Environmental Resources Management

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6 March 2014

Dennis Harwood/David Allen
555 Cordova Street
Anchorage, AK 99501

Subject: Garden Soil Sampling (NTP 18-8036-02-002E)

Dear Mr. Harwood and Mr. Allen:

The purpose of this report is to transmit the results of garden soil sampling performed on 30 August and 4 September 2013. The sampling was performed in North Pole, Alaska, approximately 13 miles southeast of Fairbanks, Alaska, within the Fairbanks North Star Borough.

Alaska Department of Environmental Conservation (ADEC) tasked ERM Alaska, Inc. (ERM) to collect samples to assess whether there is any evidence of sulfolane contamination of garden or lawn soil as a result of watering with sulfolane-impacted irrigation water. There are many residences with gardens located within and near the sulfolane groundwater plume to the north, northeast, and northwest of the North Pole Refinery (NPR) (Figure 1). ERM collected surface soil samples from six residential lawns or gardens that are watered with sulfolane-laden water from residential wells. The samples were analyzed for sulfolane, total organic carbon (TOC), and grain-size to evaluate the potential for sulfolane accumulation in the garden soil.

In addition ERM collected surface water samples from three locations in the Tanana River to support ongoing stable isotope work by the University of Alaska, Fairbanks (UAF). Sample locations are presented in Attachment A but results are not discussed in this report.

BACKGROUND

The NPR is an active petroleum refinery that receives crude oil feedstock from the Trans-Alaska Pipeline. The site was developed in the mid-1970s and operations began in 1977. The NPR contains crude oil processing units, tank farms, truck loading racks, wastewater treatment lagoons, storage areas, and two flooded gravel pits. Since 1985, the NPR has used a proprietary chemical, sulfolane, in the refining process to extract aromatics from the feedstock. Over the years, there were documented releases of sulfolane at the NPR, and there were very high concentrations of sulfolane historically

detected in the wastewater lagoons. In 2009, sulfolane was first detected in groundwater samples from offsite monitoring wells.

In 2012, the state of Alaska established an alternative cleanup level (ACL) of 14 micrograms per liter (µg/L) for sulfolane in water (ADEC 2012) and a screening level of 38 micrograms per kilogram (µg/Kg) for sulfolane in soil). Extensive characterization work has shown the sulfolane groundwater plume above the ACL to extend approximately 3.5 miles downgradient (north) of the NPR. Sulfolane has been detected in shallow monitoring wells screened across the water table, deeper monitoring wells, and also in private wells completed subpermafrost at depths up to approximately 300 feet below ground surface. The extent of sulfolane in groundwater exceeding the 14 µg/L ACL in the 10 to 55 feet below water table interval, as of the 3rd quarter of 2013 (Arcadis, 2013), is shown on Figure 1.

Prior to the current study, there has been one other garden soil sampling event. In October 2011, four soil samples were collected from two properties located within the sulfolane plume. Sulfolane was not detected in any of the samples; however, the garden areas sampled were reported to have not been watered with sulfolane-laden water during the 2011 growing season (Barr 2012).

The purpose of the current garden sampling is to evaluate potential ecological and human health risk from the application of sulfolane-laden water to garden and lawn soil. Sulfolane has a low organic carbon partitioning coefficient; therefore, it has been assumed that it does not adhere to soil particles. The samples in the current effort represent areas that are reported to have been watered with impacted water for several years. To better understand the possible retention of sulfolane in garden soil, samples from each property were also analyzed for grain size and TOC.

SOIL SAMPLE LOCATIONS

Garden or lawn surface soil samples were collected from six properties. ADEC identified candidate properties for surface sampling by reviewing responses to a June 2013 ADEC sulfolane survey of North Pole residents and by recommendations offered by Flint Hills. In selecting candidates for garden sampling, ADEC identified properties where untreated water was reportedly used to water gardens or lawns and where recent sampling indicated elevated sulfolane concentrations in the untreated water. ADEC was able to obtain access to sample garden soil at properties with a range of untreated sulfolane concentrations, as shown in Table 1. The garden sampling locations are shown in Figure 1.

Soil sample information is summarized in Table 2. The number of samples collected from each property was based on the recent groundwater sulfolane concentrations. Three samples were collected from the properties with highest groundwater sulfolane concentrations, while one soil sample was collected from the properties with lower groundwater sulfolane concentrations (note that there were two properties with similar sulfolane concentrations of approximately 120 µg/L; three samples were taken from one

of these properties and one from the other). One TOC and one soil particle size sample were also collected from each of the six properties to help interpret the distribution of any sulfolane detections. Table 2 also indicates if the samples came from a garden or lawn and any associated notes.

TABLE 1: GARDEN SOIL SAMPLE PROPERTIES WITH CURRENT SULFOLANE GROUNDWATER CONCENTRATIONS

Map ID	PW-ID	Sulfolane concentration in groundwater (µg/L)	Well Depth (feet below ground surface)	Date of Recent Sample
1	PW-1363	132	40	7/11/2013
2	PW-0625	32.5 J	Unknown	12/14/2012
3	PW-1452	181	Unknown	6/18/2013
4	PW-1451	288	34	6/10/2013
5	PW-1354	122	60	1/11/09
6	PW-0597	123 J	Unknown	12/7/2012
		88.3 J		6/6/2013
		96.5 J		6/27/2013
		70.7 J		8/6/2013

Notes:

PW-ID – Flint Hills Resource assigned private well identification number
J – Estimated concentration
µg/L – micrograms per liter

TABLE 2: PROPERTY INFORMATION AND SAMPLE LOCATION

Map ID	PAN	# Sulfolane Samples	# TOC Samples	# Particle Size Samples	Sample Location Type	Location Details and Well Water Usage
1	565831	3	1	1	Flowerbed	Samples collected from flowerbed primarily containing annual petunias and watered throughout summer with well water.
2	328430	1	1	1	Flowerbed	Samples collected from flowerbed with perennial flowers (peonies and delphinium). Watered periodically through summer with well water, but outdoor city water spigot was installed prior to sampling event.
3	627057	3	1	1	Greenhouse Vegetable Pot	Sample collected from cucumber planter box inside greenhouse that was presumably watered with well water. This location was protected from rainwater.
4	299774	3	1	1	Lawn	Approximately 4 inches of topsoil were imported and area was hydro-seeded in Spring 2013. Lawn was watered with well water extensively throughout the summer months to promote new growth.
5	565652	3	1	1	Lawn	Sample collected beneath well-established sod layer. Lawn was watered with well water throughout summer
6	327948	1	1	1	Lawn	Sample collected beneath well-established sod layer. Lawn was watered with well water throughout summer

Notes:

PAN – Fairbanks parcel account number

FIELD WORK AND SAMPLING PROCEDURES

Soil property map locations 1, 2, and 3 were sampled on 30 August 2013 and locations 4, 5, and 6 were sampled on 4 September 2013 by ERM staff. Field notes are provided in Attachment B. Weather during both sampling events was rainy with air temperatures ranging from 50˚ to 60˚ Fahrenheit (F). The North Pole area experienced a relatively warm summer with below average rainfall for the months of June, July, and August. Therefore, gardens and lawns would have been expected to receive above average rates of irrigation during the summer of 2013. However, during and for a short time prior to both sampling events conditions were rainy. Attachment C presents North Pole daily precipitation events and precipitation accumulation since 1 June 2013. Significant rain events (greater than 0.1 in) occurred within seven days of the first event and three days prior to the second sampling event.

The field team coordinated with analytical laboratory SGS North America, Inc. (SGS) in Fairbanks for transfer of sample containers. For the UAF stable isotope sampling, ERM coordinated with Michelle Barnes of UAF.

The following procedures were followed for surface soil sample collection. ADEC or Flint Hills coordinated with property owners to obtain approval for sample collection. If available, property owners were asked a series of questions by ADEC about garden or lawn watering habits at the property. ERM staff scheduled the sampling event with each the property owners. If possible, ERM staff discussed watering history with the property owner prior to sampling in order to determine the most appropriate location to sample, based on exposed soil and amount of well water received. However, of the six properties sampled, only two property owners were home at the time of sampling.

Individual soil sample location preference was given to areas of bare soil. If bare garden soil was not available, a section of lawn was selected for sampling. Care was taken not to damage flowers or vegetation. In areas of bare soil, a disposable sample spoon was used to remove the upper half inch of material from the sample site and to collect the sample. Soil samples from areas of bare soil were collected from approximately one half inch below the ground surface. In areas where there was no exposed soil and only lawn, the sod layer was either cut with a knife or shovel blade to expose bare soil. Jars were filled to minimize head space, and any soil particles adhering to the lip of the jar were wiped clean with a paper towel prior to capping the jar. If a shovel or knife was used to cut sod, all soil particles remaining on the tools were removed with a brush, and then the tools were wiped clean with a deionized water- wetted paper towel. New gloves and sampling gear were used at each sample location. Disposable sampling gear was the only investigation derived waste generated and was disposed of at the Fairbanks landfill.

Photographs documenting the sampling effort are provided in Attachment D.

Work Plan Deviations

- The work plan stated eight properties would be sampled. However, six properties were sampled because ADEC was able to obtain consent from six property owners.
- The work plan called for asking the property owner a series of questions regarding specific well water use and obtaining help from the property owner in selecting the sample location. However, sampling was scheduled with the property owners via phone, and in most cases (four of the six properties) the property owner was not present during sampling to provide additional details.

QUALITY ASSURANCE AND QUALITY CONTROL

Laboratory reports are presented in Attachment. A detailed Data Quality Assurance Review (QAR) and ADEC laboratory checklist are presented in Attachment F. Organic material in the soil samples had a high molecular weight, resulting in the laboratory's need to add a cleanup process to the sample preparation. Because of the cleanup process, the standard 14-day holding time was exceeded for all of the samples. However, all but two of the samples were re-extracted within twice the standard holding time and were therefore flagged as estimated due to exceeded holding time. The non-detected results for sulfolane were rejected in two samples (13-NPR-01-SS-03 and 13-NPR-03-SS-01) due to grossly exceeded holding times. The data quality objective for completeness was met. With the exception of the two rejected sulfolane sample results, data quality was determined as acceptable or estimated. Acceptable data are associated with quality control (QC) data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. The rejected results are only usable for screening purposes.

FINDINGS

Soil sample results are presented in Table 3. The project resulted in the following findings:

- Sulfolane was not detected in any of the lawn or garden locations sampled.
- The TOC and grain size data did not provide any insight into sulfolane retention in soil, because there were no sulfolane detections in soil.
- Detection limits were below ADEC soil screening levels.
- Data were considered useable to assess sulfolane concentrations at the time and locations of the sample event.

TABLE 3: GARDEN SURFACE SOIL SAMPLING RESULTS
FLINT HILLS RESOURCES, NORTH POLE REFINERY
NORTH POLE, ALASKA

Client Sample Id:	Location	Analysis	SM21 2540G		Sulfolane-SW8270D M w/IsoDI Sl		SW9060A-Mod		Beckman-Coulter LS Particle Size Analyzer				
		Analyte	Total Solids		Sulfolane		Total Organic Carbon		Particle Size				
		Matrix:	Date Sampled:	%	ERM Qualifier	mg/Kg	ERM Qualifier	%	ERM Qualifier	d10 (µm)	d50 (µm)	d90 (µm)	% > 2000 µm	Comments
13-NPR-01-SS-01	01-SS-01	Soil	8/30/13	62.0	--	U (<0.01)	UJ-H	--	--					
13-NPR-01-SS-02	01-SS-02	Soil	8/30/13	70.9	--	U (<0.00872)	UJ-H	3.60	--	9	64	413	20%	Organics, Grass, Roots
13-NPR-01-SS-03	01-SS-03	Soil	8/30/13	68.5	--	U (<0.009)	UR-H	--	--					
13-NPR-02-SS-01	02-SS-01	Soil	8/30/13	62.1	--	U (<0.00998)	UJ-H	17.9	--	28	216	770	30%	Organics, Grass, Roots
13-NPR-03-SS-01	03-SS-01	Soil	8/30/13	64.2	--	U (<0.00964)	UR-H	--	--	12	79	461	12%	Organics, Grass, Roots
13-NPR-03-SS-02	03-SS-02	Soil	8/30/13	61.0	--	U (<0.01016)	UJ-H	--	--					
13-NPR-03-FD-03	03-SS-03	Soil	8/30/13	75.9	--	U (<0.00816)	UJ-H	1.17	J-D					
13-NPR-03-SS-03	03-SS-03	Soil	8/30/13	77.4	--	U (<0.00796)	UJ-H	3.41	J-D					
13-NPR-04-FD-01	04-SS-01	Soil	9/4/13	60.8	--	U (<0.01014)	UJ-H	13.3	--	13	100	536	14%	Big rocks, organics
13-NPR-04-SS-01	04-SS-01	Soil	9/4/13	60.2	--	U (<0.01026)	UJ-H	12.6	--					
13-NPR-04-SS-02	04-SS-02	Soil	9/4/13	59.0	--	U (<0.01048)	UJ-H	--	--					
13-NPR-04-SS-03	04-SS-03	Soil	9/4/13	61.8	--	U (<0.01004)	UJ-H	--	--					
13-NPR-05-SS-01	05-SS-01	Soil	9/4/13	74.7	--	U (<0.00824)	UJ-H	5.46	--	9	65	453	3%	Organics
13-NPR-05-SS-02	05-SS-02	Soil	9/4/13	75.5	--	U (<0.00818)	UJ-H	--	--					
13-NPR-05-SS-03	05-SS-03	Soil	9/4/13	76.6	--	U (<0.00808)	UJ-H	--	--					
13-NPR-06-SS-01	06-SS-01	Soil	9/4/13	80.5	--	U (<0.0374)	UJ-H	1.34	--	10	61	236	6%	Organics, rocks

- The cleanup procedure was needed for the current garden soil samples but not the 2011 garden soil samples. The range of TOC values was similar between the two sets of samples (i.e., 1.8 to 23.1% in 2011 and 1.17 to 17.9% in 2013), so TOC differences do not explain the need to use the cleanup procedure in 2013. If garden soil sampling is performed in the future, the potential need to use the cleanup procedure should be discussed with the lab ahead of time to decrease the probability of needing to reanalyze samples and incur possible holding time exceedences.
- The data quality in the non-rejected results is considered adequate to show that there is no evidence of sulfolane retention at detectable concentrations in soil watered with sulfolane-laden water.
- Property owners were notified of the sampling results for their property through a letter from ADEC.

Sincerely,

Digitally signed by Jane Paris
DN: cn=Jane Paris, o=ERM, ou, email=jane.paris@erm.com, c=US
Date: 2014.03.06 13:48:00 -07'00'

Max Schwenne
2014.03.07 05:19:18 -10'00'

Jane Paris
Project Manager

Max Schwenne
Managing Partner

cc:

Tamara Cardona, ADEC (via e-mail)

Tables:

1. Garden Soil Sample Properties with Current Sulfolane Groundwater Concentrations
2. Property Information and Sample Location
3. Garden Surface Soil Sampling Results

Figures:

1. Garden Sampling Property Locations

Attachments:

A. UAF Tanana River Isotope Sample Location Information
B. Field Notes and Field Data Sheets
C. North Pole Cumulative Precipitation
D. Photo Log
E. Laboratory Reports
F. Quality Assurance Review and ADEC Checklist

REFERENCES

ADEC. 2012a. Oil and Hazardous Substances Pollution Control. Alaska Department of Environmental Conservation. April 8, 2012.

ADEC. 2012b. Letter from Steve Bainbridge to Loren Garner, Alaska Department of Environmental Conservation. July 19, 2012.

Arcadis. 2013. Third Quarter 2013 Groundwater Monitoring Report. North Pole Refinery, North Pole, Alaska. October 31, 2013.

Barr Engineering Company. 2012. Site Characterization Report – Through 2011. North Pole Refinery, North Pole, Alaska. December 2012.

ERM. 2013.Garden Surface Soil Sampling and Intermediate Product Water Sampling Work Plan. August 2013.

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FIGURES

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ERM

DATE: DEC. 2013
CHKD: J.P.
DRAWN: D.R.F.
PROJ. No.: 0209159

825 W. 8th Ave., Anchorage, AK 99501, (907) 258–4880

GARDEN SAMPLING LOCATIONS

NORTH POLE REFINERY AREA
GARDEN SAMPLING REPORT
North Pole, Alaska

FIGURE
1

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ATTACHMENT A

UAF Tanana River Isotope Sample Locations

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UAF Tanana Sample #1 – Looking downstream

UAF Tanana Sample #1 – Looking upstream

UAF Tanana Sample #1 – Looking at sample location

UAF Tanana Sample #2 – Looking upstream (debris)

UAF Tanana Sample #2 – Looking downstream

UAF Tanana Sample #2 – Sample location

UAF Tanana Sample #3 – Looking Downstream

UAF Tanana Sample #3 – Looking upstream

UAF Tanana Sample #3 – Looking upstream near bank

UAF TANANA RIVER ISOTOPE SAMPLE LOCATIONS. Samples collected on 8/30/13 by ERM staff.

