	Total/NA	Water	SM 4500 H+ B	
480-143861-4	P-4R	Total/NA	Water	SM 4500 H+ B	
480-143861-5	P-5	Total/NA	Water	SM 4500 H+ B	
480-143861-6	P-6	Total/NA	Water	SM 4500 H+ B	
480-143861-7	P-7	Total/NA	Water	SM 4500 H+ B	
LCS 480-441495/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
LCS 480-441495/23	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
480-143861-7 DU	P-7	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 441815

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-1	P-1	Total/NA	Water	SM 2540C	
480-143861-2	P-2	Total/NA	Water	SM 2540C	
480-143861-3	P-3	Total/NA	Water	SM 2540C	
480-143861-4	P-4R	Total/NA	Water	SM 2540C	
480-143861-5	P-5	Total/NA	Water	SM 2540C	
480-143861-6	P-6	Total/NA	Water	SM 2540C	
480-143861-7	P-7	Total/NA	Water	SM 2540C	
MB 480-441815/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-441815/2	Lab Control Sample	Total/NA	Water	SM 2540C	
480-143861-1 DU	P-1	Total/NA	Water	SM 2540C	

Analysis Batch: 442665

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-8	DUPLICATE WELL	Total/NA	Water	SM 2540C	
480-143861-9	FIELD BLANK	Total/NA	Water	SM 2540C	
480-143861-10	EQUIPMENT BLANK	Total/NA	Water	SM 2540C	
MB 480-442665/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 480-442665/2	Lab Control Sample	Total/NA	Water	SM 2540C	
480-143861-8 DU	DUPLICATE WELL	Total/NA	Water	SM 2540C	

Analysis Batch: 442735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-1	P-1	Total/NA	Water	300.0	
480-143861-2	P-2	Total/NA	Water	300.0	
480-143861-3	P-3	Total/NA	Water	300.0	
480-143861-4	P-4R	Total/NA	Water	300.0	
480-143861-5	P-5	Total/NA	Water	300.0	
480-143861-6	P-6	Total/NA	Water	300.0	
480-143861-7	P-7	Total/NA	Water	300.0	
480-143861-8	DUPLICATE WELL	Total/NA	Water	300.0	
480-143861-9	FIELD BLANK	Total/NA	Water	300.0	
480-143861-10	EQUIPMENT BLANK	Total/NA	Water	300.0	
MB 480-442735/28	Method Blank	Total/NA	Water	300.0	
MB 480-442735/4	Method Blank	Total/NA	Water	300.0	
LCS 480-442735/27	Lab Control Sample	Total/NA	Water	300.0	
LCS 480-442735/3	Lab Control Sample	Total/NA	Water	300.0	
480-143861-4 MS	P-4R	Total/NA	Water	300.0	
480-143861-10 MS	EQUIPMENT BLANK	Total/NA	Water	300.0	

General Chemistry (Continued)

Analysis Batch: 442735 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-10 MSD	EQUIPMENT BLANK	Total/NA	Water	300.0	

Analysis Batch: 442857

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-143861-8	DUPLICATE WELL	Total/NA	Water	SM 4500 H+ B	
480-143861-9	FIELD BLANK	Total/NA	Water	SM 4500 H+ B	
480-143861-10	EQUIPMENT BLANK	Total/NA	Water	SM 4500 H+ B	
LCS 480-442857/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
480-143861-8 DU	DUPLICATE WELL	Total/NA	Water	SM 4500 H+ B	

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: P-1

Date Collected: 10/19/18 09:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 11:15	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 13:00	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:34	KEB	TAL BUF

Client Sample ID: P-2

Date Collected: 10/19/18 15:00
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 11:19	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 13:08	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:36	KEB	TAL BUF

Client Sample ID: P-3

Date Collected: 10/19/18 10:25
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 11:37	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 13:16	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:39	KEB	TAL BUF

Client Sample ID: P-4R

Date Collected: 10/19/18 11:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 11:41	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 13:24	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:42	KEB	TAL BUF

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: P-5

Date Collected: 10/19/18 12:30
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 11:45	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 14:13	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:45	KEB	TAL BUF

Client Sample ID: P-6

Date Collected: 10/19/18 13:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 12:00	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 14:21	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:49	KEB	TAL BUF

Client Sample ID: P-7

Date Collected: 10/19/18 13:45
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			441244	10/24/18 12:06	JMP	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	441718	10/25/18 12:04	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 14:29	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	441815	10/25/18 22:38	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	441495	10/24/18 15:55	KEB	TAL BUF

Client Sample ID: DUPLICATE WELL

Date Collected: 10/19/18 00:00
Date Received: 10/20/18 09:00

Lab Sample ID: 480-143861-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			442609	10/31/18 09:24	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	443196	11/01/18 17:46	LMH	TAL BUF
Total/NA	Analysis	300.0		5	442735	10/31/18 14:37	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	442665	10/30/18 23:42	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	442857	10/31/18 14:00	KEB	TAL BUF

Lab Chronicle

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Client Sample ID: FIELD BLANK

Lab Sample ID: 480-143861-9

Date Collected: 10/19/18 15:15
Matrix: Water
Date Received: 10/20/18 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			442609	10/31/18 09:24	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	443196	11/01/18 17:50	LMH	TAL BUF
Total/NA	Analysis	300.0		1	442735	10/31/18 14:46	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	442665	10/30/18 23:42	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	442857	10/31/18 14:00	KEB	TAL BUF

Client Sample ID: EQUIPMENT BLANK

Lab Sample ID: 480-143861-10

Date Collected: 10/19/18 15:20
Matrix: Water
Date Received: 10/20/18 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			442609	10/31/18 09:24	VEG	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	443196	11/01/18 17:53	LMH	TAL BUF
Total/NA	Analysis	300.0		1	442735	10/31/18 14:54	DMR	TAL BUF
Total/NA	Analysis	SM 2540C		1	442665	10/30/18 23:42	RAF	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	442857	10/31/18 14:00	KEB	TAL BUF

Laboratory References:

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

Accreditation/Certification Summary

Client: Waste Connections, Inc. TestAmerica Job ID: 480-143861-1
Project/Site: SKB Cloquet - CCR Groundwater

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
Minnesota	NELAP	5	036-999-337	12-31-18

