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May 17, 2023

Mr. James Hix
Orphaned Well Program East EPS
Colorado Oil and Gas Conservation Commission
Department of Natural Resources
1120 Lincoln St., Suite 810
Denver, Colorado 80203

Weston Work Order No.: 15970.001.006

**Re: Site Investigation Report for the Logan J Sand Unit (OWP) #4-24 Orphan Well Location
(Remediation ID # 18166, Location ID # 312345, Facility ID # 221213)**

Dear Mr. Hix:

On behalf of the Colorado Oil and Gas Conservation Commission (COGCC) Orphan Well Program (OWP), Weston Solutions, Inc. (Weston) has prepared this site investigation report for the Logan J Sand Unit (OWP) #4-24 Orphan Well (Site) in Logan County, Colorado. This work was performed in accordance with the Master Task Order Contract Number CMS #176679, Task Order Number WS-01, which is effective as of January 6, 2023.

SITE DESCRIPTION

The Site is located in Logan County near the town of Sterling, Colorado at global positioning system (GPS) coordinates 40.682788°N, 103.356853°W. The site is located approximately 0.2 miles northwest of the intersection of County Road 25 and County Road 36 and is surrounded by cropland (**Figure 1**). According to the COGCC Colorado Oil and Gas Information System (COGIS) database, the Site consists of a former oil and gas well (API 05-075-60014). The well drilling was completed in 1953 and was last operated by Benchmark Energy, LLC (Operator ID 10380). According to COGIS, the well was plugged and abandoned as of August 17, 2021, by Noble Energy (Well Abandonment Report Document #402792171).

The Site was previously investigated by Fremont Environmental (Fremont) in 2021. The soil samples (Floor, E-Wall, and BG-1) collected by Fremont were impacted and had a mixture of exceedances for both the Table 915-1 residential soil screening levels and protection of groundwater screening levels for total petroleum hydrocarbons (TPH), 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene, naphthalene, TPH-diesel range organics (DRO), TPH-oil range organics (ORO), benzo(a)anthracene, benzo(a)pyrene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, arsenic, barium, and hexavalent chromium. According to the Fremont report, the impacted soil was left in place.

At the time of the investigation, the Site consisted of a pump jack, pump house, and associated equipment inside of the pumphouse (including a pump, tank, and debris) which were located at the COGIS documented well coordinates. The Site features and conditions at the time of the investigation can be seen in the photolog in **Attachment A**. At the time of the field investigation, there was a significant amount of snow cover on the ground; therefore, it was not possible to thoroughly observe the entire ground surface. No staining or other evidence of impacted soils at the surface was observed by Weston at the time of the field effort.

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Colorado Oil and Gas Conservation Commission

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SITE INVESTIGATION ACTIVITIES AND METHODOLOGY

Prior to mobilization, Weston contacted the Utility Notification Center of Colorado (UNCC) and submitted a utility locate request for all public utilities near the Site. Weston mobilized to the Site on February 13, 2023, with its drilling contractor, Alpine Remediation (Alpine), and its private utility locating contractor, Kinetic Industries (Kinetic). Weston mobilized to the Site a second time on April 18 to collect an additional, deeper sample from the wellhead base location.

Prior to commencing on-site activities, Weston photographed the Site to document baseline site conditions as shown in **Attachment A**. Next, Kinetic located all non-public utilities that could be identified and cleared the proposed drilling locations flagged by Weston. This procedure protects against accidental utility strikes during drilling and is also used to locate any possible flowlines or other buried equipment on-site. Weston visually inspected the area around the center of the former wellhead to determine the general condition of the Site and inventory any remaining on-site items.

To avoid contacting shallow, unmarked utilities or other equipment while drilling, Alpine utilized a hand auger to clear the first 3 feet at each boring location. The soils removed during the hand augering process were visually screened for contamination.

Alpine then advanced eight soil borings to a depth of 5 feet below ground surface (bgs) and one boring to a depth of 10 feet bgs. Soils were screened in the field by a Weston geologist using a photoionization detector (PID) and a flame ionization detector (FID), and soil cuttings were observed for visual or olfactory indications of impacts. Weston did not observe indications of impacts during the ground disturbance clearance process; therefore, the soils were spread on-site.