ATTACHMENT B

Field Notes and Data Sheets

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SGS Rainy N. Ballou

8·30·13 N. Pole Garden Sampling R. Flint

0900 Depart ERM office

0920 Pick up bottles from SGS Labs

0930 Depart Fairbanks to conduct sulfolane sampling in gardens and collect Tanana River water for UAF Isotope analysis

0945 Check out Tanana River Location North of N. pole good location.

1000 Arrive @ 517 W 6th Ave (Location #01) Tailgate safety meeting Homeowner not home - rang door bell. Flower bed in front of house next to "non-potable" spigot. Collect 3 Sulfolane + 1 TOC + 1 Grainsize

Sample ID: 13-NPR-01-SS-01@10:15 Sulfolane
13-NPR-01-SS-02@10:17 Sulf+TOC+grain
13-NPR-01-SS-03@10:19 Sulfolane

1030 Left ERM card in doorway and left Location #1.

Nee Ballou

1/4

N. Ballou Overcast 30s
R. Flint N. Pole Garden Sampling 8·30·13

1045 Arrive at Location #2 #3 2453 Homestead Dr. Homeowner not home, but connected via cell phone earlier in A.M. Grandson @ home. Said flower bed was watered not very often, sometimes with a sprinkler. Collected 3 primary Sulf. + 1 Dup Sulf + 1 TOC + 1 Dup TOC + grainsize from Flower bed in front of house.

Sample IDs:

13-NPR-03-SS-01 Sulfolane+grain 10:50
13-NPR-03-SS-02 Sulfolane+grain 10:52
13-NPR-03-SS-03 Sulfolane+TOC 10:54
13-NPR-03-FD-03 Sulfolane+TOC 10:56

1110 Depart Location #2 #3

1130 Lunch

1200 Find UAF Tanana River Location #2. (Near N. Pole High School) River location with low flow, not main channel. Junk/debris nearby. Collect 3 VOA vials for UAF

Sample ID: UAF-ISO-2-Tanana @1220

1230 Depart Tanana River Location #2

Nee Ballou

4/4

overcast 50's N. Ballou

8-30-13 N. Pole Garden Sampling R. Flint

Proposed Tanana River location # 1 is active runway and blocked off. continued SE along dike road until trail crossing. Parked van and walked trail to river. Collected UAF sample from braid of main river with substantial flow.
Sample ID: UAF-ISO-1-TANANA @1300
Collect 3 clear vials.

1330 Depart Tanana River Location #1 ERM off site to visit other project site in area (Moose Creek)

1450 Arrive at Garden Sample location #2 2336 Keeney Rd.
Several flower beds and pots. Covered greenhouse with hose running from "non-potable" spigot Collected sample from cucumber plant box. Assumed this location was not impacted by recent rain water (inside greenhouse) Collect MS/MSD also
Sample ID: 13-NPR-02-SS-01@1500
Sulfolane + TOC + grain size.

3/4

Nelle Ballou

N. Ballou scattered clouds upper 50's
R. Flint N. Pole Garden Sampling 8-30-13

1540 Arrive at UAF Tanana Location #3 Collect 3 isotope samples from bank of main channel of River. Each sample taken ≈ 50' apart from eachother. Collect 3 clear vials.
Sample ID: UAF-ISO-3-TANANA @ 1545.

1600 ERM off site - head back to office. Put all samples in fridge.

Overall Notes for Garden sampling:
Soil samples at all 3 locations were a loose, high organic potting soil. All soils were moist. Recent rain events contributed (heavy rain last night and showers this morning), except at Location # 2 which was in a covered greenhouse receiving no rain and only hose water.

Nelle Ballou

4/4

Rainy 60's N. Bolton

9.4.13 N. Pole Garden Sampling L. Davis

0900 Depart ERM office to conduct soil sampling at N. Pole properties

0915 Pick up sample containers from SGS.

0930 Arrive at 2260 Old Richardson Hwy Location #6 (Hawk's greenhouse)
Tailgate Safety meeting
Collect 1 Sulfolane + TOC + grainsize.
Soil is silty loam, moist.
Sample taken from underneath thick Sod layer. Sod cut with shovel and knife.
Sample ID: 13-NPR-06-SS-01@950
Sulfolane + TOC + Grainsize.
Owner stated lawn was watered with well water throughout summer season.

1010 Arrive at 2686 Kenai Way
Location #4 (Sophia Ward)
Homeowner stated front yard was hydroseeded on new 4" layer of topsoil (imported) this spring/early summer. They watered heavily during the

1/4

N. Bolton Rainy 60's

L. Davis N. Pole Garden Sampling 9.4.13

Summer to promote the new grass. Yard size is estimated at 50' long by 20' (at widest spot).
Collected 3 samples at different sections of yard. Homeowner stated nothing would grow in one area and hoped we would sample there. Area of no growth was adjacent to sidewalk and high traffic (foot) area. Bare soil exposed. Collected 3 Sulfolane + TOC + 1 Grainsize Sample + Duplicate Sulfolane/TOC.
Sample ID: 13-NPR-04-SS-01@1015 Sulf+TOC
13-NPR-04-SS-02@1025 Sulf
13-NPR-04-SS-03@1030 Sulf.
13-NPR-04-FD-01@1020 duplicate of 13-NPR-04-SS-01.
Sample 13-NPR-04-SS-03 was collected in base soil, others collected from underneath sod.
Note: Homeowner also asked if we were sampling for benzene and stated she was more concerned about benzene than sulfolane.
1035 Departed Kenai Way (Location #4)

2/4

9.4.13 N. Pole Garden Sampling N. Ballou L. Davis

1050 Arrive at 512 7th Ave
Location #5 (
Homeowner not home but indicated anywhere in yard was ok to sample.
Location was large manicured lawn. Sod layer removed prior to sample collection. 3 samples collected from front yard at evenly spaced intervals about 30' apart. Collected 3 Sulfolane + 1 TOC + 1 grain.
Sample ID: 13-NPR-05-SS-01 @1055 Sulf+TOC+grain
13-NPR-05-SS-02 @1100 Sulf.
13-NPR-05-SS-03 @1105 Sulf.
All soil samples were silty loam with moist moisture content.
While sampling realator began showing home to perspective buyers. No questions were asked of us. Left ERM card in doorway for homeowner.
1115 Departed Location #5 to return to ERM office.
Overall weather observation: Very Rainy throughout day & night prior to sampling.

N. Ballou N. Pole Garden Sampling 9.4.13

Sample Summary

Sample ID	Address	MAP ID	Sulfolane	TOC	Grain Size	Notes
13-NPR-01SS-01	517 W 6th	#1	X			flower bed
13-NPR-01-SS-02	517 W 6th	#1	X	X	X	flower bed
13-NPR-01-SS-03	517 W 6th	#1	X			flower bed
13-NPR-02-SS-01	2336 Keeney	#2	X	X	X	collected from MS/MSD greenhouse
13-NPR-03-SS-01	2453 Homestead	#3	X		X	flower bed
13-NPR-03-SS-02	2453 Homestead	#3	X			flower bed
13-NPR-03-SS-03	2453 Homestead	#3	X	X		flower bed
13-NPR-03-FD-03	2453 Homestead	#3	X	X		Duplicate of 13-NPR-03-SS-03
13-NPR-04SS-01	2686 Kenai	#4	X	X	X	Lawn
13-NPR-04-FD01	2686 Kenai	#4	X	X		Duplicate of 13-NPR-04-SS-01
13-NPR-04-SS-02	2686 Kenai	#4	X			Lawn
13-NPR-04-SS03	2686 Kenai	#4	X			Lawn - bare soil
13-NPR-05-SS-01	512 W 7th	#5	X	X	X	Lawn
13-NPR-05-SS-02	512 W 7th	#5	X			Lawn
13-NPR-05-SS-03	512 W 7th	#5	X			Lawn
13-NPR-06-SS-01	2260 Old Richardson	#6	X	X	X	Lawn

All samples collected in amber 8-oz jars. TOC & Sulfolane combined in one jar. Samples delivered to SGS in Fairbanks 9.4.13 @ 1330.

Totals: Primary Sulfolane = 14 Primary TOC = 6
Duplicate Sulfolane = 2 Dup TOC = 2
MS/MSD Sulfolane = 1 MS/MSD TOC = 1
Grainsize = 6

N. Ballou

4/4

ATTACHMENT C

North Pole Cumulative Precipitation

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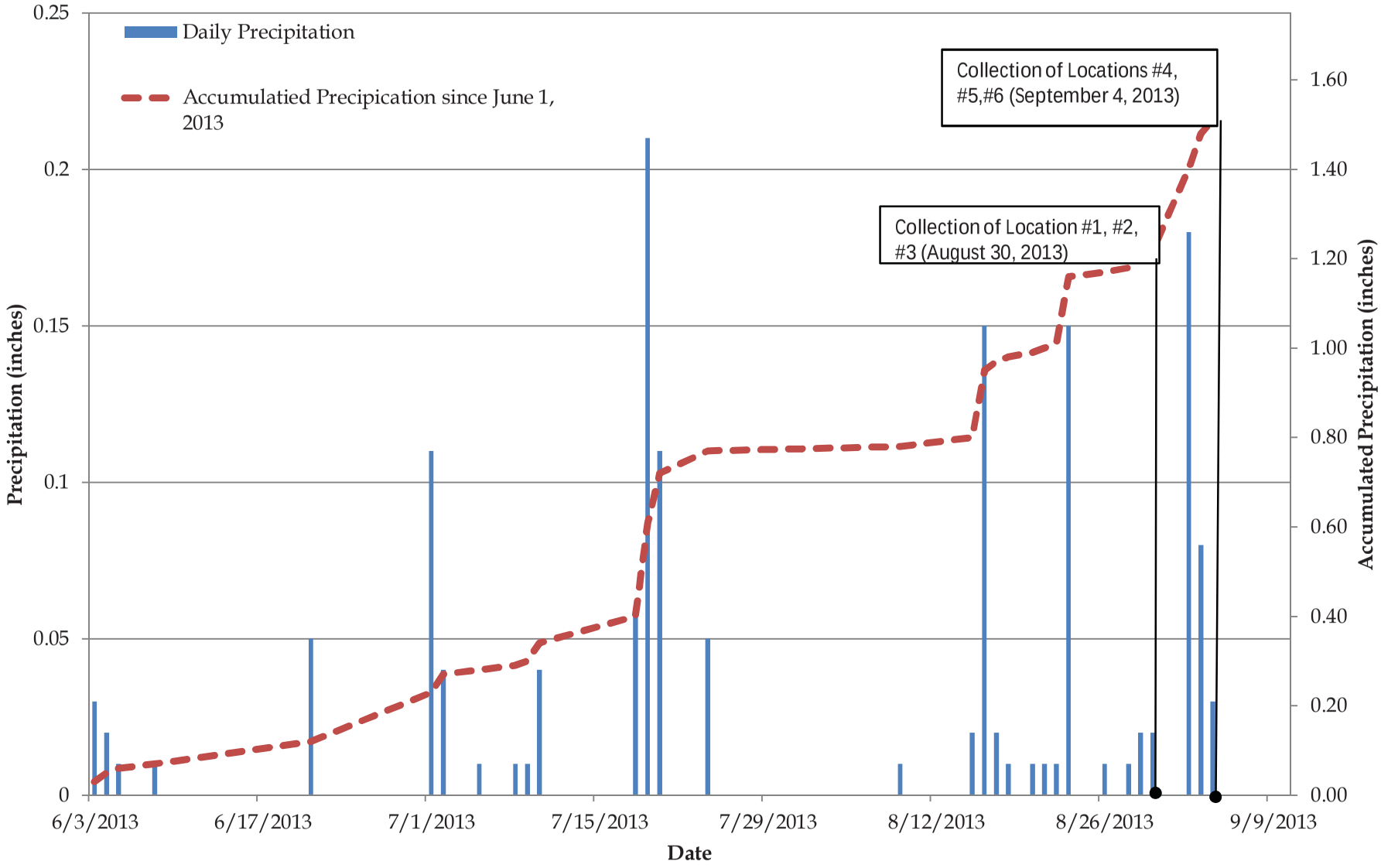
North Pole Precipitation (June 2013-September 2013)



source: http://www.wunderground.com/history/airport/PAFB/2013/9/13/MonthlyHistory.html#calendar

North Pole Alaska Cumulative Precipitation
June 2013 - September 2013

Date	recipitation]	Cumulative Precipitiation (inches)
6/3/2013	0.03	0.03
6/4/2013	0.02	0.05
6/5/2013	0.01	0.06
6/8/2013	0.01	0.07
6/21/2013	0.05	0.12
7/1/2013	0.11	0.23
7/2/2013	0.04	0.27
7/5/2013	0.01	0.28
7/8/2013	0.01	0.29
7/9/2013	0.01	0.3
7/10/2013	0.04	0.34
7/18/2013	0.06	0.4
7/19/2013	0.21	0.61
7/20/2013	0.11	0.72
7/24/2013	0.05	0.77
8/9/2013	0.01	0.78
8/15/2013	0.02	0.8
8/16/2013	0.15	0.95
8/17/2013	0.02	0.97
8/18/2013	0.01	0.98
8/20/2013	0.01	0.99
8/21/2013	0.01	1
8/22/2013	0.01	1.01
8/23/2013	0.15	1.16
8/26/2013	0.01	1.17
8/28/2013	0.01	1.18
8/29/2013	0.02	1.2
8/30/2013	0.02	1.22
9/2/2013	0.18	1.4
9/3/2013	0.08	1.48
9/4/2013	0.03	1.51

Note: Dates with no recorded precipitation are not shown

ATTACHMENT D

Photo Log

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PHOTOGRAPH 1: GARDEN SAMPLE LOCATION #1. OVERVIEW OF BED, NON-POTABLE WATER SOURCE LOCATED ON RIGHT.

PHOTOGRAPH 2: LOCATION #1 – SPOONS INDICATING SAMPLE SPACING (3)

PHOTOGRAPH 3: LOCATION #1 – TYPICAL SAMPLE HOLE

PHOTOGRAPH 4: LOCATION #2 – NON-POTABLE WATER SOURCE LEADING TO GREENHOUSE

PHOTOGRAPH 5: LOCATION #2 – SAMPLING FROM CUCUMBER PLANTER BOX IN GREENHOUSE

PHOTOGRAPH 6: LOCATION #2 – NON-POTABLE WATER HOSE

PHOTOGRAPH 7: LOCATION #3 – OVERVIEW

PHOTOGRAPH 8: LOCATION #3 – SAMPLING FROM FLOWER BED

PHOTOGRAPH 9: LOCATION #3 – TYPICAL SAMPLE HOLE

PHOTOGRAPH 10: LOCATION #4 – LAWN SAMPLING LOCATION

PHOTOGRAPH 11: LOCATION #4 – SAMPLING JUST BENEATH SOD LAYER

PHOTOGRAPH 12: LOCATION #4 – SAMPLE 13-NPR-04-SS-03 IN BARE SOIL IN HIGH TRAFFIC AREA

PHOTOGRAPH 13: LOCATION #5 – INDIVIDUAL SAMPLE LOCATIONS (3)

PHOTOGRAPH 14: LOCATION #5 – NON-POTABLE WATER SPIGOT NEAR LAWN

PHOTOGRAPH 15: LOCATION #5 – TYPICAL SAMPLE HOLE BENEATH SOD

PHOTOGRAPH 16: LOCATION #6 - OVERVIEW

PHOTOGRAPH 16: LOCATION #6 – SAMPLING JUST BENEATH SOD

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ATTACHMENT E

Laboratory Reports

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Laboratory Report of Analysis

To: Oasis Env/ERM-West, Inc.
825 W. 8th Avenue
Anchorage, AK 99516

Report Number: **1138389**

Client Project: **0209159-1 North Pole Soil Samp**

Dear Jane Paris,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Chuck at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

SGS North America
Environmental Services – Alaska Division
General Manager

Charles Homestead
2013.11.21 16:47:39 -09'00'

Chuck Homestead Date
Project Manager
Charles.Homestead@sgs.com

Print Date: 10/11/2013 4:44:41PM

Case Narrative

SGS Client: **Oasis Env/ERM-West, Inc.**
SGS Project: **1138389**
Project Name/Site: **0209159-1 North Pole Soil Samp**
Project Contact: **Jane Paris**

Refer to sample receipt form for information on sample condition.

13-NPR-01-SS-01 (1138389001) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-01-SS-02 (1138389002) PS

Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.
1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-01-SS-03 (1138389003) PS

Sulf Soil - Sample was extracted otside of hold time by the sulfolane soil clean up method.

13-NPR-02-SS-01 (1138389004) PS

9060A - Total Organic Carbon - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.
Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.
1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-03-SS-01 (1138389007) PS

Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.
Sulf Soil - Sample was extracted otside of hold time by the sulfolane soil clean up method.

13-NPR-03-SS-02 (1138389008) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-03-SS-03 (1138389009) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-03-FD-03 (1138389010) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-04-SS-01 (1138389011) PS

Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.
1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-04-FD-01 (1138389012) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-04-SS-02 (1138389013) PS

Sulf Soil - Sample was extracted otside of hold time by the sulfolane soil clean up method.

13-NPR-04-SS-03 (1138389014) PS

Sulf Soil - Sample was extracted otside of hold time by the sulfolane soil clean up method.

13-NPR-05-SS-01 (1138389015) PS

Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.
1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-05-SS-02 (1138389016) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

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Case Narrative

SGS Client: **Oasis Env/ERM-West, Inc.**
SGS Project: **1138389**
Project Name/Site: **0209159-1 North Pole Soil Samp**
Project Contact: **Jane Paris**

Refer to sample receipt form for information on sample condition.