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
SM 4500 H+ B		Water	pH
SM 4500 H+ B		Water	Temperature

Method Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Method	Method Description	Protocol	Laboratory
200.7 Rev 4.4	Metals (ICP)	EPA	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 4500 H+ B	pH	SM	TAL BUF
200.7	Preparation, Total Metals	EPA	TAL BUF

Protocol References:

EPA = US Environmental Protection Agency

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"

Laboratory References:

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

Sample Summary

Client: Waste Connections, Inc.
Project/Site: SKB Cloquet - CCR Groundwater

TestAmerica Job ID: 480-143861-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-143861-1	P-1	Water	10/19/18 09:45	10/20/18 09:00
480-143861-2	P-2	Water	10/19/18 15:00	10/20/18 09:00
480-143861-3	P-3	Water	10/19/18 10:25	10/20/18 09:00
480-143861-4	P-4R	Water	10/19/18 11:45	10/20/18 09:00
480-143861-5	P-5	Water	10/19/18 12:30	10/20/18 09:00
480-143861-6	P-6	Water	10/19/18 13:45	10/20/18 09:00
480-143861-7	P-7	Water	10/19/18 13:45	10/20/18 09:00
480-143861-8	DUPLICATE WELL	Water	10/19/18 00:00	10/20/18 09:00
480-143861-9	FIELD BLANK	Water	10/19/18 15:15	10/20/18 09:00
480-143861-10	EQUIPMENT BLANK	Water	10/19/18 15:20	10/20/18 09:00

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2223
phone 716.691.2600 fax 716.691.7991

Chain of Custody Record

TestAmerica Duluth SC 269

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Ryan Van Dette	Site Contact: Nathaniel Beinemar	Date: 10/19/18	COC No:
SKB Environmental	Tel/Fax:	Lab Contact:	Carrier:	1 of 1 COCs
13425 Courthouse Blvd	Analysis Turnaround Time			Sampler:
Rosemount, MN 55068	☐ CALENDAR DAYS ☐ WORKING DAYS			For:
(651) 438-1500 Phone	TAT if different from Below			Wa:
(651) 438-1518 FAX	☑ 2 weeks			Lab:
Project Name: Cloquet 2018 Q4 CCR GW	☐ 1 week			Job #:
Site:	☐ 2 days			480-143861 COC
PO# 3078-18-00266	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Metals (totals)* + Mercury	Chloride	Fluoride	Sulfate	TDS	pH	Radium 226 & 228 combined	Sample Specific Notes:
P-1	10/19/18	9:45	Grab	Water	7			X	X	X	X	X	X	X	
P-2		15:00	Grab	Water	7			X	X	X	X	X	X	X	
P-3		10:25	Grab	Water	7			X	X	X	X	X	X	X	
P-4R		11:45	Grab	Water	7			X	X	X	X	X	X	X	
P-5		12:30	Grab	Water	7			X	X	X	X	X	X	X	
P-6		13:45	Grab	Water	7			X	X	X	X	X	X	X	
P-7		13:45	Grab	Water	7			X	X	X	X	X	X	X	
DUPLICATE WELL		—	Grab	Water	7			X	X	X	X	X	X	X	
Field Blank		15:15	Grab	Water	7			X	X	X	X	X	X	X	
Equipment Blank		15:20	Grab	Water	7			X	X	X	X	X	X	X	
															TestAmerica Duluth SC 269

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

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

***Metals - Boron, Calcium, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Lead, Lithium, Molybdenum, Selenium, Thallium**

2.3 1.9 2.2 ~~2.7~~

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:		Cooler Temp. (°C): Obs'd: _____ Corr'd: _____		Therm ID No.: _____
Relinquished by:	Company: GES	Date/Time: 10/19/18 15:35	Received by:	Company: TAD	Date/Time: 10/19/18 1535
Relinquished by: Melissa	Company: TAD	Date/Time: 10/19/18 1620	Received by:	Company: TAB	Date/Time: 10/20/18 900
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.9, dated 2/2/2016

Login Sample Receipt Checklist

Client: Waste Connections, Inc.

Job Number: 480-143861-1

Login Number: 143861
List Number: 1
Creator: Kolb, Chris M

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	GES
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

Appendix C – Statistical Evaluation Data

1				**Background Statistics for Uncensored Full Data Sets**								
2			**User Selected Options**									
3			Date/Time of Computation	1/21/2019 1:04:54 PM								
4			From File	\\Svrrmt70-vm3\blacksburg-01\Projects\SKB Environmental\Shamrock Environmental Landfill\Statistics\ProUCL\								
5			Full Precision	OFF								
6			Confidence Coefficient	95%								
7			Coverage	95%								
8			New or Future K Observations	1								
9			Number of Bootstrap Operations	2000								
10												
11	**P-1|Boron|T^report_result_value**											
12												
13	**General Statistics**											
14						Total Number of Observations	62			Number of Distinct Observations	39		
15										Number of Missing Observations	8	
16						Minimum	19			First Quartile	43.75	
17						Second Largest	330			Median	54.5	
18						Maximum	370			Third Quartile	106.8	
19						Mean	88.6			SD	80.18	
20						Coefficient of Variation	0.905			Skewness	2.227	
21						Mean of logged Data	4.223			SD of logged Data	0.668	
22												
23						**Critical Values for Background Threshold Values (BTVs)**							
24						Tolerance Factor K (For UTL)	2.01			d2max (for USL)	3.039	
25												
26						**Normal GOF Test**						
27						Shapiro Wilk Test Statistic	0.672			**Normal GOF Test**		
28						5% Shapiro Wilk P Value	0			Data Not Normal at 5% Significance Level		
29						Lilliefors Test Statistic	0.244			**Lilliefors GOF Test**		
30						5% Lilliefors Critical Value	0.113			Data Not Normal at 5% Significance Level		
31						**Data Not Normal at 5% Significance Level**						
32												
33						**Background Statistics Assuming Normal Distribution**						
34						95% UTL with 95% Coverage	249.8			90% Percentile (z)	191.4	
35						95% UPL (t)	223.6			95% Percentile (z)	220.5	
36						95% USL	332.3			99% Percentile (z)	275.1	
37												
38						**Gamma GOF Test**						
39						A-D Test Statistic	3.51			**Anderson-Darling Gamma GOF Test**		
40						5% A-D Critical Value	0.763			Data Not Gamma Distributed at 5% Significance Level		
41						K-S Test Statistic	0.209			**Kolmogrov-Smirnoff Gamma GOF Test**		
42						5% K-S Critical Value	0.114			Data Not Gamma Distributed at 5% Significance Level		
43						**Data Not Gamma Distributed at 5% Significance Level**						
44												
45						**Gamma Statistics**						
46						k hat (MLE)	2.068			k star (bias corrected MLE)	1.978	
47						Theta hat (MLE)	42.85			Theta star (bias corrected MLE)	44.78	
48						nu hat (MLE)	256.4			nu star (bias corrected)	245.3	
49						MLE Mean (bias corrected)	88.6			MLE Sd (bias corrected)	62.99	
50												