The following oil and gas features were identified at the Site: a pump jack, pump house, and associated equipment in the pumphouse (including a pump, tank, and debris). The wellhead was investigated by advancing two soil borings, one 5-foot deep bgs soil boring approximately 4 feet from the former wellhead (the base) and one to a depth of 10-feet bgs to investigate the deeper soils near the wellhead. An additional three soil borings were drilled approximately 10 feet from the former wellhead (one in each cardinal direction). A soil boring could not be advanced to the east of the wellhead because of the presence of the pump house.

One soil boring was advanced approximately 10 feet away from the pump house in each cardinal direction (north, south, and east). A soil boring could not be advanced to the west because of the presence of the pump jack. The flowline was investigated by advancing one soil boring near the presumed termination of the flowline, as indicated by Kinetic locate. Each soil boring was advanced to 5 or 10 feet bgs using a track-mounted direct-push rig (Geoprobe®). Soil boring locations are shown on the sample location map in **Figure 2**.

All borings were field-screened using a PID/FID at 2.5- or 5-foot intervals, as soil recovery volume allowed. Groundwater was not encountered in any of the soil borings. Based on soil screening observations and COGCC sampling requirements, a total of six grab samples (two wellhead base samples [312345_WH01_B01@5' and 312345_WH01_B02@10'], a flowline sample [312345_FL01@5'], and three pump house samples [312345_PH01_N01@5', 312345_PH01_S01@5', and 312345_PH01_E01@5']) were collected and submitted to Pace Analytical (Pace) for analysis. The grab samples were submitted for preliminary analysis of TPH as total volatile petroleum hydrocarbons (TVPH),



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total extractable petroleum hydrocarbons (TEPH), and total recoverable petroleum hydrocarbons (TRPH). Additional soil volumes were collected and submitted to Pace to hold for analysis of potential benzene, toluene, ethylbenzene, and xylenes (BTEX); 1,2,4-TMB; 1,3,5-Trimethylbenzene (1,3,5-TMB); polycyclic aromatic hydrocarbons (PAHs); soil suitability for reclamation parameters, including specific conductivity (SC), Sodium Adsorption Ratio (SAR), pH, and boron; and COGCC Table 915-1 metals analysis. Total TPH concentrations (calculated as a sum of TVPH, TEPH, and TRPH) were below the 500 milligrams per kilogram (mg/kg) COGCC allowable concentration for four of the samples submitted, and the additional analyses listed above were requested.

Two additional borings were advanced to 3-foot bgs to collect background soil samples from undisturbed areas adjacent to the Site. Background soil samples were submitted to the laboratory for soil reclamation parameter analysis (boron, electrical conductivity [EC], pH, and SAR) and COGCC Table 915-1.

Soil borings were backfilled by Alpine using uncontaminated soil cuttings and bentonite chips. Utility and sample location flags were removed once drilling was complete. Soil boring locations were collected using a Geode[®] GPS receiver (sub-meter, sub-foot accuracy). Post worksite condition photos were taken once work was completed.

RESULTS

Following receipt of the final laboratory reports, Weston performed Stage 2A data validation to determine the quality of the analytical data. The data validation evaluated sample-related quality control (QC) elements and assigned data validation qualifiers when QC element(s) did not meet the project-specified acceptance criteria. Qualified data are considered usable for project decision-making purposes with potential bias considered. Any rejected data (qualified R) are not usable due to serious deficiencies in meeting QC requirements, as the associated analyte may or may not be present in the Site sample. A copy of the data validation report is included in **Attachment B**. All the analytical data in this data set were found to be useable.

Laboratory analytical results exceeded the COGCC Table 915-1 screening value for TPH in the 10-foot wellhead base sample, and allowable soil suitability parameters for pH in the three pump house samples, the flowline sample, and the background samples. Two samples also exceeded Table 915-1 for arsenic. Complete laboratory analytical results are tabulated in **Table 1**, and a summary of the results are discussed below. A copy of the laboratory report is included in **Attachment C**.