13-NPR-05-SS-03 (1138389017) PS

1625 Sulf Soil Cleanup - Sample re-extracted outside of hold time.

13-NPR-06-SS-01 (1138389018) PS

Particle Size Bekman Coulter Laser was analyzed by SGS of Ft. McMurray Alberta Canada.

13-NPR-02-SS-01 MS (1138389005) BMS

9060A - Total Organic Carbon - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.
1625 Sulfolane - BMS/BMSD could not be re-extracted with clean up technique due to limited sample size.

13-NPR-02-SS-01 MSD (1138389006) BMSD

9060A - Total Organic Carbon - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.
1625 Sulfolane - BMS/BMSD could not be re-extracted with clean up technique due to limited sample size.

LCS for HBN 1486086 [XXX/29994 (1180421) LCS

SULF SOIL - MS/MSD not reported due to extraction error.

1138389004MS (1175413) MS

9060A - Total Organic Carbon - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.

1138421001MS (1182462) MS

Sulf Soil - Sample was extracted by the sulfolane soil clean up method outside of hold time.

1138389004MSD (1175414) MSD

9060A - Total Organic Carbon - MS recovery is outside of QC criteria. Refer to LCS for accuracy requirements.

1138421001MSD (1182463) MSD

Sulf Soil - Sample was extracted by the sulfolane soil clean up method outside of hold time.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

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Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (<http://www.sgs.com/terms_and_conditions.htm>), unless other written agreements have been accepted by both parties.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6020, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV	Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 2xDL)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
13-NPR-01-SS-01	1138389001	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-01-SS-02	1138389002	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-01-SS-03	1138389003	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-02-SS-01	1138389004	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-02-SS-01 MS	1138389005	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-02-SS-01 MSD	1138389006	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-03-SS-01	1138389007	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-03-SS-02	1138389008	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-03-SS-03	1138389009	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-03-FD-03	1138389010	08/30/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-04-SS-01	1138389011	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-04-FD-01	1138389012	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-04-SS-02	1138389013	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-04-SS-03	1138389014	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-05-SS-01	1138389015	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-05-SS-02	1138389016	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-05-SS-03	1138389017	09/04/2013	09/05/2013	Soil/Solid (dry weight)
13-NPR-06-SS-01	1138389018	09/04/2013	09/05/2013	Soil/Solid (dry weight)

Method	Method Description
SM21 2540G	Percent Solids SM2540G
Sulfolane-SW8270D M w/IsoDI S	Sulfolane SW8270D-M w/IsoDil(S)
SW9060A-Mod	Total Organic Carbon-M in Soil

Print Date: 10/11/2013 4:44:43PM

Detectable Results Summary

Client Sample ID: **13-NPR-01-SS-02**
Lab Sample ID: 1138389002
Waters Department

Parameter	Result	Units
Total Organic Carbon	3.60	%

Client Sample ID: **13-NPR-02-SS-01**
Lab Sample ID: 1138389004
Waters Department

Parameter	Result	Units
Total Organic Carbon	17.9	%

Client Sample ID: **13-NPR-03-SS-03**
Lab Sample ID: 1138389009
Waters Department

Parameter	Result	Units
Total Organic Carbon	3.41	%

Client Sample ID: **13-NPR-03-FD-03**
Lab Sample ID: 1138389010
Waters Department

Parameter	Result	Units
Total Organic Carbon	1.17	%

Client Sample ID: **13-NPR-04-SS-01**
Lab Sample ID: 1138389011
Waters Department

Parameter	Result	Units
Total Organic Carbon	12.6	%

Client Sample ID: **13-NPR-04-FD-01**
Lab Sample ID: 1138389012
Waters Department

Parameter	Result	Units
Total Organic Carbon	13.3	%

Client Sample ID: **13-NPR-05-SS-01**
Lab Sample ID: 1138389015
Waters Department

Parameter	Result	Units
Total Organic Carbon	5.46	%

Client Sample ID: **13-NPR-06-SS-01**
Lab Sample ID: 1138389018
Waters Department

Parameter	Result	Units
Total Organic Carbon	1.34	%

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Results of **13-NPR-01-SS-01**

Client Sample ID: **13-NPR-01-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389001
Lab Project ID: 1138389

Collection Date: 08/30/13 10:15
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 62.0

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0100	U	0.0161	0.00500	mg/Kg	1		09/30/13 20:54
Surrogates								
Sulfolane-d8	78.6		40-100		%	1		09/30/13 20:54

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 20:54
Container ID: 1138389001-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.059 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-01-SS-02**

Client Sample ID: **13-NPR-01-SS-02**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389002
Lab Project ID: 1138389

Collection Date: 08/30/13 10:17
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 70.9

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00872	U	0.0141	0.00436	mg/Kg	1		09/30/13 21:02
Surrogates								
Sulfolane-d8	68.1		40-100		%	1		09/30/13 21:02

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:02
Container ID: 1138389002-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.179 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-01-SS-02**

Client Sample ID: **13-NPR-01-SS-02**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389002
Lab Project ID: 1138389

Collection Date: 08/30/13 10:17
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 70.9

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	3.60		0.634	0.190	%	1		09/07/13 10:19

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 10:19
Container ID: 1138389002-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 55.6 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-01-SS-03**

Client Sample ID: **13-NPR-01-SS-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389003
Lab Project ID: 1138389

Collection Date: 08/30/13 10:19
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 68.5

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00900	U	0.0145	0.00450	mg/Kg	1		10/06/13 18:52
Surrogates								
Sulfolane-d8	55.3		40-100		%	1		10/06/13 18:52

Batch Information

Analytical Batch: XMS7657
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: MCM
Analytical Date/Time: 10/06/13 18:52
Container ID: 1138389003-A

Prep Batch: XXX30061
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 10/02/13 09:50
Prep Initial Wt./Vol.: 60.356 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-02-SS-01**

Client Sample ID: **13-NPR-02-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389004
Lab Project ID: 1138389

Collection Date: 08/30/13 15:00
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 62.1

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00998	U	0.0161	0.00499	mg/Kg	1		09/30/13 21:09
Surrogates								
Sulfolane-d8	62.5		40-100		%	1		09/30/13 21:09

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:09
Container ID: 1138389004-C

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.052 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-02-SS-01**

Client Sample ID: **13-NPR-02-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389004
Lab Project ID: 1138389

Collection Date: 08/30/13 15:00
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 62.1

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	17.9		0.724	0.217	%	1		09/07/13 10:32

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 10:32
Container ID: 1138389004-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 55.6 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-03-SS-01**

Client Sample ID: **13-NPR-03-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389007
Lab Project ID: 1138389

Collection Date: 08/30/13 10:50
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 64.2

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00964	U	0.0156	0.00482	mg/Kg	1		10/06/13 18:59
Surrogates								
Sulfolane-d8	60.5		40-100		%	1		10/06/13 18:59

Batch Information

Analytical Batch: XMS7657
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: MCM
Analytical Date/Time: 10/06/13 18:59
Container ID: 1138389007-A

Prep Batch: XXX30061
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 10/02/13 09:50
Prep Initial Wt./Vol.: 60.073 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-03-SS-02**

Client Sample ID: **13-NPR-03-SS-02**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389008
Lab Project ID: 1138389

Collection Date: 08/30/13 10:52
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 61.0

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0102	U	0.0164	0.00508	mg/Kg	1		09/30/13 21:17
Surrogates								
Sulfolane-d8	65.7		40-100		%	1		09/30/13 21:17

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:17
Container ID: 1138389008-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.002 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-03-SS-03**

Client Sample ID: **13-NPR-03-SS-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389009
Lab Project ID: 1138389

Collection Date: 08/30/13 10:54
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 77.4

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00796	U	0.0128	0.00398	mg/Kg	1		09/30/13 21:25
Surrogates								
Sulfolane-d8	65.8		40-100		%	1		09/30/13 21:25

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:25
Container ID: 1138389009-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.344 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-03-SS-03**

Client Sample ID: **13-NPR-03-SS-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389009
Lab Project ID: 1138389

Collection Date: 08/30/13 10:54
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 77.4

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	3.41		0.403	0.121	%	1		09/07/13 11:06

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 11:06
Container ID: 1138389009-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 80.1 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-03-FD-03**

Client Sample ID: **13-NPR-03-FD-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389010
Lab Project ID: 1138389

Collection Date: 08/30/13 10:56
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 75.9

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00816	U	0.0132	0.00408	mg/Kg	1		09/30/13 21:32
Surrogates								
Sulfolane-d8	64.6		40-100		%	1		09/30/13 21:32

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:32
Container ID: 1138389010-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.029 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-03-FD-03**

Client Sample ID: **13-NPR-03-FD-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389010
Lab Project ID: 1138389

Collection Date: 08/30/13 10:56
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 75.9

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	1.17		0.107	0.0321	%	1		09/07/13 11:41

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 11:41
Container ID: 1138389010-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 307.3 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-04-SS-01**

Client Sample ID: **13-NPR-04-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389011
Lab Project ID: 1138389

Collection Date: 09/04/13 10:15
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 60.2

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0103	U	0.0165	0.00513	mg/Kg	1		09/30/13 21:40
Surrogates								
Sulfolane-d8	64.3		40-100		%	1		09/30/13 21:40

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:40
Container ID: 1138389011-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.216 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-04-SS-01**

Client Sample ID: **13-NPR-04-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389011
Lab Project ID: 1138389

Collection Date: 09/04/13 10:15
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 60.2

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	12.6		0.760	0.228	%	1		09/07/13 11:51

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 11:51
Container ID: 1138389011-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 54.6 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-04-FD-01**

Client Sample ID: **13-NPR-04-FD-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389012
Lab Project ID: 1138389

Collection Date: 09/04/13 10:20
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 60.8

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0101	U	0.0164	0.00507	mg/Kg	1		09/30/13 21:47
Surrogates								
Sulfolane-d8	69.1		40-100		%	1		09/30/13 21:47

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:47
Container ID: 1138389012-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.32 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-04-FD-01**

Client Sample ID: **13-NPR-04-FD-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389012
Lab Project ID: 1138389

Collection Date: 09/04/13 10:20
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 60.8

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	13.3		0.785	0.235	%	1		09/07/13 12:08

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 12:08
Container ID: 1138389012-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 52.4 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-04-SS-02**

Client Sample ID: **13-NPR-04-SS-02**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389013
Lab Project ID: 1138389

Collection Date: 09/04/13 10:25
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 59.0

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0105	U	0.0169	0.00524	mg/Kg	1		10/06/13 19:07
Surrogates								
Sulfolane-d8	70.7		40-100		%	1		10/06/13 19:07

Batch Information

Analytical Batch: XMS7657
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: MCM
Analytical Date/Time: 10/06/13 19:07
Container ID: 1138389013-A

Prep Batch: XXX30061
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 10/02/13 09:50
Prep Initial Wt./Vol.: 60.198 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-04-SS-03**

Client Sample ID: **13-NPR-04-SS-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389014
Lab Project ID: 1138389

Collection Date: 09/04/13 10:30
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 61.8

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0100	U	0.0162	0.00502	mg/Kg	1		10/06/13 19:14
Surrogates								
Sulfolane-d8	66.7		40-100		%	1		10/06/13 19:14

Batch Information

Analytical Batch: XMS7657
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: MCM
Analytical Date/Time: 10/06/13 19:14
Container ID: 1138389014-A

Prep Batch: XXX30061
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 10/02/13 09:50
Prep Initial Wt./Vol.: 59.936 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-05-SS-01**

Client Sample ID: **13-NPR-05-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389015
Lab Project ID: 1138389

Collection Date: 09/04/13 10:55
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 74.7

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00824	U	0.0133	0.00412	mg/Kg	1		09/30/13 21:55
Surrogates								
Sulfolane-d8	59.3		40-100		%	1		09/30/13 21:55

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 21:55
Container ID: 1138389015-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.342 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-05-SS-01**

Client Sample ID: **13-NPR-05-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389015
Lab Project ID: 1138389

Collection Date: 09/04/13 10:55
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 74.7

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	5.46		0.458	0.137	%	1		09/07/13 12:16

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/07/13 12:16
Container ID: 1138389015-A

Prep Batch: WXX10124
Prep Method: METHOD
Prep Date/Time: 09/07/13 09:25
Prep Initial Wt./Vol.: 73.1 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Results of **13-NPR-05-SS-02**

Client Sample ID: **13-NPR-05-SS-02**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389016
Lab Project ID: 1138389

Collection Date: 09/04/13 11:00
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 75.5

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00818	U	0.0132	0.00409	mg/Kg	1		09/30/13 22:02
Surrogates								
Sulfolane-d8	63.4		40-100		%	1		09/30/13 22:02

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 22:02
Container ID: 1138389016-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.193 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-05-SS-03**

Client Sample ID: **13-NPR-05-SS-03**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389017
Lab Project ID: 1138389

Collection Date: 09/04/13 11:05
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 76.6

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.00808	U	0.0130	0.00404	mg/Kg	1		09/30/13 22:10
Surrogates								
Sulfolane-d8	81.3		40-100		%	1		09/30/13 22:10

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: DSH
Analytical Date/Time: 09/30/13 22:10
Container ID: 1138389017-A

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 09/24/13 08:30
Prep Initial Wt./Vol.: 60.093 g
Prep Extract Vol: 1 mL

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Results of **13-NPR-06-SS-01**

Client Sample ID: **13-NPR-06-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389018
Lab Project ID: 1138389

Collection Date: 09/04/13 09:50
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 80.5

Results by **Semivolatile Organic GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Sulfolane	0.0374	U	0.0602	0.0187	mg/Kg	1		10/08/13 23:05
Surrogates								
Sulfolane-d8	94		50-120		%	1		10/08/13 23:05

Batch Information

Analytical Batch: XMS7669
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Analyst: MCM
Analytical Date/Time: 10/08/13 23:05
Container ID: 1138389018-A

Prep Batch: XXX29850
Prep Method: SW3550C
Prep Date/Time: 09/06/13 22:00
Prep Initial Wt./Vol.: 30.345 g
Prep Extract Vol: 4.9 mL

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Results of **13-NPR-06-SS-01**

Client Sample ID: **13-NPR-06-SS-01**
Client Project ID: **0209159-1 North Pole Soil Samp**
Lab Sample ID: 1138389018
Lab Project ID: 1138389

Collection Date: 09/04/13 09:50
Received Date: 09/05/13 10:00
Matrix: Soil/Solid (dry weight)
Solids (%): 80.5

Results by **Waters Department**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Total Organic Carbon	1.34		0.554	0.166	%	1		09/06/13 15:25

Batch Information

Analytical Batch: WTC2281
Analytical Method: SW9060A-Mod
Analyst: KJO
Analytical Date/Time: 09/06/13 15:25
Container ID: 1138389018-A

Prep Batch: WXX10123
Prep Method: METHOD
Prep Date/Time: 09/06/13 11:50
Prep Initial Wt./Vol.: 56.1 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:44PM

Method Blank

Blank ID: MB for HBN 1481463 [SPT/9139]
Blank Lab ID: 1175368

Matrix: Soil/Solid (dry weight)

QC for Samples:
1138389001, 1138389002, 1138389003, 1138389004, 1138389007, 1138389008, 1138389009, 1138389010, 1138389011, 1138389012, 1138389013, 1138389014, 1138389015, 1138389016, 1138389017, 1138389018

Results by **SM21 2540G**

Parameter	Results	LOQ/CL	DL	Units
Total Solids	100			%

Batch Information

Analytical Batch: SPT9139
Analytical Method: SM21 2540G
Instrument:
Analyst: KRL
Analytical Date/Time: 9/6/2013 6:30:00PM

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Duplicate Sample Summary

Original Sample ID: 1134243011
Duplicate Sample ID: 1175369

Analysis Date: 09/06/2013 18:30
Matrix: Soil/Solid (dry weight)

QC for Samples:

1138389001, 1138389002, 1138389003, 1138389004, 1138389007, 1138389008, 1138389009, 1138389010, 1138389011, 1138389012, 1138389013, 1138389014, 1138389015, 1138389016, 1138389017, 1138389018

Results by **SM21 2540G**

NAME	Original ()	Duplicate ()	RPD (%)	RPD CL
Total Solids	91.1	91.0	0.08	15.00

Batch Information

Analytical Batch: SPT9139
Analytical Method: SM21 2540G
Instrument:
Analyst: KRL

Print Date: 10/11/2013 4:44:46PM

Method Blank

Blank ID: MB for HBN 1481464 [WXX/10123]
Blank Lab ID: 1175371

Matrix: Soil/Solid (dry weight)

QC for Samples:
1138389018

Results by **SW9060A-Mod**

Parameter	Results	LOQ/CL	DL	Units
Total Organic Carbon	0.0300U	0.0500	0.0150	%

Batch Information

Analytical Batch: WTC2281
Analytical Method: SW9060A-Mod
Instrument: TOC Analyzer
Analyst: KJO
Analytical Date/Time: 9/6/2013 12:11:49PM

Prep Batch: WXX10123
Prep Method: METHOD
Prep Date/Time: 9/6/2013 11:50:00AM
Prep Initial Wt./Vol.: 500 mg
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:48PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1138389 [WXX10123]
Blank Spike Lab ID: 1175372
Date Analyzed: 09/06/2013 12:24

Spike Duplicate ID: LCSD for HBN 1138389 [WXX10123]
Spike Duplicate Lab ID: 1175373
Matrix: Soil/Solid (dry weight)