51	**Background Statistics Assuming Gamma Distribution**											
52				95% Wilson Hilferty (WH) Approx. Gamma UPL		209.5				90% Percentile		172.7
53				95% Hawkins Wixley (HW) Approx. Gamma UPL		208.9				95% Percentile		210.9
54				95% WH Approx. Gamma UTL with	95% Coverage	247.4				99% Percentile		295.5
55				95% HW Approx. Gamma UTL with	95% Coverage	249.3						
56					95% WH USL	396.2				95% HW USL		415.6
57												
58	**Lognormal GOF Test**											
59					Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk Lognormal GOF Test**					
60					5% Shapiro Wilk P Value	1.3677E-4	Data Not Lognormal at 5% Significance Level					
61					Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**					
62					5% Lilliefors Critical Value	0.113	Data Not Lognormal at 5% Significance Level					
63	**Data Not Lognormal at 5% Significance Level**											
64												
65	**Background Statistics assuming Lognormal Distribution**											
66					95% UTL with	95% Coverage	261.4			90% Percentile (z)		160.7
67						95% UPL (t)	210.2			95% Percentile (z)		204.8
68						95% USL	519.9			99% Percentile (z)		322.9
69												
70	**Nonparametric Distribution Free Background Statistics**											
71	**Data do not follow a Discernible Distribution (0.05)**											
72												
73	**Nonparametric Upper Limits for Background Threshold Values**											
74					Order of Statistic, r	61				95% UTL with	95% Coverage	330
75					Approximate f	1.605				Confidence Coefficient (CC) achieved by UTL		0.823
76				95% Percentile Bootstrap UTL with	95% Coverage	329				95% BCA Bootstrap UTL with	95% Coverage	329
77					95% UPL	308.5				90% Percentile		140
78					90% Chebyshev UPL	331.1				95% Percentile		299.5
79					95% Chebyshev UPL	440.9				99% Percentile		345.6
80					95% USL	370						
81												
82	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
83	data set free of outliers and consists of observations collected from clean unimpacted locations.											
84	The use of USL tends to provide a balance between false positives and false negatives provided the data											
85	represents a background data set and when many onsite observations need to be compared with the BTV.											
86												

87	**P-1|Calcium|T^report_result_value**											
88												
89	**General Statistics**											
90					Total Number of Observations	61			Number of Distinct Observations	48		
91									Number of Missing Observations	9		
92					Minimum	16000			First Quartile	123000		
93					Second Largest	235000			Median	146000		
94					Maximum	296000			Third Quartile	166000		
95					Mean	140961			SD	43682		
96					Coefficient of Variation	0.31			Skewness	0.188		
97					Mean of logged Data	11.79			SD of logged Data	0.408		
98												
99	**Critical Values for Background Threshold Values (BTVs)**											
100					Tolerance Factor K (For UTL)	2.013			d2max (for USL)	3.033		
101												
102	**Normal GOF Test**											
103					Shapiro Wilk Test Statistic	0.957			**Normal GOF Test**			
104					5% Shapiro Wilk P Value	0.0695			Data appear Normal at 5% Significance Level			
105					Lilliefors Test Statistic	0.126			**Lilliefors GOF Test**			
106					5% Lilliefors Critical Value	0.113			Data Not Normal at 5% Significance Level			
107	**Data appear Approximate Normal at 5% Significance Level**											
108												
109	**Background Statistics Assuming Normal Distribution**											
110					95% UTL with 95% Coverage	228905			90% Percentile (z)	196941		
111					95% UPL (t)	214534			95% Percentile (z)	212811		
112					95% USL	273451			99% Percentile (z)	242580		
113												
114	**Gamma GOF Test**											
115					A-D Test Statistic	2.062			**Anderson-Darling Gamma GOF Test**			
116					5% A-D Critical Value	0.752			Data Not Gamma Distributed at 5% Significance Level			
117					K-S Test Statistic	0.152			**Kolmogrov-Smirnoff Gamma GOF Test**			
118					5% K-S Critical Value	0.114			Data Not Gamma Distributed at 5% Significance Level			
119	**Data Not Gamma Distributed at 5% Significance Level**											
120												
121	**Gamma Statistics**											
122					k hat (MLE)	8.068			k star (bias corrected MLE)	7.682		
123					Theta hat (MLE)	17471			Theta star (bias corrected MLE)	18348		
124					nu hat (MLE)	984.3			nu star (bias corrected)	937.3		
125					MLE Mean (bias corrected)	140961			MLE Sd (bias corrected)	50857		
126												
127	**Background Statistics Assuming Gamma Distribution**											
128					95% Wilson Hilferty (WH) Approx. Gamma UPL	234284			90% Percentile	208792		
129					95% Hawkins Wixley (HW) Approx. Gamma UPL	239397			95% Percentile	233680		
130					95% WH Approx. Gamma UTL with 95% Coverage	257906			99% Percentile	285303		
131					95% HW Approx. Gamma UTL with 95% Coverage	265396						
132					95% WH USL	341106			95% HW USL	359565		
133												
134	**Lognormal GOF Test**											
135					Shapiro Wilk Test Statistic	0.813			**Shapiro Wilk Lognormal GOF Test**			
136					5% Shapiro Wilk P Value	2.999E-10			Data Not Lognormal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
137					Lilliefors Test Statistic	0.183	**Lilliefors Lognormal GOF Test**					
138					5% Lilliefors Critical Value	0.113	Data Not Lognormal at 5% Significance Level					
139	**Data Not Lognormal at 5% Significance Level**											
140												
141	**Background Statistics assuming Lognormal Distribution**											
142				95% UTL with	95% Coverage	300801				90% Percentile (z)		223179
143					95% UPL (t)	263025				95% Percentile (z)		258829
144					95% USL	455965				99% Percentile (z)		341773
145												
146	**Nonparametric Distribution Free Background Statistics**											
147	**Data appear Approximate Normal at 5% Significance Level**											
148												
149	**Nonparametric Upper Limits for Background Threshold Values**											
150					Order of Statistic, r	60				95% UTL with	95% Coverage	235000
151					Approximate f	1.579				Confidence Coefficient (CC) achieved by UTL		0.816
152				95% Percentile Bootstrap UTL with	95% Coverage	235000				95% BCA Bootstrap UTL with	95% Coverage	235000
153					95% UPL	205300				90% Percentile		174000
154					90% Chebyshev UPL	273077				95% Percentile		190000
155					95% Chebyshev UPL	332921				99% Percentile		259400
156					95% USL	296000						
157												
158	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
159	data set free of outliers and consists of observations collected from clean unimpacted locations.											
160	The use of USL tends to provide a balance between false positives and false negatives provided the data											
161	represents a background data set and when many onsite observations need to be compared with the BTV.											
162												