TPH

Reported cumulative TPH concentrations were 94.7 mg/kg for the wellhead base sample (312345_WH01_B01@5'), 599 mg/kg for the deeper base sample (312345_WH01_B02@10'), and 5.55 mg/kg for the northern pump house sample (312345_PH01_N01@5'). All other samples were below the laboratory limits of detection (LOD).

Other Volatile Compounds (BTEX and TMBs)

Measured BTEX and TMB concentrations were below LOD for all samples analyzed.



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PAHs

All analytes were below laboratory LOD or COGCC Table 915-1 values.

Soil Suitability for Reclamation

Reported pH units of 8.71 in the sample collected north of the pump house, 8.35 in the sample collected south of the pump house, 8.52 in the sample collected east of the pump house, and 8.41 in the flowline sample all exceeded COGCC Table 915-1 soil suitability screening levels. Laboratory data for the background samples (312345_BK01@3' and 312345_BK02@3') did not exceed the COGCC Table 915-1 concentrations for pH.

Metals

Measured metals concentrations for one of the pumphouse samples and the flowline end sample were above the site-specific background concentrations (1.25 x average background concentrations) or COGCC Table 915-1 allowable concentration values.

Field Screening Results

Soil samples were field screened using a MiniRAE 3000 PID and a TVA202 Photo/Flame Ionizer (PID/FID) that were bump tested daily and calibrated as needed. Field screening results for collected soil samples are provided in the table below.

Logan J Sand Unit (OWP) #4-24			
Sample ID	Sample Description	PID Reading (ppm)	FID Reading (ppm)
312345_WH01_B01@5'	Wellhead – base	2.2	NA
312345_WH01_N01@5'	Wellhead – north	2.0	NA
312345_WH01_S01@5'	Wellhead – south	8.0	NA
312345_WH01_W01@5'	Wellhead – west	2.5	NA
312345_PH01_N01@5'	Pump House – north	6.7	NA
312345_PH01_S01@5'	Pump House – south	8.9	NA
312345_PH01_E01@5'	Pump House – east	47.0	NA
312345_FL01@5'	Flowline end	6.8	NA
312345_WH01_B02@5'	Wellhead – Base (deep sample)	3	4
312345_WH01_B02@7.5'	Wellhead – Base (deep sample)	1	2.5
312345_WH01_B02@10'	Wellhead – Base (deep sample)	1.5	3

Notes:

NA = Not Analyzed

FID – Flame Ionization Detector

ID – Identification

ppm – parts per million



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Recommendations

The Fremont report from 2021 indicated that there were impacts at the wellhead Site below 9 feet bgs and the Weston investigation confirmed these findings. Laboratory analytical results from the Weston investigation indicated that the three pump house samples and the flowline sample exceeded COGCC Table 915-1 allowable concentrations for soil suitability parameters for pH. The northern pump house sample and the flowline exceeded Table 915-1 for arsenic, and the deeper wellhead base sample (10-foot) exceeded for TPH. Weston recommends additional investigation near the three pumphouse samples, and flowline sample to delineate the extent of the soil suitability parameter exceedances for reclamation purposes. The wellhead location should be re-excavated and delineated vertically and horizontally until the Table 915-1 cleanup standards are achieved. It is anticipated that the impacted soil volume will exceed 10 cubic yards.

Sincerely,
Weston Solutions, Inc.

A handwritten signature in black ink, appearing to read "Andy Wanta".

Andy Wanta
Project Geologist

A handwritten signature in black ink, appearing to read "Samuel Allen".