QC for Samples: 1138389018

Results by **SW9060A-Mod**

	Blank Spike (%)			Spike Duplicate (%)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Total Organic Carbon	3.35	3.05	91	3.35	3.11	93	(75-125)	1.90	(< 25)

Batch Information

Analytical Batch: **WTC2281**
Analytical Method: **SW9060A-Mod**
Instrument: **TOC Analyzer**
Analyst: **KJO**

Prep Batch: **WXX10123**
Prep Method: **METHOD**
Prep Date/Time: **09/06/2013 11:50**
Spike Init Wt./Vol.: 3.35 % Extract Vol: 1 mL
Dupe Init Wt./Vol.: 3.35 % Extract Vol: 1 mL

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Matrix Spike Summary

Original Sample ID: 1138389018
MS Sample ID: 1175374 MS
MSD Sample ID:

QC for Samples: 1138389018

Analysis Date: 09/06/2013 15:25
Analysis Date: 09/06/2013 15:44
Analysis Date:
Matrix: Soil/Solid (dry weight)

Results by **SW9060A-Mod**

		Matrix Spike (%)			Spike Duplicate (%)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Total Organic Carbon	1.34	1.95	3.03	86				75-125		

Batch Information

Analytical Batch: WTC2281
Analytical Method: SW9060A-Mod
Instrument: TOC Analyzer
Analyst: KJO
Analytical Date/Time: 9/6/2013 3:44:53PM

Prep Batch: WXX10123
Prep Method: TOC Soils Prep (S)
Prep Date/Time: 9/6/2013 11:50:00AM
Prep Initial Wt./Vol.: 63.50mg
Prep Extract Vol: 1.00mL

Print Date: 10/11/2013 4:44:49PM

Method Blank

Blank ID: MB for HBN 1481468 [WXX/101243
Blank] aL ID: 11b7402

Mairxd: Cox/Colx(y(rwg px h) iR

5 Q for CaS mpe:
11s8s89002t 11s8s89004t 11s8s89009t 11s8s89010t 11s8s89011t 11s8s89012t 11s8s89017

upeUlie Lw **SW9060A-Mod**

TaraS pipr	upeUlie	] P5 /Q]	D]	Onxie
coial P rhanx QarLon	0%s00O	0%700	0%170	A

Batch Information

- nalwix al Bai.) : WcQ228s
- nalwix al Mpi) o(: CW9060- zMo(
IneirUS pni: cP Q - nalwKpr
- nalwei: J EP
- nalwix al Daip/cxS p: 9/b/201s 9:ss:74- M

TrpmBai.) : WXX10124
TrpmMpi) o(: MVcHP D
TrpmDaip/cxS p: 9/b/201s 9:27:00- M
TrpmInxixal Wi%Gol% 700 S h
TrpmVdira. i Gol: 1 S]

Trxni Daip: 10/11/201s 4:44:49TM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1138389 [WXX1012] b
Blank Spike La7 ID: 115t] 03
DaAe y nalzde/ : 096056 2013 09:] 5

Spike D4pliuaAe ID: LCSD for HBN 1138389 [WXX1012] b
Spike D4pliuaAe La7 ID: 115t] 0]
s aAtiM Soil6Soli/ x/ rz (eiwgAn

%C for SaP pleR 1138389002Q1138389009Q1138389010Q1138389011Q1138389012Q1138389001t

c eR4lAR7z SW9060A-Mod

	Blank Spike xmh			Spike D4pliuaAe xmh					
) araP eAer	Spike	c eR4lA	c eu xmh	Spike	c eR4lA	c eu xmh	CL	c) D xmh	c) D CL
ToAal Orwaniu Car7on	3.3t	3.02	90	3.3t	3.0]	91	x5t -12t h	0.t V	x< 2t h

Batch Information

y nalzAual BaAug: **WTC2283**
y nalzAual s eAgo/ : **SW9060A-Mod**
InRA4P enA **TOC Analyzer**
y nalzRA **KJO**

) rep BaAug: **WXX10124**
) rep s eAgo/ : **METHOD**
) rep DaAe6TiP e: **09/07/2013 09:25**
Spike IniAWA6Eol.: 3.3t m GMAkauAEol: 1 P L
D4pe IniAWA6Eol.: 3.3t m GMAkauAEol: 1 P L

Billable Matrix Spike Summary

Original Sample ID: 1138389004
MS Sample ID: 1138389005 BMS
MSD Sample ID: 1138389006 BMSD

Analysis Date: 09/07/2013 10:32
Analysis Date: 09/07/2013 10:41
Analysis Date: 09/07/2013 10:53
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **SW9060A-Mod**

		Matrix Spike (%)				Spike Duplicate (%)					
Parameter	Sample	Spike	Result	Rec (%)		Spike	Result	Rec (%)		CL	RPD (%)	RPD CL
Total Organic Carbon	17.9	3.11	22.7	155	*	2.93	19.0	39	*	75-125	17.50	(< 50)

Batch Information

Analytical Batch: WTC2283
Analytical Method: SW9060A-Mod
Instrument: TOC Analyzer
Analyst: KJO
Analytical Date/Time: 9/7/2013 10:41:35AM

Prep Batch: WXX10124
Prep Method: TOC Soils Prep (S)
Prep Date/Time: 9/7/2013 9:25:00AM
Prep Initial Wt./Vol.: 51.90mg
Prep Extract Vol: 1.00mL

Print Date: 10/11/2013 4:44:51PM

Method Blank

Blank ID: MB for HBN 1481369 [XXX/29850]
Blank Lab ID: 1175333

Matrix: Soil/Solid (dry weight)

QC for Samples:
1138389018

Results by **Sulfolane-SW8270D M w/IsoDI SI**

Parameter	Results	LOQ/CL	DL	Units
Sulfolane	0.00620U	0.0100	0.00310	mg/Kg
Surrogates				
Sulfolane-d8	84.7	50-120		%

Batch Information

Analytical Batch: XMS7668
Analytical Method: Sulfolane-SW8270D M w/IsoDI SI
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: MCM
Analytical Date/Time: 10/8/2013 8:13:00PM

Prep Batch: XXX29850
Prep Method: SW3550C
Prep Date/Time: 9/6/2013 10:00:00PM
Prep Initial Wt./Vol.: 30 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:51PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1138389 [XXX29850]
Blank Spike Lab ID: 1175334
Date Analyzed: 10/08/2013 20:20

Matrix: Soil/Solid (dry weight)

QC for Samples: 1138389018

Results by **Sulfolane-SW8270D M w/IsoDI SI**

Blank Spike (mg/Kg)

Parameter	Spike	Result	Rec (%)	CL
Sulfolane	0.05	0.0496	99	(70-120)
Surrogates				
Sulfolane-d8	0.833	77.1	77	(50-120)

Batch Information

Analytical Batch: **XMS7668**
Analytical Method: **Sulfolane-SW8270D M w/IsoDI SI**
Instrument: **SVA Agilent 780/5975 GC/MS**
Analyst: **MCM**

Prep Batch: **XXX29850**
Prep Method: **SW3550C**
Prep Date/Time: **09/06/2013 22:00**
Spike Init Wt./Vol.: 0.05 mg/Kg Extract Vol: 1 mL
Dupe Init Wt./Vol.: Extract Vol:

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200 West Potter Drive Anchorage, AK 95518
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Method Blank

Blank ID: MB for HBN 1486086 [XXX/29994]
Blank Lab ID: 1180420

Matrix: Soil/Solid (dry weight)

QC for Samples:
1138389001, 1138389002, 1138389004, 1138389008, 1138389009, 1138389010, 1138389011, 1138389012, 1138389015, 1138389016, 1138389017, 1138389018

Results by **Sulfolane-SW8270D M w/IsoDI SI**

Parameter	Results	LOQ/CL	DL	Units
Sulfolane	0.00620U	0.0100	0.00310	mg/Kg
Surrogates				
Sulfolane-d8	88.1	40-100		%

Batch Information

Analytical Batch: XMS7645
Analytical Method: Sulfolane-SW8270D M w/IsoDI SI
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: DSH
Analytical Date/Time: 9/30/2013 8:32:00PM

Prep Batch: XXX29994
Prep Method: SW3520C + Water Ext for Soils
Prep Date/Time: 9/24/2013 8:30:00AM
Prep Initial Wt./Vol.: 60 g
Prep Extract Vol: 1 mL

Print Date: 10/11/2013 4:44:53PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1138389 [XXX299950
Blank Spike La] ID: 118b521
Da7e 4nalt Aey: b9z3bz2b13 2b:5b

s a7riu: SoilzSoliy Mjrt xei(w7g

%C for Sa) ple/ : 1138389bb1K1138389bb2K1138389bb5K1138389bb8K1138389bb9K1138389b1bK1138389b11K
1138389b12K1138389b1QK1138389b1. K1138389b1- K1138389b18

d e/ R7] t Sulfolane-SW8270D M w/IsoDI SI

Blank Spike Mj (zc (g

hara) e7er	Spike	d e/ R7	dePMmg	CL
SRfolane	b6bQ	b6b39b	- 8	M- bT12b g
Surrogates				
SRfolaneTy8	b6833	8- 6	88	M5bT1bb g

Batch Information

4nalt 7Pal Ba7Pw: **XMS7645**
4nalt 7Pal s e7woy: **Sulfolane-SW8270D M w/IsoDI SI**
In/ 7fR) en7: **SVA Agilent 780/5975 GC/MS**
4nalt / 7: **DSH**

hrep Ba7Pw: **XXX29994**
hrep s e7woy: **SW3520C + Water Ext for Soils**
hrep Da7ezW) e: **09/24/2013 08:30**
Spike Ini7V 7fEol6 b6bQ) (zc (Gu7aP7Eol: 1) L
DRpe Ini7V 7fEol6 Gu7aP7Eol:

Method Blank

Blank ID: MB for HBN 1486106 [XXX/29901]
Blank Lab ID: 118Q4CS

Matrix: eoil/eolid (dry w, ight)

mp for eas 3l, 5:
112828S9927112828S9967112828S9127112828S914

R, 5ult5 by **Sulfolane-SW8270D M w/IsoDI SI**

Paras , t, r	R, 5ult5	LOm/pL	DL	Unit5
eulfolan,	9.990Q9U	9.9199	9.99219	s g/Kg
Surrogates				
eulfolan, -d8	68.0	49-199		%

Batch Information

Analytical Batch: XMe60C6
Analytical M, thod: eulfolan, -eW8Q69D M w/I5oDI el
In5trus , nt: eVA Agil, nt 689/CS6C Gp/Me
Analy5t: MpM
Analytical Dat, /Tis , : 19/0/Q912 0:96:99PM

Pr, 3 Batch: XXX29901
Pr, 3 M, thod: eW2CQ9p + Wat, r Ext for eoil5
Pr, 3 Dat, /Tis , : 19/Q/Q912 S:C9:99AM
Pr, 3 Initial Wt./Vol.: 09 g
Pr, 3 Extract Vol: 1 s L

Print Dat, : 19/11/Q912 4:44:C4PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1138389 [XXX322510
Blank Spike La] ID: 118b752
Da4e t nalAyez: 12d25db213 18:17

u a4iM SoildSoliz xzrA(eiwg4n

KC for SaP pleR 1138389223Q113838922. Q1138389213Q1138389217

/ eRsl4R] A Sulfolane-SW8270D M w/IsoDI SI

Blank Spike xP wd%wh

) araP e4er	Spike	/ eRsl4	/ emxc h	CL
Sslfolane	2-26	2-2629	12b	x. 2T1b2 h
Surrogates				
SslfolaneTz8	2-833	59-8	. 2	x72T122 h

Batch Information

t nalA4mal Ba4ng: **XMS7657**
t nalA4mal u e4goz: **Sulfolane-SW8270D M w/IsoDI SI**
InR4rsP en4 **SVA Agilent 780/5975 GC/MS**
t nalAR4 **MCM**

) rep Ba4ng: **XXX30061**
) rep u e4goz: **SW3520C + Water Ext for Soils**
) rep Da4edWP e: **10/02/2013 09:50**
Spike Ini4V 4dEol-: 2-26 P wd%w GM4ram4Eol: 1 P L
Dspe Ini4V 4dEol-: GM4ram4Eol:

) rin4Da4e: 12df1db213 7:77:67) u

Matrix Spike Summary

Original Sample ID: 1138421001
MS Sample ID: 1182462 MS
MSD Sample ID: 1182463 MSD

Analysis Date: 10/06/2013 19:44
Analysis Date: 10/06/2013 19:51
Analysis Date: 10/06/2013 19:59
Matrix: Soil/Solid (dry weight)

QC for Samples: 1138389003, 1138389007, 1138389013, 1138389014

Results by **Sulfolane-SW8270D M w/IsoDl Sl**

		Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Sulfolane	0.00455J	0.0568	0.0624	102	0.0570	0.0618	101	60-140	1.00	(< 25)
Surrogates										
Sulfolane-d8		0.947	0.720	76	0.949	0.608	64	40-100	17.00	

Batch Information

Analytical Batch: XMS7657
Analytical Method: Sulfolane-SW8270D M w/IsoDl Sl
Instrument: SVA Agilent 780/5975 GC/MS
Analyst: MCM
Analytical Date/Time: 10/6/2013 7:51:00PM

Prep Batch: XXX30061
Prep Method: Liq/Liq SW8270D-M IsoDl-Sulf Soil
Prep Date/Time: 10/2/2013 9:50:00AM
Prep Initial Wt./Vol.: 60.28g
Prep Extract Vol: 1.00mL

Print Date: 10/11/2013 4:44:55PM

SGS **1138389**

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0904131300

Locations Nationwide
Alaska Maryland
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North Carolina Indiana
West Virgina Kentucky
www.us.sgs.com

CLIENT:	ERM ALASKA		
CONTACT:	NELLIE BALLOU	PHONE NO:	907-458-8276
PROJECT NAME:	North Pole Soil Sampling	PROJECT/ PWSID/ PERMIT#:	0209159-1
REPORTS TO:	JANE.PARIS@ERM.COM	E-MAIL:	JANE.PARIS@ERM.COM
INVOICE TO: ermwestaccountspayable@erm.com		QUOTE #: P.O. #:	10847

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Page _1_ of _2_

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	TYPE C = COMP G = GRAB MI = Multi Incre-mental Soils	Preserv-ative Used: NONE	Sulfolane 8270D with 1625xm	TOC 9060A-Mod	Grainsize-Bekman Coulter Laser	REMARKS/ LOC ID
(1) A	13-NPR-01-SS-01	8/30/2013	1015	SO	1	G		X			
(2) A-B	13-NPR-01-SS-02	8/30/2013	1017	SO	2	G		X	X	X	
(3) A	13-NPR-01-SS-03	8/30/2013	1019	SO	1	G		X			
(4) A-D (5) A-C	13-NPR-02-SS-01	8/30/2013	1500	SO	4	G		X	X	X	MS/MSD
(7) A-B	13-NPR-03-SS-01	8/30/2013	1050	SO	2	G		X		X	
(8) A	13-NPR-03-SS-02	8/30/2013	1052	SO	1	G		X			
(9) A	13-NPR-03-SS-03	8/30/2013	1054	SO	1	G		X	X		
(10) A	13-NPR-03-FD-03	8/30/2013	1056	SO	1	G		X	X		
(11) A-B	13-NPR-04-SS-01	9/4/2013	1015	SO	2	G		X	X	X	
(12) A	13-NPR-04-FD-01	9/4/2013	1020	SO	1	G		X	X		

	Date	Time		
Relinquished By: (1) Nellie Ballou	9/4/2013	1300	Received By:	9-4-13 1400
Relinquished By: (2)	9-4-13	1515	Received By:	
Relinquished By: (3)			Received By:	
Relinquished By: (4)	09/05/13	10:00	Received For Laboratory By:	

DOD Project? YES (NO)
Cooler ID: 1 cooler

Data Deliverable Requirements: Level II EDD

Requested Turnaround Time and-or Special Instructions: Standard TAT

Temp Blank °C: 1.9 or Ambient [ ] (See attached Sample Receipt Form)

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT (See attached Sample Receipt Form)

[X 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

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CHAIN OF CUSTODY RECORD
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Locations Nationwide
Alaska Maryland
New Jersey New York
North Carolina Indiana
West Virgina Kentucky
www.us.sgs.com

CLIENT:	ERM ALASKA		
CONTACT:	NELLIE BALLOU	PHONE NO:	907-458-8276
PROJECT NAME:	North Pole Soil Sampling	PROJECT/ PWSID/ PERMIT#:	0209159-1
REPORTS TO:	JANE.PARIS@ERM.COM	E-MAIL:	JANE.PARIS@ERM.COM
INVOICE TO: ermwestaccountspayable@erm.com		QUOTE #: P.O. #:	10847

Instructions: Sections 1 - 5 must be filled out.
Omissions may delay the onset of analysis.