	A	B	C	D	E	F	G	H	I	J	K	L
163	**P-1|Chloride|T^report_result_value**											
164												
165	**General Statistics**											
166					Total Number of Observations	60				Number of Distinct Observations		57
167										Number of Missing Observations		10
168					Minimum	16800				First Quartile		69000
169					Second Largest	408000				Median		93600
170					Maximum	601000				Third Quartile		135500
171					Mean	122007				SD		96676
172					Coefficient of Variation	0.792				Skewness		2.786
173					Mean of logged Data	11.5				SD of logged Data		0.643
174												
175	**Critical Values for Background Threshold Values (BTVs)**											
176					Tolerance Factor K (For UTL)	2.017				d2max (for USL)		3.027
177												
178	**Normal GOF Test**											
179					Shapiro Wilk Test Statistic	0.743				**Normal GOF Test**		
180					5% Shapiro Wilk P Value	1.142E-13				Data Not Normal at 5% Significance Level		
181					Lilliefors Test Statistic	0.205				**Lilliefors GOF Test**		
182					5% Lilliefors Critical Value	0.114				Data Not Normal at 5% Significance Level		
183	**Data Not Normal at 5% Significance Level**											
184												
185	**Background Statistics Assuming Normal Distribution**											
186					95% UTL with 95% Coverage	316984				90% Percentile (z)		245902
187					95% UPL (t)	284902				95% Percentile (z)		281024
188					95% USL	414631				99% Percentile (z)		346908
189												
190	**Gamma GOF Test**											
191					A-D Test Statistic	1.029				**Anderson-Darling Gamma GOF Test**		
192					5% A-D Critical Value	0.761				Data Not Gamma Distributed at 5% Significance Level		
193					K-S Test Statistic	0.112				**Kolmogrov-Smirnoff Gamma GOF Test**		
194					5% K-S Critical Value	0.116				Detected data appear Gamma Distributed at 5% Significance Level		
195	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
196												

197	**Gamma Statistics**											
198					k hat (MLE)	2.474			k star (bias corrected MLE)			2.361
199					Theta hat (MLE)	49325			Theta star (bias corrected MLE)			51677
200					nu hat (MLE)	296.8			nu star (bias corrected)			283.3
201					MLE Mean (bias corrected)	122007			MLE Sd (bias corrected)			79404
202												
203	**Background Statistics Assuming Gamma Distribution**											
204				95% Wilson Hilferty (WH) Approx. Gamma UPL		274497			90% Percentile			228329
205				95% Hawkins Wixley (HW) Approx. Gamma UPL		276410			95% Percentile			274855
206				95% WH Approx. Gamma UTL with	95% Coverage	321243			99% Percentile			377053
207				95% HW Approx. Gamma UTL with	95% Coverage	326947						
208					95% WH USL	495534			95% HW USL			523931
209												
210	**Lognormal GOF Test**											
211					Shapiro Wilk Test Statistic	0.987			**Shapiro Wilk Lognormal GOF Test**			
212					5% Shapiro Wilk P Value	0.918			Data appear Lognormal at 5% Significance Level			
213					Lilliefors Test Statistic	0.0697			**Lilliefors Lognormal GOF Test**			
214					5% Lilliefors Critical Value	0.114			Data appear Lognormal at 5% Significance Level			
215	**Data appear Lognormal at 5% Significance Level**											
216												
217	**Background Statistics assuming Lognormal Distribution**											
218					95% UTL with	95% Coverage	359572		90% Percentile (z)			224145
219					95% UPL (t)		290500		95% Percentile (z)			283106
220					95% USL		688262		99% Percentile (z)			438729
221												
222	**Nonparametric Distribution Free Background Statistics**											
223	**Data appear Approximate Gamma Distribution at 5% Significance Level**											
224												
225	**Nonparametric Upper Limits for Background Threshold Values**											
226					Order of Statistic, r	59			95% UTL with	95% Coverage		408000
227					Approximate f	1.553			Confidence Coefficient (CC) achieved by UTL			0.808
228				95% Percentile Bootstrap UTL with	95% Coverage	417650			95% BCA Bootstrap UTL with	95% Coverage		417650
229					95% UPL	338900			90% Percentile			218900
230					90% Chebyshev UPL	414441			95% Percentile			247100
231					95% Chebyshev UPL	546904			99% Percentile			487130
232					95% USL	601000						
233												
234	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
235	data set free of outliers and consists of observations collected from clean unimpacted locations.											
236	The use of USL tends to provide a balance between false positives and false negatives provided the data											
237	represents a background data set and when many onsite observations need to be compared with the BTV.											
238												