Sammy Allen
Project Manager

Attachments:

Figures

Figure 1 – Site Location Map

Figure 2 – Sample Location Map

Table

Table 1 – Laboratory Results Summary Table – Soil Samples

Attachment A: Photolog

Attachment B: Data Validation Report

Attachment C: Laboratory Analytical Reports

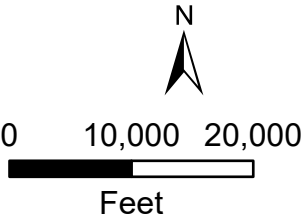
FIGURES


P:\COGCC\COGCC_Base\COGCC_Vicinity_Maps.aprx Date Saved: 4/7/2023 10:13 AM | User: letarties



Legend

● Site Location



REPORT DATE: April 2023	FIGURE NO: 1	LOGAN J SAND UNIT (OWP) #4-24 SITE LOCATION MAP LOCATION ID: 312345 REMEDATION ID: 18166 FEBRUARY 2023 COLORADO OIL AND GAS CONSERVATION COMMISSION
PROJECT: COGCC Orphan Well Program	CLIENT NAME: COGCC	
		
SCALE: 1:189,000		

312345_WH01_B02@10'		
Parameter	Concentration	COGCC Table 915-1
TPH mg/kg		
Total TPH	599	500
No Other Parameters Analyzed		

312345_WH01_B01@5'		
Parameter	Concentration	COGCC Table 915-1
TPH mg/kg		
Total TPH	94.7	500
No Table 915-1 Exceedances		

312345_PH01_N01@5'		
Parameter	Concentration	COGCC Table 915-1
Soil Suitability for Reclamation Parameters		
pH	8.71	6-8.3
Arsenic	3.42	3.14
No Other Table 915-1 Exceedances		

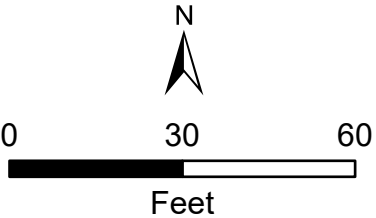
312345_PH01_E01@5'		
Parameter	Concentration	COGCC Table 915-1
TPH mg/kg		
Total TPH	0	500
Soil Suitability for Reclamation Parameters		
pH	8.52	6-8.3
No Other Table 915-1 Exceedances		

312345_FL01@5'		
Parameter	Concentration	COGCC Table 915-1
TPH mg/kg		
Total TPH	0	500
Soil Suitability for Reclamation Parameters		
pH	8.41	6-8.3
Arsenic	3.17	3.14
No Other Table 915-1 Exceedances		

312345_PH01_S01@5'		
Parameter	Concentration	COGCC Table 915-1
Soil Suitability for Reclamation Parameters		
pH	8.35	6-8.3
No Other Table 915-1 Exceedances		

Samples collected February 2023
Google Earth Imagery Date: October 2015

- Legend
- COGCC Documented Well Location
 - Field Screened Sample Location
 - Background Sample Location
 - Lab Analyzed Sample Location



REPORT DATE: May 2023	FIGURE NO: 2
PROJECT: 15970.001.006.0003	CLIENT NAME: COGCC
	SCALE: 1:400

Logan J Sand Unit (OWP) #4-24
SAMPLE LOCATION MAP
LOCATION ID:312345
REMEDATION ID:18166
FEBRUARY 2023
COLORADO OIL AND GAS CONSERVATION COMMISSION