Page 2 of 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Preservative Used: 3	Sulfolane 8270D with 1625xm (NONE)	TOC 9060A-Mod (NONE)	Grainsize-Bekman Coulter Laser (NONE)	REMARKS/ LOC ID
						TYPE C = COMP G = GRAB MI = Multi Incremental Soils				
(13) A	13-NPR-04-SS-02	9/4/2013	1025	SO	1	G	X			
(14) A	13-NPR-04-SS-03	9/4/2013	1030	SO	1	G	X			
(15) A-B	13-NPR-05-SS-01	9/4/2013	1055	SO	2	G	X	X	X	
(16) A	13-NPR-05-SS-02	9/4/2013	1100	SO	1	G	X			
(17) A	13-NPR-05-SS-03	9/4/2013	1105	SO	1	G	X			
(18) A-B	13-NPR-06-SS-01	9/4/2013	950	SO	2	G	X	X	X	

5

Relinquished By: (1) Nellie Ballou	Date 9/4/2013	Time 1300	Received By: 9-4-13 1400
Relinquished By: (2)	Date 9-4-13	Time 1545	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date 09/05/13	Time 10:00	Received For Laboratory By:

4 DOD Project? YES (NO)
Cooler ID: 1 cooler

Data Deliverable Requirements: Level II EDD

Requested Turnaround Time and-or Special Instructions: Standard TAT

Temp Blank °C: 1.9
or Ambient [ ]
(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT
(See attached Sample Receipt Form)

[X 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

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1138389

SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were **custody seals** intact? Note # & location, if applicable. COC accompanied samples?	(Yes) No N/A (Yes) No N/A	2 front
Temperature blank compliant* (i.e., 0-6°C after correction factor)? * *Note: Exemption permitted for chilled samples collected less than 8 hours ago.* Cooler ID: 1 @ 1.9 w/ Therm.ID: 200 Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ *Note: If non-compliant, use form FS-0029 to document affected samples/analyses.* If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP**" will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." **If temperature(s) <0°C, were all sample containers ice free?**	(Yes) No N/A Yes No (N/A)	
Delivery method (specify all that apply): (Client) USPS Alert Courier C&D Delivery AK Air Lynden Carlile ERA PenAir FedEx UPS NAC Other: → *For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?*	Note ABN/ tracking # See Attached or N/A Yes No (N/A)	
→ For samples received with payment, note amount ($) and cash / check / CC (**circle one**) or note: → For samples **received in FBKS**, ANCH staff will verify all criteria are reviewed.		SRF Initiated by: JD N/A N/A
Were samples received within hold time? *Note: Refer to form F-083 "Sample Guide" for hold time information.* Do samples **match COC*** (i.e., sample IDs, dates/times collected)? * *Note: Exemption permitted if times differ <1hr; in which case, use times on COC.* Were analyses requested unambiguous?	(Yes) No N/A (Yes) No N/A (Yes) No N/A	
Were samples in **good condition** (no leaks/cracks/breakage)? Packing material used (specify all that apply): (Bubble Wrap) Separate plastic bags Vermiculite Other:	(Yes) No N/A	
Were all VOA vials **free of headspace** (i.e., bubbles ≤6 mm)? Were all soil VOAs **field extracted** with MeOH+BFB?	Yes No (N/A) Yes No (N/A)	
Were **proper containers** (type/mass/volume/preservative*) used? * *Note: Exemption permitted for waters to be analyzed for metals.* Were **Trip Blanks** (i.e., VOAs, LL-Hg) in cooler with samples?	(Yes) No N/A Yes No (N/A)	
For **special handling** (e.g., "MI" or foreign soils, lab filter, limited volume, (Ref Lab)), were bottles/paperwork flagged (e.g., sticker)?	Yes No (N/A)	JD Grain Size
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was **pH verified and compliant**? If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No (N/A) Yes No (N/A)	
For **RUSH/SHORT Hold Time**, were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	Yes No (N/A)	
For **SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP**, were containers / paperwork flagged accordingly?	(Yes) No N/A	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	Yes No (N/A)	SRF Completed by: MD 09/05/13 PM = CGH N/A
Was **PEER REVIEW** of ***sample numbering/labeling completed?***	Yes No (N/A)	Peer Reviewed by: (N/A)
Additional notes (if applicable):		

Note to Client: *Any "no" circled above indicates non-compliance with standard procedures and may impact data quality.*

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SAMPLE RECEIPT FORM FOR TRANSFERS

Note: This form is to be completed by Anchorage Sample Receiving staff for all shipments received at SGS-Anchorage from SGS-Fairbanks.

Were samples received numbered with all criteria on Sample Receipt Form F0004 documented by Fairbanks Sample Receiving staff? If "No," ***Anchorage Sample Receiving staff must complete the receiving process & document pH verification, sample condition, etc. on the SRF initiated by Fairbanks staff*** (attached).	Yes (No) N/A	Use space below for additional notes…

Review Criteria:	Condition:	Comments/Action Taken:
Were **custody seals** intact? Note # & location: COC accompanied samples?	(Yes) No N/A (Yes) No N/A	1F 1B
Temperature blank compliant (i.e., 0-6°C after correction factor)? Cooler ID: _____ @ 0.7 w/ Therm.ID: 242 Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ ***Note: If non-compliant, use form FS-0029 to document affected samples/analyses.*** If samples are received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "**COOLER TEMP** will be noted to the right. In cases where neither a temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled." **If temperature(s) <0°C, were all containers ice free?**	(Yes) No N/A Yes No (N/A)	
Delivery method: (Lynden) ~~Other:~~		
Completed by: MD 09/05/13		

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CLIENT: SGS - AK

SGS Reference: SGS Ft McMurray

Additional Comments:

Page ____ of ____

CONTACT: Julie Shumway PHONE NO: (907) 562-2343

PROJECT NAME: 1138389 PROJECT/ PWSID/ PERMIT#:

REPORTS TO: Julie Shumway E-MAIL: Julie.Shumway@sgs.com

INVOICE TO: QUOTE #:

P.O. #: 1138389

3

2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX	# CONTAINERS	Preservative Used: TYPE C = COMP G = GRAB	Multi Incremental Soils Particle Size- Bekman Coulter Laser Note				MS	MSD	SGS lab #	Loc ID	REMARKS
	13-NPR-01-SS-02	08/30/13	1017	SO	1	GRAB	x								
	13-NPR-02-SS-01	08/30/13	1500	SO	1	GRAB	x								
	13-NPR-02-SS-01	08/30/13	1500	SO	1	GRAB	x				x				
	13-NPR-02-SS-01	08/30/13	1500	SO	1	GRAB	x					x			
	13-NPR-03-SS-01	08/30/13	1050	SO	1	GRAB	x								
	13-NPR-04-SS-01	09/04/13	1015	SO	1	GRAB	x								
	13-NPR-05-SS-01	09/04/13	1055	SO	1	GRAB	x								
	13-NPR-06-SS-01	09/04/13	950	SO	1	GRAB	x								

5

Relinquished By: (1)	Date 09/10/13	Time	Received By:
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:

4

DOD Project? YES NO

Cooler ID: _____

Data Deliverable Requirements: Level II report + Excel EDD

Requested Turnaround Time and-or Special Instructions:

Temp Blank °C: _____

or Ambient [ ]

(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)

INTACT BROKEN ABSENT

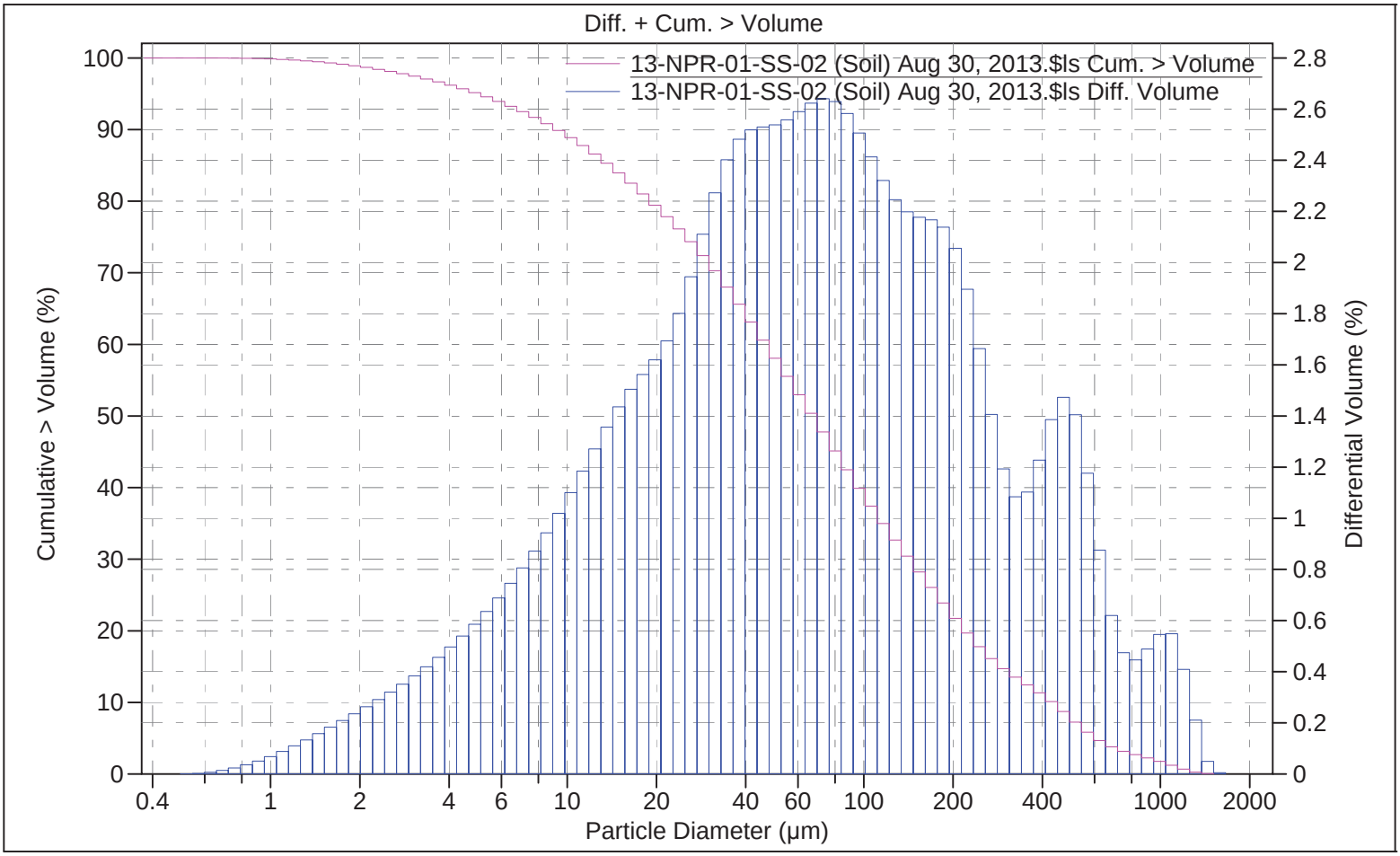
(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

Beckman Coulter LS Particle Size Analyzer

18 Sep 2013 15:44

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-01-SS-02 (Soil) Aug 30, 2013.$ls
	13-NPR-01-SS-02 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-01-SS-02 (Soil)
Comment 1:	30 Aug 2013 @ 10:17
Comment 2:	Oversize 20.21% >2000 microns - organics, grass, roots
Optical model:	FraunhoferPIDS.rf780d
Start time:	15:38 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-01-SS-02 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	145.9 µm	S.D.:	211.1 µm
		Skewness:	2.735 Right skewed
		Kurtosis:	8.591 Leptokurtic

d_{10}: 8.845 µm d_{50}: 64.33 µm d_{90}: 412.9 µm

<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
4.779 µm	14.21 µm	24.13 µm	64.33 µm	168.8 µm	259.2 µm	412.9 µm	580.2 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
580.2 µm	412.9 µm	259.2 µm	64.33 µm	24.13 µm	14.21 µm	8.845 µm	4.779 µm
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm			
11.3%	39.6%	43.0%	59.4%	1.31%			
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm			
88.7%	60.4%	57.0%	40.6%	98.7%			

Volume %	13-NPR-01 -SS-02 (Soil) Aug 30, 2013 .$ls Particle
5	580.2
10	412.9
16	259.2
25	168.8
50	64.33
75	24.13
84	14.21
90	8.845
95	4.779

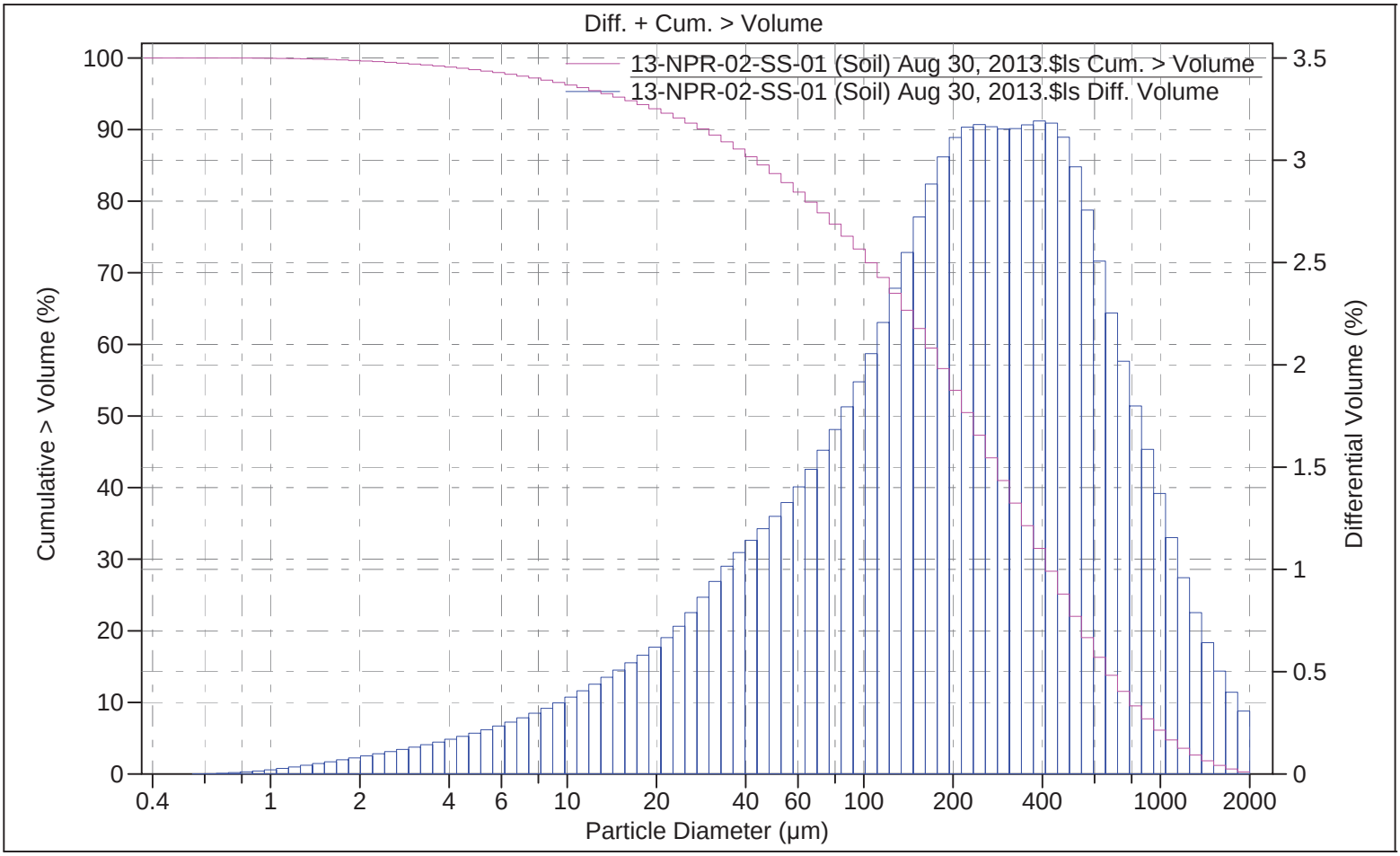
13-NPR-01-SS-02 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	2.64	47.8
0.412	0	100	76.42	2.63	45.1
0.452	0.000022	100	83.89	2.58	42.5
0.496	0.00036	100	92.09	2.51	39.9
0.545	0.0022	100	101.1	2.41	37.4
0.598	0.0067	99.997	111.0	2.32	35.0
0.656	0.014	99.99	121.8	2.25	32.7
0.721	0.024	99.98	133.7	2.20	30.4
0.791	0.036	99.95	146.8	2.18	28.2
0.868	0.051	99.9	161.2	2.17	26.0
0.953	0.068	99.9	176.9	2.14	23.9
1.047	0.088	99.8	194.2	2.06	21.7
1.149	0.11	99.7	213.2	1.90	19.7
1.261	0.13	99.6	234.1	1.66	17.8
1.385	0.16	99.5	256.9	1.41	16.1
1.520	0.18	99.3	282.1	1.19	14.7
1.668	0.21	99.1	309.6	1.08	13.5
1.832	0.24	98.9	339.9	1.10	12.4
2.011	0.26	98.7	373.1	1.23	11.3
2.207	0.29	98.4	409.6	1.39	10.1
2.423	0.32	98.1	449.7	1.47	8.73
2.660	0.35	97.8	493.6	1.40	7.26
2.920	0.38	97.5	541.9	1.18	5.85
3.205	0.42	97.1	594.9	0.88	4.67
3.519	0.46	96.7	653.0	0.62	3.80
3.863	0.50	96.2	716.8	0.47	3.18
4.240	0.54	95.7	786.9	0.45	2.70
4.655	0.59	95.2	863.9	0.49	2.26
5.110	0.64	94.6	948.3	0.55	1.77
5.610	0.69	93.9	1041	0.55	1.22
6.158	0.75	93.3	1143	0.41	0.68
6.760	0.81	92.5	1255	0.21	0.27
7.421	0.87	91.7	1377	0.050	0.055
8.147	0.94	90.8	1512	0.0053	0.0053
8.943	1.02	89.9	1660	0	0
9.817	1.10	88.9	1822	0	0
10.78	1.18	87.8	2000		0
11.83	1.27	86.6			
12.99	1.36	85.3			
14.26	1.44	84.0			
15.65	1.50	82.5			
17.18	1.56	81.0			
18.86	1.62	79.4			
20.70	1.69	77.8			
22.73	1.80	76.1			
24.95	1.94	74.3			
27.39	2.11	72.4			
30.07	2.27	70.3			
33.01	2.40	68.0			
36.24	2.48	65.6			
39.78	2.52	63.1			
43.67	2.53	60.6			
47.94	2.54	58.1			
52.62	2.56	55.5			
57.77	2.59	53.0			
63.41	2.62	50.4			