239	P-1|Fluoride|T^report_result_value											
240												
241	General Statistics											
242					Total Number of Observations	61			Number of Distinct Observations	4		
243									Number of Missing Observations	9		
244					Minimum	100			First Quartile	250		
245					Second Largest	500			Median	250		
246					Maximum	500			Third Quartile	250		
247					Mean	298			SD	116.6		
248					Coefficient of Variation	0.391			Skewness	0.896		
249					Mean of logged Data	5.625			SD of logged Data	0.388		
250												
251	Critical Values for Background Threshold Values (BTVs)											
252					Tolerance Factor K (For UTL)	2.013			d2max (for USL)	3.033		
253												
254	Normal GOF Test											
255					Shapiro Wilk Test Statistic	0.657			Normal GOF Test			
256					5% Shapiro Wilk P Value	0			Data Not Normal at 5% Significance Level			
257					Lilliefors Test Statistic	0.43			Lilliefors GOF Test			
258					5% Lilliefors Critical Value	0.113			Data Not Normal at 5% Significance Level			
259	Data Not Normal at 5% Significance Level											
260												
261	Background Statistics Assuming Normal Distribution											
262					95% UTL with 95% Coverage	532.8			90% Percentile (z)	447.5		
263					95% UPL (t)	494.5			95% Percentile (z)	489.9		
264					95% USL	651.8			99% Percentile (z)	569.4		
265												
266	Gamma GOF Test											
267					A-D Test Statistic	9.84			Anderson-Darling Gamma GOF Test			
268					5% A-D Critical Value	0.752			Data Not Gamma Distributed at 5% Significance Level			
269					K-S Test Statistic	0.398			Kolmogrov-Smirnoff Gamma GOF Test			
270					5% K-S Critical Value	0.114			Data Not Gamma Distributed at 5% Significance Level			
271	Data Not Gamma Distributed at 5% Significance Level											
272												
273	Gamma Statistics											
274					k hat (MLE)	7.064			k star (bias corrected MLE)	6.728		
275					Theta hat (MLE)	42.19			Theta star (bias corrected MLE)	44.3		
276					nu hat (MLE)	861.9			nu star (bias corrected)	820.8		
277					MLE Mean (bias corrected)	298			MLE Sd (bias corrected)	114.9		
278												
279	Background Statistics Assuming Gamma Distribution											
280					95% Wilson Hilferty (WH) Approx. Gamma UPL	511			90% Percentile	451.5		
281					95% Hawkins Wixley (HW) Approx. Gamma UPL	515.1			95% Percentile	508.7		
282					95% WH Approx. Gamma UTL with 95% Coverage	566.1			99% Percentile	628		
283					95% HW Approx. Gamma UTL with 95% Coverage	573.7						
284					95% WH USL	761.8			95% HW USL	787		
285												
286	Lognormal GOF Test											
287					Shapiro Wilk Test Statistic	0.693			Shapiro Wilk Lognormal GOF Test			
288					5% Shapiro Wilk P Value	2.220E-16			Data Not Lognormal at 5% Significance Level			

289	Lilliefors Test Statistic					0.376	**Lilliefors Lognormal GOF Test**					
290	5% Lilliefors Critical Value					0.113	Data Not Lognormal at 5% Significance Level					
291	**Data Not Lognormal at 5% Significance Level**											
292												
293	**Background Statistics assuming Lognormal Distribution**											
294	95% UTL with 95% Coverage					605.1	90% Percentile (z)					455.6
295	95% UPL (t)					532.7	95% Percentile (z)					524.6
296	95% USL					898.6	99% Percentile (z)					683.2
297												
298	**Nonparametric Distribution Free Background Statistics**											
299	**Data do not follow a Discernible Distribution (0.05)**											
300												
301	**Nonparametric Upper Limits for Background Threshold Values**											
302	Order of Statistic, r					60	95% UTL with 95% Coverage					500
303	Approximate f					1.579	Confidence Coefficient (CC) achieved by UTL					0.816
304	95% Percentile Bootstrap UTL with 95% Coverage					500	95% BCA Bootstrap UTL with 95% Coverage					500
305	95% UPL					500	90% Percentile					500
306	90% Chebyshev UPL					650.8	95% Percentile					500
307	95% Chebyshev UPL					810.6	99% Percentile					500
308	95% USL					500						
309												
310	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
311	data set free of outliers and consists of observations collected from clean unimpacted locations.											
312	The use of USL tends to provide a balance between false positives and false negatives provided the data											
313	represents a background data set and when many onsite observations need to be compared with the BTV.											
314												