Beckman Coulter LS Particle Size Analyzer

18 Sep 2013 16:38

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-02-SS-01 (Soil) Aug 30, 2013.$ls
	13-NPR-02-SS-01 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-02-SS-01 (Soil)
Comment 1:	Aug.30, 2013 @ 15:00
Comment 2:	Overize 30.99% >2000 microns Organic matter, grass, roots, soil fertilizer
Optical model:	FraunhoferPIDS.rf780d
Start time:	15:50 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-02-SS-01 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	324.7 µm	S.D.:	334.4 µm
		Skewness:	1.808 Right skewed
		Kurtosis:	3.744 Leptokurtic

d_{10}: 27.72 µm d_{50}: 216.4 µm d_{90}: 770.0 µm

<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
13.01 µm	47.44 µm	84.41 µm	216.4 µm	451.5 µm	601.6 µm	770.0 µm	1024 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
1024 µm	770.0 µm	601.6 µm	216.4 µm	84.41 µm	47.44 µm	27.72 µm	13.01 µm

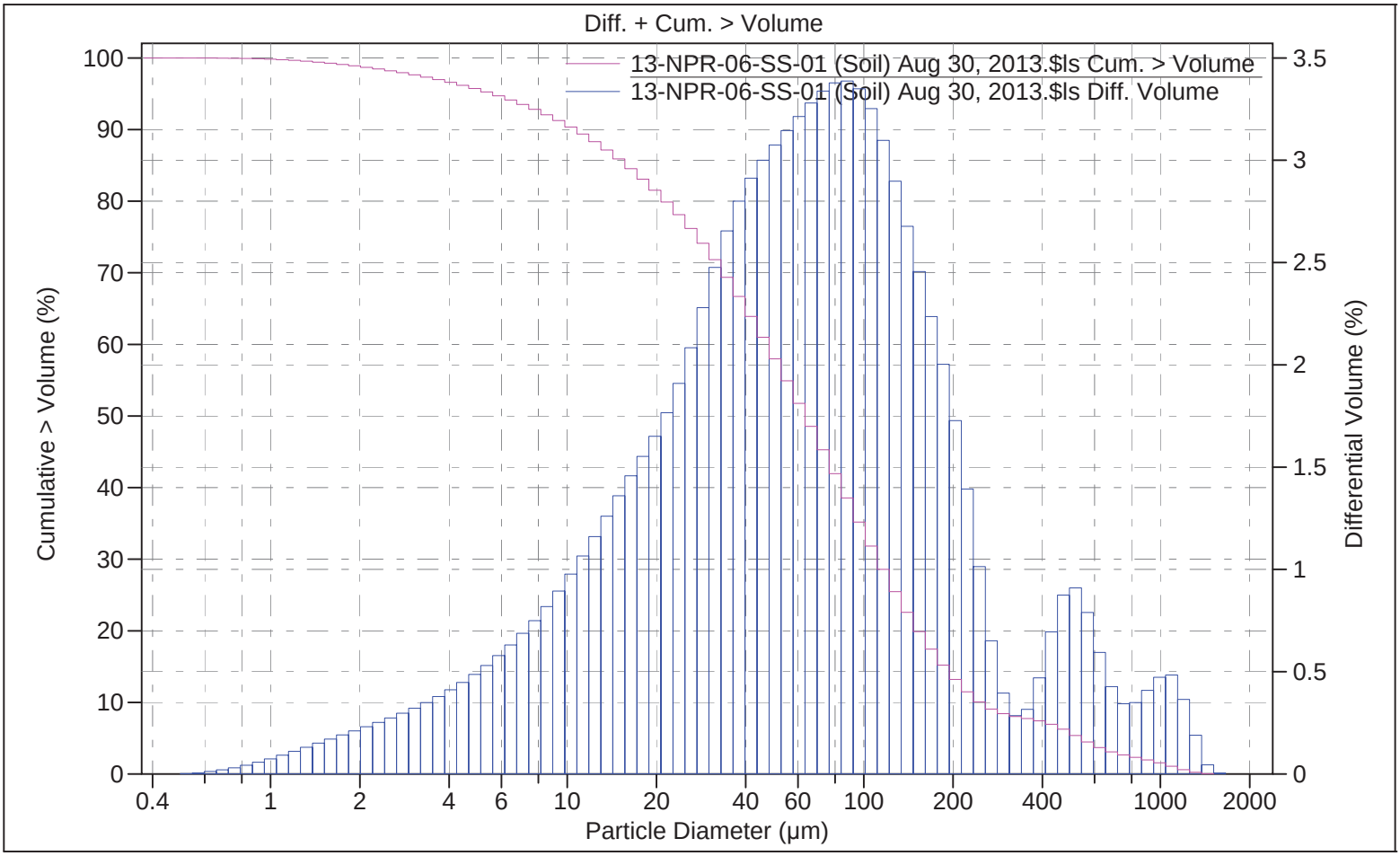
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm
3.85%	15.1%	16.7%	26.3%	0.42%
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm
96.1%	84.9%	83.3%	73.7%	99.6%

Volume %	13-NPR-02 -SS-01 (Soil) Aug 30, 2013 .$ls Particle
5	1024
10	770.0
16	601.6
25	451.5
50	216.4
75	84.41
84	47.44
90	27.72
95	13.01

13-NPR-02-SS-01 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	1.58	78.4
0.412	0	100	76.42	1.68	76.8
0.452	0.000002	100	83.89	1.79	75.1
0.496	0.000058	100	92.09	1.92	73.3
0.545	0.00044	100	101.1	2.05	71.4
0.598	0.0016	100	111.0	2.21	69.3
0.656	0.0038	99.998	121.8	2.37	67.1
0.721	0.0068	99.99	133.7	2.55	64.8
0.791	0.010	99.99	146.8	2.72	62.2
0.868	0.015	99.98	161.2	2.88	59.5
0.953	0.021	99.96	176.9	3.02	56.6
1.047	0.027	99.9	194.2	3.11	53.6
1.149	0.035	99.9	213.2	3.16	50.5
1.261	0.043	99.9	234.0	3.17	47.3
1.384	0.051	99.8	256.9	3.16	44.1
1.520	0.060	99.8	282.1	3.15	41.0
1.668	0.069	99.7	309.6	3.15	37.8
1.832	0.079	99.7	339.9	3.17	34.7
2.011	0.089	99.6	373.1	3.19	31.5
2.207	0.099	99.5	409.6	3.18	28.3
2.423	0.11	99.4	449.7	3.11	25.1
2.660	0.12	99.3	493.6	2.97	22.0
2.920	0.13	99.2	541.9	2.76	19.0
3.205	0.14	99.0	594.8	2.51	16.3
3.519	0.16	98.9	653.0	2.25	13.8
3.863	0.17	98.7	716.8	2.02	11.5
4.240	0.18	98.6	786.9	1.80	9.51
4.655	0.20	98.4	863.9	1.59	7.71
5.110	0.22	98.2	948.3	1.37	6.13
5.610	0.23	98.0	1041	1.16	4.76
6.158	0.25	97.7	1143	0.96	3.60
6.760	0.27	97.5	1255	0.79	2.64
7.421	0.30	97.2	1377	0.64	1.85
8.147	0.32	96.9	1512	0.50	1.21
8.943	0.35	96.6	1660	0.40	0.71
9.818	0.38	96.2	1822	0.31	0.31
10.78	0.41	95.9	2000		0
11.83	0.44	95.4			
12.99	0.47	95.0			
14.26	0.51	94.5			
15.65	0.54	94.0			
17.18	0.58	93.5			
18.86	0.62	92.9			
20.71	0.67	92.3			
22.73	0.72	91.6			
24.95	0.79	90.9			
27.39	0.86	90.1			
30.07	0.94	89.2			
33.01	1.02	88.3			
36.24	1.08	87.3			
39.78	1.14	86.2			
43.67	1.20	85.1			
47.94	1.26	83.9			
52.62	1.33	82.6			
57.77	1.40	81.3			
63.41	1.49	79.9			

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-06-SS-01 (Soil) Aug 30, 2013.$ls
	13-NPR-06-SS-01 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-06-SS-01 (Soil)
Comment 1:	Aug 30, 2013 @ 9:50
Comment 2:	Oversize 5.80 >2000 microns (Some big rocks and organic matter)
Optical model:	FraunhoferPIDS.rf780d
Start time:	17:07 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-06-SS-01 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	119.6 µm	S.D.:	188.5 µm
		Skewness:	3.568 Right skewed
		Kurtosis:	14.51 Leptokurtic

d_{10}: 10.17 µm d_{50}: 60.88 µm d_{90}: 236.0 µm

<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
5.344 µm	16.21 µm	26.35 µm	60.88 µm	123.8 µm	171.3 µm	236.0 µm	514.0 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
514.0 µm	236.0 µm	171.3 µm	60.88 µm	26.35 µm	16.21 µm	10.17 µm	5.344 µm
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm			
9.83%	39.2%	43.4%	64.0%	1.29%			
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm			
90.2%	60.8%	56.6%	36.0%	98.7%			

Volume %	13-NPR-06 -SS-01 (Soil) Aug 30, 2013 .$ls Particle
5	514.0
10	236.0
16	171.3
25	123.8
50	60.88
75	26.35
84	16.21
90	10.17
95	5.344

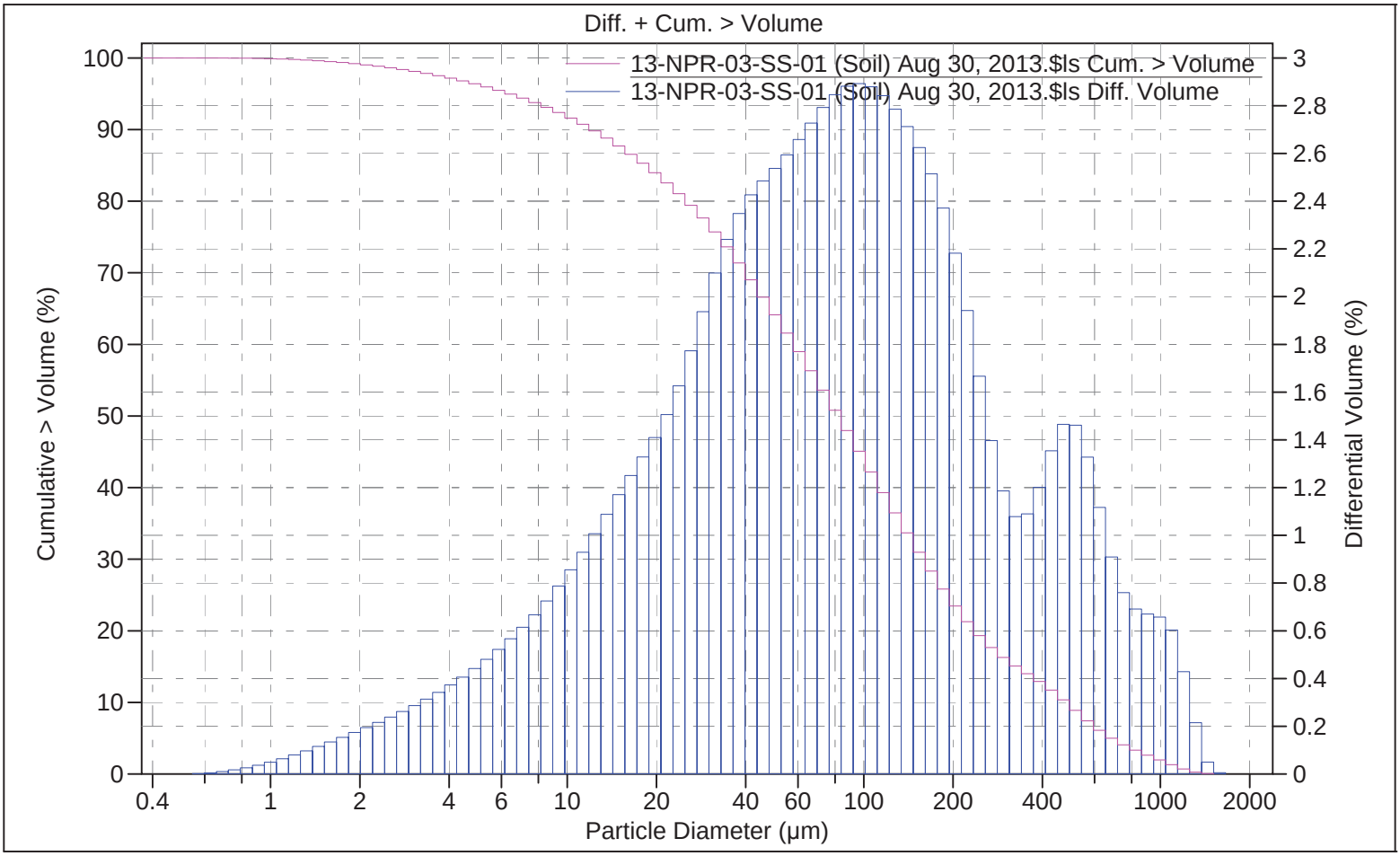
13-NPR-06-SS-01 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	3.34	45.3
0.412	0.000021	100	76.42	3.38	41.9
0.452	0.00033	100	83.89	3.39	38.6
0.496	0.0020	100	92.09	3.35	35.2
0.545	0.0059	99.998	101.1	3.25	31.8
0.598	0.012	99.99	111.0	3.10	28.6
0.656	0.020	99.98	121.8	2.90	25.5
0.721	0.030	99.96	133.7	2.68	22.6
0.791	0.043	99.9	146.8	2.46	19.9
0.868	0.057	99.9	161.2	2.24	17.4
0.953	0.074	99.8	176.9	2.00	15.2
1.047	0.092	99.8	194.2	1.73	13.2
1.149	0.11	99.7	213.2	1.39	11.5
1.261	0.13	99.6	234.1	1.01	10.1
1.385	0.15	99.4	256.9	0.65	9.07
1.520	0.17	99.3	282.1	0.40	8.42
1.668	0.19	99.1	309.6	0.29	8.02
1.832	0.21	98.9	339.9	0.32	7.74
2.011	0.23	98.7	373.1	0.47	7.42
2.207	0.25	98.5	409.6	0.69	6.95
2.423	0.27	98.2	449.7	0.87	6.26
2.660	0.30	97.9	493.6	0.91	5.38
2.920	0.32	97.6	541.9	0.79	4.48
3.205	0.35	97.3	594.9	0.59	3.69
3.519	0.38	97.0	653.0	0.43	3.09
3.863	0.41	96.6	716.8	0.34	2.66
4.240	0.45	96.2	786.9	0.35	2.32
4.655	0.49	95.7	863.9	0.41	1.97
5.110	0.53	95.2	948.3	0.47	1.56
5.610	0.58	94.7	1041	0.48	1.09
6.158	0.63	94.1	1143	0.36	0.60
6.760	0.69	93.5	1255	0.19	0.24
7.421	0.75	92.8	1377	0.045	0.050
8.147	0.82	92.1	1512	0.0048	0.0048
8.943	0.89	91.3	1660	0	0
9.817	0.98	90.4	1822	0	0
10.78	1.07	89.4	2000		0
11.83	1.16	88.3			
12.99	1.26	87.2			
14.26	1.36	85.9			
15.65	1.46	84.5			
17.18	1.55	83.1			
18.86	1.65	81.5			
20.70	1.77	79.9			
22.73	1.91	78.1			
24.95	2.08	76.2			
27.39	2.28	74.1			
30.07	2.48	71.8			
33.01	2.65	69.4			
36.24	2.80	66.7			
39.78	2.91	63.9			
43.67	3.00	61.0			
47.94	3.08	58.0			
52.62	3.15	54.9			
57.77	3.21	51.8			
63.41	3.28	48.6			

Beckman Coulter LS Particle Size Analyzer

18 Sep 2013 16:37

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-03-SS-01 (Soil) Aug 30, 2013.$ls
	13-NPR-03-SS-01 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-03-SS-01 (Soil)
Comment 1:	Aug 30, 2013 @ 10:50
Comment 2:	Oversize 12.37% >2000 microns - Organics:Grass, Roots
Optical model:	FraunhoferPIDS.rf780d
Start time:	16:34 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-03-SS-01 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	162.7 µm	S.D.:	223.1 µm
		Skewness:	2.507 Right skewed
		Kurtosis:	6.816 Leptokurtic

d_{10}: 11.62 µm d_{50}: 78.54 µm d_{90}: 460.5 µm

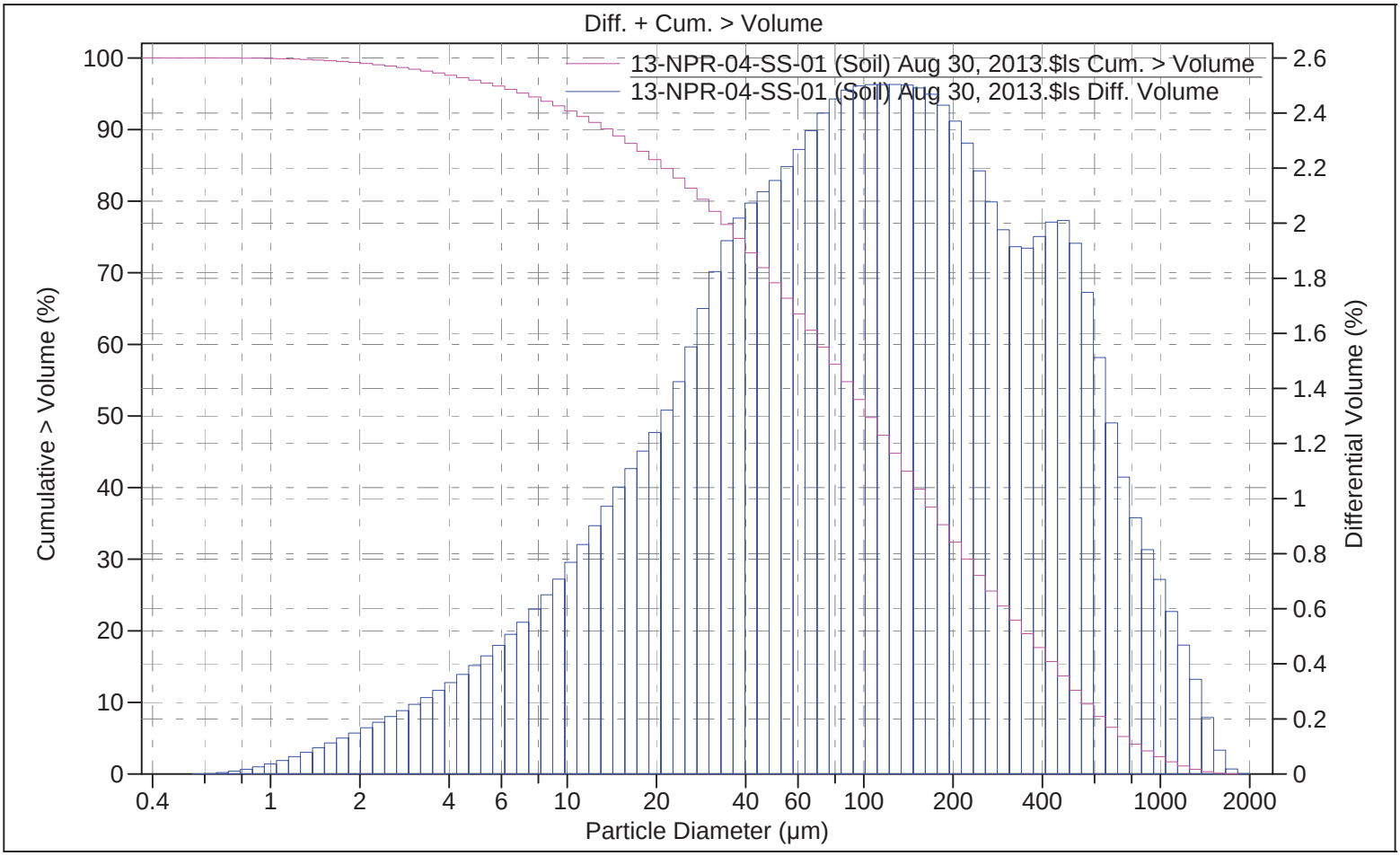
<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
6.115 µm	18.82 µm	31.07 µm	78.54 µm	183.0 µm	288.4 µm	460.5 µm	652.5 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
652.5 µm	460.5 µm	288.4 µm	78.54 µm	31.07 µm	18.82 µm	11.62 µm	6.115 µm
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm			
8.57%	33.6%	37.0%	54.2%	0.95%			
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm			
91.4%	66.4%	63.0%	45.8%	99.0%			

Volume %	13-NPR-03 -SS-01 (Soil) Aug 30, 2013 .$ls Particle
5	652.5
10	460.5
16	288.4
25	183.0
50	78.54
75	31.07
84	18.82
90	11.62
95	6.115

13-NPR-03-SS-01 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	2.79	53.6
0.412	0	100	76.42	2.85	50.8
0.452	0.000018	100	83.89	2.88	48.0
0.496	0.00028	100	92.09	2.89	45.1
0.545	0.0017	100	101.1	2.88	42.2
0.598	0.0050	99.998	111.0	2.84	39.3
0.656	0.010	99.99	121.8	2.79	36.5
0.721	0.017	99.98	133.7	2.71	33.7
0.791	0.026	99.97	146.8	2.62	31.0
0.868	0.037	99.9	161.2	2.51	28.3
0.953	0.049	99.9	176.9	2.37	25.8
1.047	0.064	99.9	194.2	2.18	23.5
1.149	0.080	99.8	213.2	1.94	21.3
1.261	0.097	99.7	234.1	1.67	19.3
1.385	0.12	99.6	256.9	1.40	17.7
1.520	0.13	99.5	282.1	1.19	16.3
1.668	0.15	99.4	309.6	1.08	15.1
1.832	0.17	99.2	339.9	1.09	14.0
2.011	0.19	99.0	373.1	1.20	12.9
2.207	0.22	98.8	409.6	1.35	11.7
2.423	0.24	98.6	449.7	1.46	10.4
2.660	0.26	98.4	493.6	1.46	8.90
2.920	0.29	98.1	541.9	1.33	7.44
3.205	0.31	97.8	594.9	1.12	6.11
3.519	0.34	97.5	653.0	0.91	4.99
3.863	0.37	97.2	716.8	0.76	4.08
4.240	0.41	96.8	786.9	0.69	3.32
4.655	0.44	96.4	863.9	0.67	2.63
5.110	0.48	96.0	948.3	0.66	1.96
5.610	0.52	95.5	1041	0.60	1.30
6.158	0.57	95.0	1143	0.43	0.70
6.760	0.61	94.4	1255	0.22	0.27
7.421	0.67	93.8	1377	0.050	0.055
8.147	0.72	93.1	1512	0.0053	0.0053
8.943	0.79	92.4	1660	0	0
9.817	0.86	91.6	1822	0	0
10.78	0.93	90.7	2000		0
11.83	1.01	89.8			
12.99	1.09	88.8			
14.26	1.17	87.7			
15.65	1.25	86.5			
17.18	1.33	85.3			
18.86	1.41	84.0			
20.70	1.51	82.6			
22.73	1.63	81.1			
24.95	1.77	79.4			
27.39	1.94	77.7			
30.07	2.10	75.7			
33.01	2.24	73.6			
36.24	2.35	71.4			
39.78	2.43	69.0			
43.67	2.48	66.6			
47.94	2.54	64.1			
52.62	2.59	61.6			
57.77	2.66	59.0			
63.41	2.73	56.3			

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-04-SS-01 (Soil) Aug 30, 2013.$ls
	13-NPR-04-SS-01 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-04-SS-01 (Soil)
Comment 1:	Aug 30, 2013 @ 10:15
Comment 2:	Oversize 13.82% >2000 microns (Big rocks and organic matter)
Optical model:	FraunhoferPIDS.rf780d
Start time:	16:49 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-04-SS-01 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	200.2 µm	S.D.:	249.9 µm
		Skewness:	2.159 Right skewed
		Kurtosis:	5.296 Leptokurtic

d_{10}: 13.11 µm d_{50}: 100.4 µm d_{90}: 536.3 µm

<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
6.884 µm	21.56 µm	35.91 µm	100.4 µm	263.6 µm	404.4 µm	536.3 µm	732.7 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
732.7 µm	536.3 µm	404.4 µm	100.4 µm	35.91 µm	21.56 µm	13.11 µm	6.884 µm
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm			
7.55%	29.5%	32.3%	47.1%	0.77%			
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm			
92.4%	70.5%	67.7%	52.9%	99.2%			

Volume %	13-NPR-04 -SS-01 (Soil) Aug 30, 2013 .$ls Particle
5	732.7
10	536.3
16	404.4
25	263.6
50	100.4
75	35.91
84	21.56
90	13.11
95	6.884

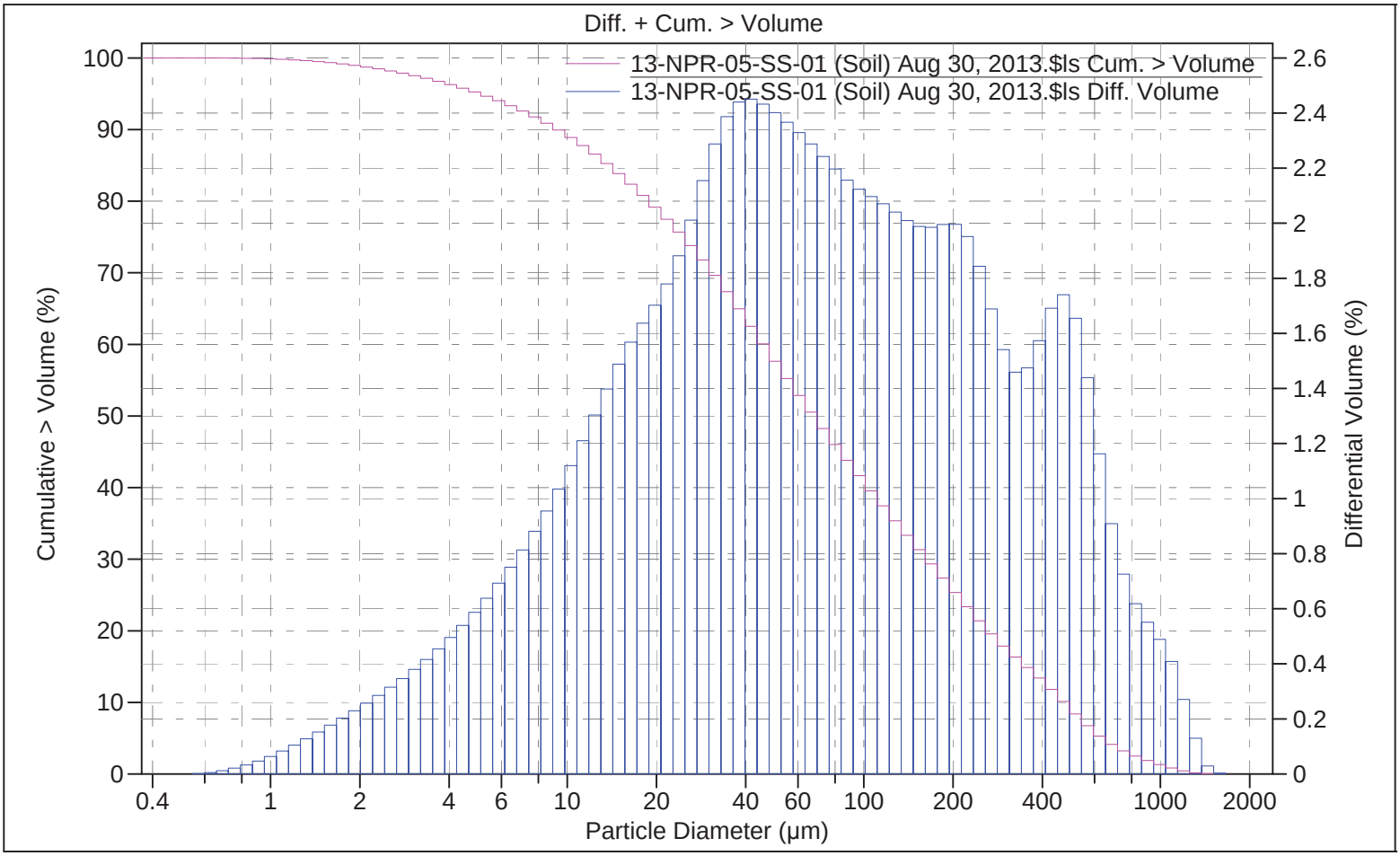
13-NPR-04-SS-01 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	2.40	59.6
0.412	0	100	76.42	2.45	57.2
0.452	0	100	83.89	2.48	54.8
0.496	0.000019	100	92.09	2.50	52.3
0.545	0.00028	100	101.1	2.50	49.8
0.598	0.0017	100	111.0	2.50	47.3
0.656	0.0050	99.998	121.8	2.50	44.8
0.721	0.010	99.99	133.7	2.50	42.3
0.791	0.017	99.98	146.8	2.49	39.8
0.868	0.026	99.97	161.2	2.47	37.3
0.953	0.037	99.9	176.9	2.43	34.8
1.047	0.049	99.9	194.2	2.37	32.4
1.149	0.063	99.9	213.2	2.29	30.0
1.261	0.079	99.8	234.1	2.19	27.7
1.385	0.095	99.7	256.9	2.08	25.6
1.520	0.11	99.6	282.1	1.98	23.5
1.668	0.13	99.5	309.6	1.91	21.5
1.832	0.15	99.4	339.9	1.91	19.6
2.011	0.17	99.2	373.1	1.95	17.7
2.207	0.19	99.1	409.6	2.00	15.7
2.423	0.21	98.9	449.7	2.01	13.7
2.660	0.23	98.7	493.6	1.93	11.7
2.920	0.25	98.4	541.9	1.75	9.78
3.205	0.28	98.2	594.9	1.51	8.03
3.519	0.30	97.9	653.0	1.27	6.52
3.863	0.33	97.6	716.8	1.08	5.24
4.240	0.36	97.3	786.9	0.93	4.17
4.655	0.39	96.9	863.9	0.81	3.23
5.110	0.43	96.5	948.3	0.71	2.42
5.610	0.47	96.1	1041	0.59	1.71
6.158	0.51	95.6	1143	0.47	1.12
6.760	0.55	95.1	1255	0.34	0.66
7.421	0.60	94.6	1377	0.21	0.31
8.147	0.65	94.0	1512	0.087	0.11
8.943	0.71	93.3	1660	0.018	0.020
9.817	0.77	92.6	1822	0.0015	0.0015
10.78	0.83	91.8	2000		0
11.83	0.90	91.0			
12.99	0.97	90.1			
14.26	1.04	89.1			
15.65	1.11	88.1			
17.18	1.17	87.0			
18.86	1.24	85.8			
20.70	1.32	84.6			
22.73	1.42	83.2			
24.95	1.55	81.8			
27.39	1.69	80.3			
30.07	1.82	78.6			
33.01	1.94	76.7			
36.24	2.02	74.8			
39.78	2.07	72.8			
43.67	2.11	70.7			
47.94	2.16	68.6			
52.62	2.21	66.4			
57.77	2.27	64.2			
63.41	2.34	62.0			

Beckman Coulter LS Particle Size Analyzer

18 Sep 2013 17:01

File name:	C:\LS13320\2013\SGS Alaska\soil\13-NPR-05-SS-01 (Soil) Aug 30, 2013.$ls
	13-NPR-05-SS-01 (Soil) Aug 30, 2013.$ls
File ID:	1138389
Sample ID:	13-NPR-05-SS-01 (Soil)
Comment 1:	Aug 30, 2013 @ 10:55
Comment 2:	Oversize 3.11% >2000 microns (Some organic matters)
Optical model:	FraunhoferPIDS.rf780d
Start time:	16:58 18 Sep 2013



Volume Statistics (Arithmetic) 13-NPR-05-SS-01 (Soil) Aug 30, 2013.$ls

Calculations from 0.375 µm to 2000 µm

Volume:	100%		
Mean:	155.9 µm	S.D.:	212.8 µm
		Skewness:	2.303 Right skewed
		Kurtosis:	5.949 Leptokurtic

d_{10}: 8.885 µm d_{50}: 64.89 µm d_{90}: 453.0 µm

<5%	<16%	<25%	<50%	<75%	<84%	<90%	<95%
4.848 µm	14.13 µm	23.54 µm	64.89 µm	197.6 µm	316.5 µm	453.0 µm	609.8 µm
>5%	>10%	>16%	>50%	>75%	>84%	>90%	>95%
609.8 µm	453.0 µm	316.5 µm	64.89 µm	23.54 µm	14.13 µm	8.885 µm	4.848 µm
<10 µm	<44 µm	<50 µm	<90 µm	<2 µm			
11.3%	40.1%	43.4%	57.8%	1.25%			
>10 µm	>44 µm	>50 µm	>90 µm	>2 µm			
88.7%	59.9%	56.6%	42.2%	98.8%			

Volume %	13-NPR-05 -SS-01 (Soil) Aug 30, 2013 .$ls Particle
5	609.8
10	453.0
16	316.5
25	197.6
50	64.89
75	23.54
84	14.13
90	8.885
95	4.848