315	P-1|pH|T^report_result_value										
316											
317	General Statistics										
318					Total Number of Observations	62			Number of Distinct Observations	17	
319									Number of Missing Observations	8	
320					Minimum	6			First Quartile	6.925	
321					Second Largest	8			Median	7.1	
322					Maximum	8.1			Third Quartile	7.375	
323					Mean	7.137			SD	0.38	
324					Coefficient of Variation	0.0532			Skewness	-0.109	
325					Mean of logged Data	1.964			SD of logged Data	0.0537	
326											
327					Critical Values for Background Threshold Values (BTVs)						
328					Tolerance Factor K (For UTL)	2.01			d2max (for USL)	3.039	
329											
330					Normal GOF Test						
331					Shapiro Wilk Test Statistic	0.961			Normal GOF Test		
332					5% Shapiro Wilk P Value	0.114			Data appear Normal at 5% Significance Level		
333					Lilliefors Test Statistic	0.12			Lilliefors GOF Test		
334					5% Lilliefors Critical Value	0.113			Data Not Normal at 5% Significance Level		
335					Data appear Approximate Normal at 5% Significance Level						
336											
337					Background Statistics Assuming Normal Distribution						
338					95% UTL with 95% Coverage	7.901			90% Percentile (z)	7.624	
339					95% UPL (t)	7.777			95% Percentile (z)	7.762	
340					95% USL	8.292			99% Percentile (z)	8.021	
341											
342					Gamma GOF Test						
343					A-D Test Statistic	0.851			Anderson-Darling Gamma GOF Test		
344					5% A-D Critical Value	0.749			Data Not Gamma Distributed at 5% Significance Level		
345					K-S Test Statistic	0.113			Kolmogrov-Smirnoff Gamma GOF Test		
346					5% K-S Critical Value	0.113			Data Not Gamma Distributed at 5% Significance Level		
347					Data Not Gamma Distributed at 5% Significance Level						
348											
349					Gamma Statistics						
350					k hat (MLE)	355.3			k star (bias corrected MLE)	338.1	
351					Theta hat (MLE)	0.0201			Theta star (bias corrected MLE)	0.0211	
352					nu hat (MLE)	44060			nu star (bias corrected)	41929	
353					MLE Mean (bias corrected)	7.137			MLE Sd (bias corrected)	0.388	
354											
355					Background Statistics Assuming Gamma Distribution						
356					95% Wilson Hilferty (WH) Approx. Gamma UPL	7.792			90% Percentile	7.639	
357					95% Hawkins Wixley (HW) Approx. Gamma UPL	7.794			95% Percentile	7.787	
358					95% WH Approx. Gamma UTL with 95% Coverage	7.925			99% Percentile	8.071	
359					95% HW Approx. Gamma UTL with 95% Coverage	7.928					
360					95% WH USL	8.354			95% HW USL	8.362	
361											
362					Lognormal GOF Test						
363					Shapiro Wilk Test Statistic	0.955			Shapiro Wilk Lognormal GOF Test		
364					5% Shapiro Wilk P Value	0.0543			Data appear Lognormal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
365					Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**					
366					5% Lilliefors Critical Value	0.113	Data appear Lognormal at 5% Significance Level					
367	**Data appear Lognormal at 5% Significance Level**											
368												
369	**Background Statistics assuming Lognormal Distribution**											
370				95% UTL with	95% Coverage	7.939				90% Percentile (z)		7.634
371					95% UPL (t)	7.801				95% Percentile (z)		7.785
372					95% USL	8.39				99% Percentile (z)		8.075
373												
374	**Nonparametric Distribution Free Background Statistics**											
375	**Data appear Approximate Normal at 5% Significance Level**											
376												
377	**Nonparametric Upper Limits for Background Threshold Values**											
378					Order of Statistic, r	61				95% UTL with	95% Coverage	8
379					Approximate f	1.605				Confidence Coefficient (CC) achieved by UTL		0.823
380				95% Percentile Bootstrap UTL with	95% Coverage	7.995				95% BCA Bootstrap UTL with	95% Coverage	7.7
381					95% UPL	7.87				90% Percentile		7.6
382					90% Chebyshev UPL	8.286				95% Percentile		7.7
383					95% Chebyshev UPL	8.806				99% Percentile		8.039
384					95% USL	8.1						
385												
386	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
387	data set free of outliers and consists of observations collected from clean unimpacted locations.											
388	The use of USL tends to provide a balance between false positives and false negatives provided the data											
389	represents a background data set and when many onsite observations need to be compared with the BTV.											
390												

391	P-1|Sulfate as SO4|T^report_result_value										
392											
393	General Statistics										
394					Total Number of Observations	62			Number of Distinct Observations	60	
395									Number of Missing Observations	8	
396					Minimum	13000			First Quartile	32875	
397					Second Largest	139000			Median	44250	
398					Maximum	161000			Third Quartile	65450	
399					Mean	53223			SD	32834	
400					Coefficient of Variation	0.617			Skewness	1.432	
401					Mean of logged Data	10.71			SD of logged Data	0.589	
402											
403					Critical Values for Background Threshold Values (BTVs)						
404					Tolerance Factor K (For UTL)	2.01			d2max (for USL)	3.039	
405											
406					Normal GOF Test						
407					Shapiro Wilk Test Statistic	0.861			Normal GOF Test		
408					5% Shapiro Wilk P Value	1.1801E-7			Data Not Normal at 5% Significance Level		
409					Lilliefors Test Statistic	0.175			Lilliefors GOF Test		
410					5% Lilliefors Critical Value	0.113			Data Not Normal at 5% Significance Level		
411					Data Not Normal at 5% Significance Level						
412											
413					Background Statistics Assuming Normal Distribution						
414					95% UTL with 95% Coverage	119214			90% Percentile (z)	95301	
415					95% UPL (t)	108503			95% Percentile (z)	107230	
416					95% USL	153010			99% Percentile (z)	129606	
417											
418					Gamma GOF Test						
419					A-D Test Statistic	0.628			Anderson-Darling Gamma GOF Test		
420					5% A-D Critical Value	0.757			Detected data appear Gamma Distributed at 5% Significance Level		
421					K-S Test Statistic	0.102			Kolmogrov-Smirnoff Gamma GOF Test		
422					5% K-S Critical Value	0.114			Detected data appear Gamma Distributed at 5% Significance Level		
423					Detected data appear Gamma Distributed at 5% Significance Level						
424											
425					Gamma Statistics						
426					k hat (MLE)	3.114			k star (bias corrected MLE)	2.974	
427					Theta hat (MLE)	17093			Theta star (bias corrected MLE)	17897	
428					nu hat (MLE)	386.1			nu star (bias corrected)	368.8	
429					MLE Mean (bias corrected)	53223			MLE Sd (bias corrected)	30863	
430											
431					Background Statistics Assuming Gamma Distribution						
432					95% Wilson Hilferty (WH) Approx. Gamma UPL	112554			90% Percentile	94603	
433					95% Hawkins Wixley (HW) Approx. Gamma UPL	114046			95% Percentile	111975	
434					95% WH Approx. Gamma UTL with 95% Coverage	129682			99% Percentile	149648	
435					95% HW Approx. Gamma UTL with 95% Coverage	132699					
436					95% WH USL	194936			95% HW USL	206766	
437											
438					Lognormal GOF Test						
439					Shapiro Wilk Test Statistic	0.971			Shapiro Wilk Lognormal GOF Test		
440					5% Shapiro Wilk P Value	0.316			Data appear Lognormal at 5% Significance Level		

	A	B	C	D	E	F	G	H	I	J	K	L
441					Lilliefors Test Statistic	0.0757	**Lilliefors Lognormal GOF Test**					
442					5% Lilliefors Critical Value	0.113	Data appear Lognormal at 5% Significance Level					
443	**Data appear Lognormal at 5% Significance Level**											
444												
445	**Background Statistics assuming Lognormal Distribution**											
446				95% UTL with	95% Coverage	146785				90% Percentile (z)		95592
447					95% UPL (t)	121130				95% Percentile (z)		118395
448					95% USL	269109				99% Percentile (z)		176859
449												
450	**Nonparametric Distribution Free Background Statistics**											
451	**Data appear Gamma Distributed at 5% Significance Level**											
452												
453	**Nonparametric Upper Limits for Background Threshold Values**											
454					Order of Statistic, r	61				95% UTL with	95% Coverage	139000
455					Approximate f	1.605				Confidence Coefficient (CC) achieved by UTL		0.823
456				95% Percentile Bootstrap UTL with	95% Coverage	139000				95% BCA Bootstrap UTL with	95% Coverage	138900
457					95% UPL	135200				90% Percentile		101770
458					90% Chebyshev UPL	152515				95% Percentile		124750
459					95% Chebyshev UPL	197492				99% Percentile		147580
460					95% USL	161000						
461												
462	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
463	data set free of outliers and consists of observations collected from clean unimpacted locations.											
464	The use of USL tends to provide a balance between false positives and false negatives provided the data											
465	represents a background data set and when many onsite observations need to be compared with the BTV.											
466												