13-NPR-05-SS-01 (Soil) Aug 30, 2013.$ls

Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %	Channel Diameter (Lower) µm	Diff. Volume %	Cum. > Volume %
0.375	0	100	69.61	2.24	48.3
0.412	0	100	76.42	2.20	46.0
0.452	0.000006	100	83.89	2.16	43.8
0.496	0.00018	100	92.09	2.12	41.7
0.545	0.0013	100	101.1	2.10	39.5
0.598	0.0050	99.998	111.0	2.07	37.4
0.656	0.012	99.99	121.8	2.04	35.4
0.721	0.021	99.98	133.7	2.01	33.3
0.791	0.033	99.96	146.8	1.99	31.3
0.868	0.047	99.9	161.2	1.99	29.3
0.953	0.064	99.9	176.9	2.00	27.3
1.047	0.083	99.8	194.2	2.00	25.4
1.149	0.10	99.7	213.2	1.95	23.4
1.261	0.13	99.6	234.1	1.84	21.4
1.385	0.15	99.5	256.9	1.69	19.6
1.520	0.18	99.3	282.1	1.54	17.9
1.668	0.20	99.2	309.6	1.46	16.3
1.832	0.23	99.0	339.9	1.47	14.9
2.011	0.26	98.7	373.1	1.57	13.4
2.207	0.29	98.5	409.6	1.69	11.8
2.423	0.32	98.2	449.7	1.74	10.1
2.660	0.35	97.9	493.6	1.66	8.39
2.920	0.38	97.5	541.9	1.44	6.74
3.205	0.42	97.2	594.9	1.16	5.30
3.519	0.45	96.7	653.0	0.91	4.14
3.863	0.50	96.3	716.8	0.73	3.23
4.240	0.54	95.8	786.9	0.62	2.50
4.655	0.59	95.2	863.9	0.55	1.88
5.110	0.64	94.7	948.3	0.49	1.33
5.610	0.69	94.0	1041	0.41	0.84
6.158	0.75	93.3	1143	0.27	0.43
6.760	0.81	92.6	1255	0.13	0.16
7.421	0.88	91.8	1377	0.029	0.032
8.147	0.95	90.9	1512	0.0030	0.0030
8.943	1.03	89.9	1660	0	0
9.817	1.12	88.9	1822	0	0
10.78	1.21	87.8	2000		0
11.83	1.30	86.6			
12.99	1.40	85.3			
14.26	1.49	83.9			
15.65	1.57	82.4			
17.18	1.64	80.8			
18.86	1.70	79.2			
20.70	1.78	77.5			
22.73	1.88	75.7			
24.95	2.01	73.8			
27.39	2.15	71.8			
30.07	2.29	69.6			
33.01	2.39	67.4			
36.24	2.44	65.0			
39.78	2.45	62.5			
43.67	2.43	60.1			
47.94	2.40	57.6			
52.62	2.37	55.2			
57.77	2.33	52.9			
63.41	2.29	50.5			

ATTACHMENT F

Quality Assurance Review and ADEC Checklist

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1. QUALITY ASSURANCE REVIEW

Laboratory quality assurance / quality control (QA / QC) data associated with the analysis of project samples has been reviewed to evaluate the usability of the analytical data generated during 2013 surface soil sampling at select residential garden sites near the Flint Hills Resources, North Pole Refinery, North Pole, Alaska.

All samples were collected, reported, and shipped in general accordance with the work plan (ERM 2013). Sample analysis was performed by the Alaska Department of Environmental Conservation (ADEC) certified laboratory, (SGS Anchorage, Alaska, Inc. [SGS] with the exception of grain size. Samples requiring grain size determination were shipped to SGS Fort McMurray, Alberta Canada.

All data were reviewed in accordance with United States Environmental Protection Agency (EPA) National Functional Guidelines for Organic Methods (EPA 2008), analytical methodology and ADEC regulatory guidance documents (ADEC 2009; 2010; 2011; 2012). This data review focused on the following QC parameters and impact on data quality objectives (DQOs): sample handling and chain-of-custody documentation; holding time compliance; field QC (trip blanks, field duplicates); laboratory QC (method blanks, laboratory control samples (LCS) and LCS duplicates (LCSD), surrogates, matrix spikes (MS) and MS duplicates [MSD]), limits of detection (LOD) and limits of quantitation (LOQ); and completeness.

Results that were detected at concentrations below the LOQ but above the limit of detection (LOD) are flagged "J" and considered estimated.

Ninety-two percent of the data are considered usable according to established DQOs. Eight percent of the data are considered rejected (R) and only suitable for screening purposes. The details of this review and qualification of the data are summarized in the following sections.

1.1. Sample Collection

Sixteen soil samples were collected for sulfolane; eight soil samples were collected for grain size and total organic carbon. Ten samples were collected on August 30, 2013, and six samples were collected on September 4, 2013.

All samples were reported in a single sample delivery group (SDG), 1138389.

Soil samples were hand delivered to the SGS office in Fairbanks, Alaska. The Fairbanks laboratory transferred the samples to the respective SGS laboratories. Samples were analyzed for the following parameters and analytical procedures:

- Sulfolane, SW8270D (Modified) using a selective ion, isotopic dilution;
- Total Organic Carbon (TOC), SW9060;
- Grain Size, Particle Size Beckman Coulter Lazer

1.2. Sample Handling and Chain-of-Custody (COC)

The sample cooler was shipped with custody seals intact. COC forms, laboratory sample receipt forms, and case narratives were reviewed to evaluate the integrity of the samples and the quality of the associated data. All sample containers in the sample cooler were received at the laboratory intact and within temperature range.

1.3. Holding Time Compliance

All samples for sulfolane analysis were initially extracted within the 14 day holding time criteria established for SW8270D, sulfolane analysis (ADEC 2013) and in accordance with work plan specifications. Due to the high molecular weight of the organic material in the samples (high boiling point), the laboratory was unable to concentrate the samples to the required 1 milliliter (ml) volume. In an effort to remove potential biogenic contribution and provide the lowest possible LOD, the laboratory added a cleanup step to the preparation. As a result of this cleanup step, most samples were extracted after the established holding time criteria of 14 days expired. All sulfolane results in the following samples re-extracted within 28 days of sample collection are considered estimated and have been flagged (J/UJ-H): 13-NPR-01-SS-01, -01-SS-02, -02-SS-01, -03-FD-03, -03-SS-02, -03-SS-03, -04-FD-01, -04-SS-01, -04-SS-02, -04-SS-03, 05-SS-01, -05-SS-02, -05-SS-03, -06-SS-01.

Non-detected sulfolane results associated with grossly exceeded holding times (2 times actual holding time [2 X 14 days = 28 days]) in the following samples are considered rejected and have been flagged UR: 13-NPR-01-SS-03 and 13-NPR-03-SS-01. Because Sulfolane was not detected in these samples, positive results did not require estimation.

1.4. Field QA/QC

Field QA/QC protocols are designed to measure for potential sample bias as a result of sampling procedures and possible contamination during collection and transport of samples. Collection and analysis of field duplicates facilitates an evaluation of precision that takes into account potential variables associated with sampling procedures, site heterogeneity and laboratory analyses. In compliance with the Work Plan, field duplicates were collected at a rate of one per every ten project samples. Two duplicate samples were collected with the 14 primary samples. When analytes were present in concentrations below the LOD in one or both samples, no valid comparison could be made, as was the case with sulfolane analyses. Reportable percent difference (RPDs) for one of the two TOC samples was within limits. The other sample pair, 13-NPR-03-SS-03 and 13-NPR-03-FD-03 were outside the appropriate range. These results were flagged J-D and considered estimated.

1.4.1. Laboratory Blanks

Laboratory / Method blanks were analyzed concurrent with an analytical batch of 20 or fewer primary samples for each of the analytical methods performed on project samples. Target analytes were not detected in laboratory blanks associated with this SDG.

1.4.2. Laboratory Control Samples

The laboratory monitors internal precision and accuracy for each analytical batch with a set of laboratory control samples (LCS / LCSD). A known quantity of target analytes are added to blank laboratory control samples prior to extraction and analysis and recoveries are calculated. Acceptable recovery criteria vary with each analytical method and matrix. The LCS / LCSD percent recoveries met laboratory and project QC goals for target analytes associated with this SDG.

1.4.3. Surrogate and Internal Standard (Isotope Dilution)

Surrogates and internal standards are specified for organic chromatographic analytical procedures such as that used for sulfolane. Surrogates and internal standards are compounds similar to target analytes and are added to each sample during collection, preparation or post-extraction. Subsequent percent recovery or area response indicates overall method performance. Surrogate recoveries were within prescribed control limits for all primary samples, method blanks, LCS / LCSD, MS / MSD and other QA / QC samples associated with this SDG. Internal standard area response was not reviewed.

SGS Reporting Criteria

Naphthalene-d8 is considered an internal standard by the laboratory because it was added post-extraction. The naphthalene-d8 response factor was used to adjust the percent recovery of the sulfolane-d8 surrogate in each sample (absolute recovery). The naphthalene-d8 response was not evaluated relative to the continuing calibration but was evaluated against an instrument blank. Because the laboratories do not report the internal standard recoveries with Level II reports, the recovery of the internal standard (recovery standard) was not reported or evaluated.

The laboratory considers sulfolane-d8 the recovery surrogate, because the compound was added prior to extraction. The adjusted surrogate (sulfolane-d8) area for the isotope dilution method was used to quantitate the sulfolane results in the samples. The percent recovery for this compound was reported on each of the sample Form 1s.

Matrix Spikes

Extra volumes of primary field samples were collected and submitted to the laboratory for matrix spike / matrix spike duplicate (MS / MSD) analyses. Matrix spikes have a known quantity of target analytes are added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control.

The laboratory chose not to report the results from the sample provided due to extraction errors made by the laboratory. The MS/MSD results associated with another client's project were reported; however, the results in the Flint Hills Project were not evaluated against the non-project sample results.

Percent recoveries were outside of limits for TOC in one MS/MSD sample. The associated LCS percent recoveries were within limits indicating matrix interference; therefore, no data required qualification.

1.4.4. Limits of Quantitation and Limits of Detection (Sensitivity)

The Key Elements Document requires that the Detection Limit (DL) not exceed 5 ppb and the Limit of Quantitation (LOQ) not exceed 10 ppb. It also requires the laboratory to analyze a least two calibration standards at a concentration below the ADEC Migration to Groundwater Action Level of 43 ppb.

The DLs in four samples and LOQs in all samples exceeded the limits established by the Key Element document.

SGS reports non-detected results as the Limit of Detection (LOD). This number is 2 times the DL. The Key Element Document does not establish a limit for LOD. However, it appears SGS used the LOD to meet criteria established for the LOQ.

All DLs, LODs and LOWs were below ADEC Migration to Groundwater Action Level of 43 ppb in the project samples.

1.5. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing LCS/LCSDs MS/MSDs and field duplicate pairs for this project. The only measure of precision for sulfolane and TOC for this SDG was field collected duplicate samples. Field duplicates and MS/MSD samples were collected in accordance with work plan specifications. Field duplicate RPDs met applicable control limits, with any exceptions noted in the Laboratory QC section. Recoveries and RPDs for all LCS/LSCD and MS/MSD samples were within required limits except as noted in Laboratory QC section.

1.5.1. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 85%:

$$\% \text{ completeness} = \frac{\text{number of valid (i.e., non-R flagged) results}}{\text{number of possible results}}$$

All requested analyses were performed in accordance with Work Plan specifications. Two results were qualified as unusable (i.e., "R"). Completeness for this project is 92%.

1.5.2. Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were specified in the work plan and verified in the field to account accurately for site variations and sample matrices. The DQO for representativeness was met.

1.5.3. Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this project followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

1.6. Data Summary

Data Quality Objective for completeness was met and the non-detected results for sulfolane were rejected in two samples due to grossly exceeded holding times. With the exception of two sulfolane sample results, data quality was determined as acceptable or estimated. Acceptable data are associated with QC data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. The rejected results are only usable for screening purposes.

References

Alaska Department of Environmental Conservation (ADEC). 2009. Technical Memorandum: Environmental Laboratory Data and Quality Assurance Requirements. March.

ADEC. 2010. Laboratory Data Review Checklist. Version 2.7. January.

ADEC. 2012. Technical Memorandum: Guidelines for Data Reporting, Data Reduction, and Treatment of Non-detect Values. June.

ADEC. 2013. Sulfolane Key Elements Document. Version 4. July 22, 2013.

United States Environmental Protection Agency (EPA). 2008. *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA-540-R-08-01). June.

EPA. 2010. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA-540-R-10-011). January.

ERM Alaska, Inc. 2013. *Garden Surface Soil Sampling and Intermediate Product Water Sampling Work Plan, North Pole, Alaska. ADEC NTP# 18803602002B.* August.

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Laboratory Data Review Checklist

Completed by:	Robert Beckman		
Title:	Project Scientist	Date:	Nov 26, 2013
CS Report Name:	0209159-1 North Pole Soil Samp	Report Date:	Oct 11, 2013
Consultant Firm:	ERM Alaska, Inc.		
Laboratory Name:	SGS North America, Inc.	Laboratory Report Number:	1138389
ADEC File Number:	100.38.090	ADEC RecKey Number:	

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

(•) Yes ( ) No ( ) NA (Please explain.) Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

( ) Yes ( ) No (•) NA (Please explain) Comments:

Samples were transferred to Ft. McMurray, Alberta, Canada for Grain Size analysis. ADEC CS approval is not necessary for this procedure.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

b. Correct analyses requested?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

Temperature blanks were measured within the acceptable temperature range upon receipt at the SGS office and Anchorage lab.

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

○ Yes ○ No ◉ NA (Please explain) Comments:

Requested analyses do not require preservation other than chilling.

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

◉ Yes ○ No ○ NA (Please explain) Comments:

Samples were received on good condition.

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/ preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

○ Yes ○ No ◉ NA (Please explain) Comments:

There were no discrepancies to document,

e. Data quality or usability affected? (Please explain)

Comments:

Data quality and usability was not affected.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No ○ NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

◉ Yes ○ No ○ NA (Please explain) Comments:

c. Were all corrective actions documented?

◉ Yes ○ No ○ NA (Please explain) Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Samples were re-extracted outside of hold times. Care narrative does not describe the effect on data quality/usability.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

b. All applicable holding times met?

( ) Yes (•) No ( ) NA (Please explain) Comments:

Sulfolane soil cleanup procedure was performed on multiple samples. Samples were prepared and re-extracted outside of hold time following cleanup.

c. All soils reported on a dry weight basis?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

( ) Yes ( ) No ( ) NA (Please explain) Comments:

Five samples were reported ND at a LOQ above the minimum required detection level of 10 ppb for the project. However none were reported ND at a LOQ above the ADEC-approved cleanup level of 38 ppb.

e. Data quality or usability affected? (Please explain)

Comments:

Two sample results are considered rejected due to gross hold time exceedences, and flagged "UR". All other results are considered estimated and flagged UJ-H.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

ii. All method blank results less than PQL?

(•) Yes ( ) No ( ) NA (Please explain) Comments:

iii. If above PQL, what samples are affected? Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

○ Yes ○ No ◉ NA (Please explain) Comments:

No affected samples to flag.

v. Data quality or usability affected? (Please explain) Comments:

Data quality and usability was not affected due to method blank results.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

◉ Yes ○ No ○ NA (Please explain) Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

○ Yes ○ No ◉ NA (Please explain) Comments:

Metals/Inorganics were not associated with this SDG.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

◉ Yes ○ No ○ NA (Please explain) Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

○ Yes ◉ No ○ NA (Please explain) Comments:

RPDs were out of range for sample 13-NPR-02-SS-01 for TOC.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

No samples were affected. LCS/LCSD confirmed precision.

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

○ Yes ○ No ◉ NA (Please explain) Comments:

No affected samples to flag.

vii. Data quality or usability affected? (Please explain) Comments:

Data quality and usability are not affected by LCS or MS/MSD results.

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

◉ Yes ○ No ○ NA (Please explain) Comments:

See QAR for surrogate details.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

◉ Yes ○ No ○ NA (Please explain) Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ○ No ◉ NA (Please explain) Comments:

No samples had failed surrogate recoveries.

iv. Data quality or usability affected? (Use the comment box to explain.). Comments:

Data quality and usability was not affected by surrogate results.

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

○ Yes ○ No ◉ NA (Please explain.) Comments:

Volatile samples were not submitted with this SDG.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

○ Yes ○ No ◉ NA (Please explain.) Comments:

See above.

iii. All results less than PQL?

○ Yes ○ No ◉ NA (Please explain.) Comments:

See above.

iv. If above PQL, what samples are affected?

Comments:

v. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability was not affected. No volatile samples were submitted with this SDG.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

◉ Yes ○ No ○ NA (Please explain) Comments:

ii. Submitted blind to lab?

◉ Yes ○ No ○ NA (Please explain.) Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute Value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

○ Yes ◉ No ○ NA (Please explain) Comments:

RPD for TOC between samples -03-FD-03 and -03-SS-03 was 97.82%

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

◉ Yes ○ No ○ NA (Please explain) Comments:

TOC results for the two above mentioned samples will be estimated and flagged J-D

f. Decontamination or Equipment Blank (if applicable)

○ Yes ○ No ◉ NA (Please explain) Comments:

Reusable equipment was not used for this sample collection.

i. All results less than PQL?

○ Yes ○ No ◉ NA (Please explain) Comments:

See above.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability was not affected due to Decon/Equipment blanks.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

○ Yes ○ No ◉ NA (Please explain) Comments:

No additional flags/qualifiers were used.

Reset Form

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