	A	B	C	D	E	F	G	H	I	J	K	L
467	P-1|Total Dissolved Solids|T^report_result_value											
468												
469	General Statistics											
470					Total Number of Observations	60				Number of Distinct Observations		59
471										Number of Missing Observations		10
472					Minimum	51500				First Quartile		513000
473					Second Largest	1590000				Median		732000
474					Maximum	1930000				Third Quartile		799500
475					Mean	688037				SD		306083
476					Coefficient of Variation	0.445				Skewness		1.101
477					Mean of logged Data	13.3				SD of logged Data		0.635
478												
479	Critical Values for Background Threshold Values (BTVs)											
480					Tolerance Factor K (For UTL)	2.017				d2max (for USL)		3.027
481												
482	Normal GOF Test											
483					Shapiro Wilk Test Statistic	0.895				Normal GOF Test		
484					5% Shapiro Wilk P Value	1.9618E-5				Data Not Normal at 5% Significance Level		
485					Lilliefors Test Statistic	0.15				Lilliefors GOF Test		
486					5% Lilliefors Critical Value	0.114				Data Not Normal at 5% Significance Level		
487	Data Not Normal at 5% Significance Level											
488												
489	Background Statistics Assuming Normal Distribution											
490					95% UTL with 95% Coverage	1305348				90% Percentile (z)		1080297
491					95% UPL (t)	1203774				95% Percentile (z)		1191498
492					95% USL	1614507				99% Percentile (z)		1400091
493												
494	Gamma GOF Test											
495					A-D Test Statistic	3.008				Anderson-Darling Gamma GOF Test		
496					5% A-D Critical Value	0.755				Data Not Gamma Distributed at 5% Significance Level		
497					K-S Test Statistic	0.158				Kolmogrov-Smirnoff Gamma GOF Test		
498					5% K-S Critical Value	0.115				Data Not Gamma Distributed at 5% Significance Level		
499	Data Not Gamma Distributed at 5% Significance Level											
500												
501	Gamma Statistics											
502					k hat (MLE)	3.788				k star (bias corrected MLE)		3.609
503					Theta hat (MLE)	181651				Theta star (bias corrected MLE)		190623
504					nu hat (MLE)	454.5				nu star (bias corrected)		433.1
505					MLE Mean (bias corrected)	688037				MLE Sd (bias corrected)		362154
506												
507	Background Statistics Assuming Gamma Distribution											
508					95% Wilson Hilferty (WH) Approx. Gamma UPL	1375090				90% Percentile		1173609
509					95% Hawkins Wixley (HW) Approx. Gamma UPL	1432734				95% Percentile		1371058
510					95% WH Approx. Gamma UTL with 95% Coverage	1568016				99% Percentile		1794949
511					95% HW Approx. Gamma UTL with 95% Coverage	1655442						
512					95% WH USL	2264473				95% HW USL		2494819
513												
514	Lognormal GOF Test											
515					Shapiro Wilk Test Statistic	0.761				Shapiro Wilk Lognormal GOF Test		
516					5% Shapiro Wilk P Value	1.007E-12				Data Not Lognormal at 5% Significance Level		

517	Lilliefors Test Statistic					0.18	**Lilliefors Lognormal GOF Test**					
518	5% Lilliefors Critical Value					0.114	Data Not Lognormal at 5% Significance Level					
519	**Data Not Lognormal at 5% Significance Level**											
520												
521	**Background Statistics assuming Lognormal Distribution**											
522	95% UTL with 95% Coverage					2156043	90% Percentile (z)					1352079
523	95% UPL (t)					1746591	95% Percentile (z)					1702694
524	95% USL					4093087	99% Percentile (z)					2624052
525												
526	**Nonparametric Distribution Free Background Statistics**											
527	**Data do not follow a Discernible Distribution (0.05)**											
528												
529	**Nonparametric Upper Limits for Background Threshold Values**											
530	Order of Statistic, r					59	95% UTL with 95% Coverage					1590000
531	Approximate f					1.553	Confidence Coefficient (CC) achieved by UTL					0.808
532	95% Percentile Bootstrap UTL with 95% Coverage					1607000	95% BCA Bootstrap UTL with 95% Coverage					1590000
533	95% UPL					1188450	90% Percentile					914700
534	90% Chebyshev UPL					1613905	95% Percentile					980550
535	95% Chebyshev UPL					2033292	99% Percentile					1729400
536	95% USL					1930000						
537												
538	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
539	data set free of outliers and consists of observations collected from clean unimpacted locations.											
540	The use of USL tends to provide a balance between false positives and false negatives provided the data											
541	represents a background data set and when many onsite observations need to be compared with the BTV.											
542												

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation	1/21/2019 12:05:44 PM
From File	Updated_Shamrock CCR ProUCL 2018_GKS_units.xls
Full Precision	OFF

Rosner's Outlier Test for P-1|Boron|T^report_result_value

Mean	**89.85**
Standard Deviation	**86.55**
Number of data	**67**
Number of suspected outliers	**1**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	89.85	85.9	380	32	3.378	3.242	3.602

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 380

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for P-1|Calcium|T^report_result_value

Mean	**144143**
Standard Deviation	**50172**
Number of data	**67**
Number of suspected outliers	**1**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	144143	49796	367000	22	4.475	3.242	3.602

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 367000

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 367000

	A	B	C	D	E	F	G	H	I	J	K	L
45	**Rosner's Outlier Test for P-1|Chloride|T^report_result_value**											
46												
47												
48				**Mean**	**132515**							
49				**Standard Deviation**	**126199**							
50				**Number of data**	**61**							
51				**Number of suspected outliers**	**1**							
52												
53				Potential	Obs.	Test	Critical	Critical				
54	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
55	1	132515	125160	763000	22	5.037	3.206	3.566				
56												
57	For 5% Significance Level, there is 1 Potential Outlier											
58	Potential outliers is: 763000											
59												
60	For 1% Significance Level, there is 1 Potential Outlier											
61	Potential outliers is: 763000											
62												
63												
64	**Rosner's Outlier Test for P-1|Fluoride|T^report_result_value**											
65												
66												
67				**Mean**	**298**							
68				**Standard Deviation**	**116.6**							
69				**Number of data**	**61**							
70				**Number of suspected outliers**	**1**							
71												
72				Potential	Obs.	Test	Critical	Critical				
73	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
74	1	298	115.7	500	1	1.746	3.206	3.566				
75												
76	For 5% Significance Level, there is no Potential Outlier											
77												
78	For 1% Significance Level, there is no Potential Outlier											
79												
80												
81	**Rosner's Outlier Test for P-1|pH|T^report_result_value**											
82												
83												
84				**Mean**	**7.148**							
85				**Standard Deviation**	**0.371**							
86				**Number of data**	**67**							
87				**Number of suspected outliers**	**1**							
88												
89				Potential	Obs.	Test	Critical	Critical				
90	#	Mean	sd	outlier	Number	value	value (5%)	value (1%)				
91	1	7.148	0.368	6	29	3.117	3.242	3.602				
92												
93	For 5% Significance Level, there is no Potential Outlier											
94												
95	For 1% Significance Level, there is no Potential Outlier											

Rosner's Outlier Test for P-1|Sulfate as SO4|T^report_result_value

Mean	**53937**
Standard Deviation	**33388**
Number of data	**67**
Number of suspected outliers	**1**

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	53937	33138	161000	62	3.231	3.242	3.602

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Rosner's Outlier Test for P-1|Total Dissolved Solids|T^report_result_value

Mean	**714954**
Standard Deviation	**369219**
Number of data	**61**
Number of suspected outliers	**1**

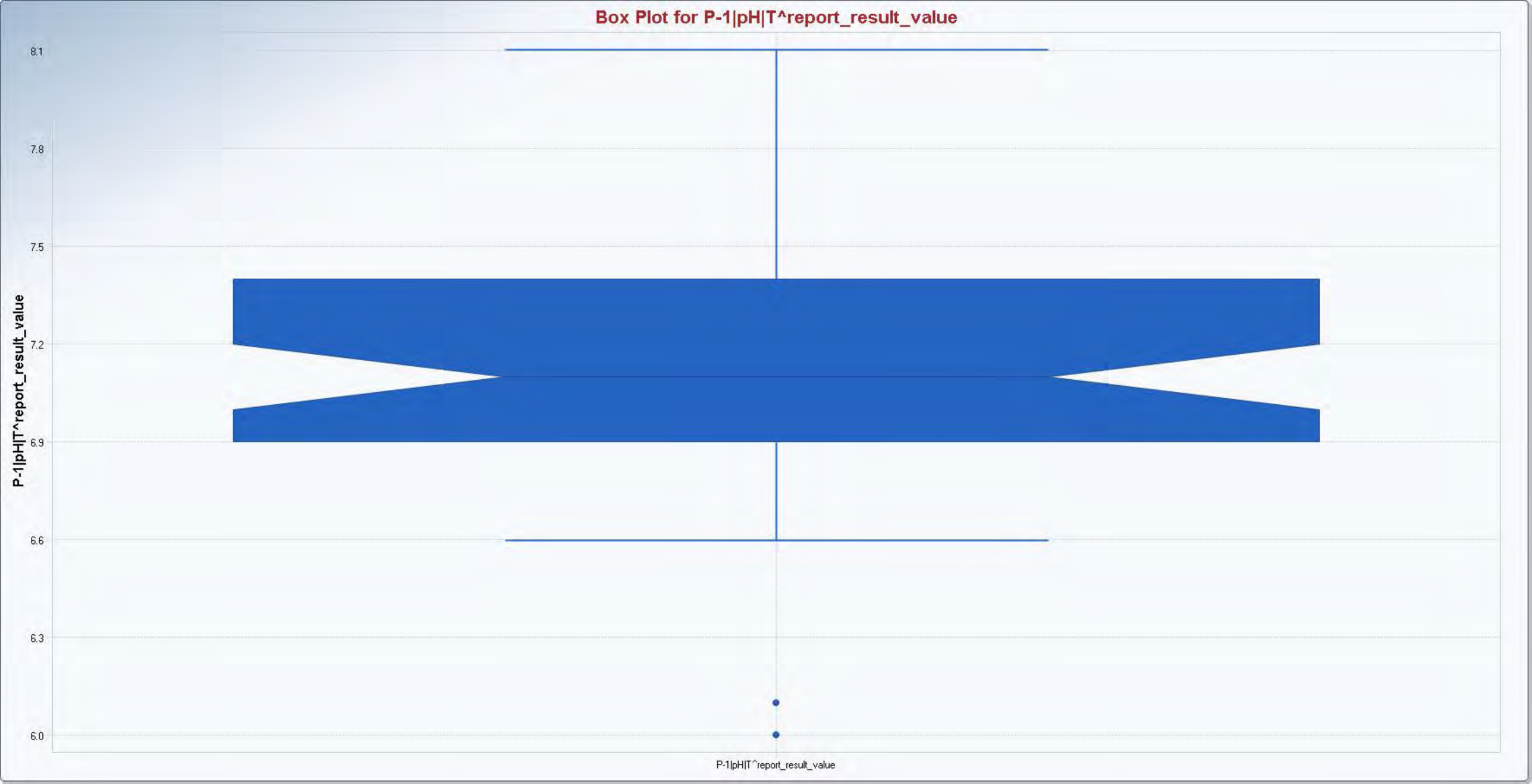
#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	714954	366180	2330000	22	4.411	3.206	3.566

For 5% Significance Level, there is 1 Potential Outlier

Potential outliers is: 2330000

For 1% Significance Level, there is 1 Potential Outlier

Potential outliers is: 2330000


Box Plot for P-1|pH|T^report_result_value
8.1
7.8
7.5
7.2
6.9
6.6
6.3
6.0
P-1|pH|T^report_result_value
P-1|pH|T^report_result_value