TABLES

Laboratory Results Summary Table
Logan J Sand Unit (OWP) #4-24
Soil Samples

COGCC Soil Analytical Table - Logan J Sand Unit (OWP) #4-24			Organic Compounds in Soil (mg/kg)																																			
COGCC Allowable Concentration (Soil) -->			500			500			500			500			1.2			490			5.8			58			30			27			1800			1800		
Site Specific Background Concentration -->																																						
Location	Sample Date	Sample ID	TPH (sum of volatile, extractable, and recoverable hydrocarbons)			TPH (Total volatile [C6-C10] hydrocarbons)			TPH (total extractable [C10-C28] hydrocarbons)			TPH (total recoverable [C28-C36] hydrocarbons)			Benzene			Toluene			Ethylbenzene			Total Xylenes (sum of o-, m-, and p- isomers)			1,2,4-Trimethylbenzene			1,3,5-Trimethylbenzene			Anthracene			Acenaphthene		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_WH01_B01@5'	94.7			<0.500	U		23.5			71.2			NA			NA			NA			NA			NA			NA			NA					
Logan J Sand Unit (OWP) #4-24	4/18/2023	312345_WH01_B02@10'	599			<0.500	U		196			403			<0.00100	U		<0.00500	U		<0.00100	U		<0.00300	U		<0.00100	U		<0.00100	U		NA					
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_E01@5'	0	U		<0.500	U		<4.00	U		<4.00	U		<0.00100	U		<0.00500	U		<0.00100	U		<0.00300	U		<0.00100	U		<0.00100	U		<0.00600	UJ	H			
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_N01@5'	5.55			<0.500	U		<4.00	U		5.55			<0.00100	U		<0.00500	U		<0.00100	U		<0.00300	U		<0.00100	U		<0.00100	U		<0.00600	UJ	H			
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_S01@5'	0			<0.500	U		<4.00	U		<4.00	U		<0.00100	U		<0.00500	U		<0.00100	U		<0.00300	U		<0.00100	U		<0.00100	U		<0.00600	UJ	H			
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_FL01@5'	0			<0.500	U		<4.00	U		<4.00	U		<0.00100	U		<0.00500	U		<0.00100	U		<0.00300	U		<0.00100	U		<0.00100	U		<0.00600	UJ	H			
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK01@3'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA					
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK02@3'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA					

Legend:
COGCC - Colorado Oil and Gas Conservation Commission
Orange Highlight - COGCC Table 915-1 TPH, BTEX, PAH, metal exceedance
Yellow Highlight - COGCC Table 915-1 soil suitability exceedance
Grey Highlight - below laboratory detection limit
NA - not analyzed
mg/kg - milligrams per kilogram
mmhos/com - millimhos per centimeter
[Conc] - reported concentration
Q - qualifier (reported by laboratory or data validation)
RC - reason code (reported by data validation)
Note - Refer to Data Validation Report for Q and RC definitions

Laboratory Results Summary Table
Logan J Sand Unit (OWP) #4-24
Soil Samples

COGCC Soil Analytical Table - Logan J Sand Unit (OWP) #4-24			PAHs in Soil (mg/kg)															PAHs in Soil (mg/kg)														
COGCC Allowable Concentration (Soil) -->			1.1			11			11			0.11			110			0.11			240			240			1.1			2		
Site Specific Background Concentration -->																																
Location	Sample Date	Sample ID	Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(k)fluoranthene			Chrysene			Dibenzo(a,h)anthracene			Fluoranthene			Fluorene			Indeno(1,2,3-cd)pyrene			Naphthalene		
			[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_WH01_B01@5'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	4/18/2023	312345_WH01_B02@10'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_E01@5'	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.0200	UJ	H
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_N01@5'	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.0200	UJ	H
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_S01@5'	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.0200	UJ	H
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_FL01@5'	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.00600	UJ	H	<0.0200	UJ	H
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK01@3'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK02@3'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		

Legend:
COGCC - Colorado Oil and Gas Conservation Commission
Orange Highlight - COGCC Table 915-1 TPH, BTEX, PAH, metal exceedance
Yellow Highlight - COGCC Table 915-1 soil suitability exceedance
Grey Highlight - below laboratory detection limit
NA - not analyzed
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mmhos/com - millimhos per centimeter
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RC - reason code (reported by data validation)
Note - Refer to Data Validation Report for Q and RC definitions

Laboratory Results Summary Table
Logan J Sand Unit (OWP) #4-24
Soil Samples

COGCC Soil Analytical Table - Logan J Sand Unit (OWP) #4-24												Soil Suitability for Reclamation Parameters																				
COGCC Allowable Concentration (Soil) -->			18			24			180			<4			<6			(6-8.3)			2			0.68			15000			71		
Site Specific Background Concentration -->																					3.14											
Location	Sample Date	Sample ID	Pyrene			1-Methylnaphthalene			2-Methylnaphthalene			Specific Conductance (SC) (mmhos/cm)			Sodium Adsorption Ratio (Calculation)			pH (pH units)			Boron (mg/L)			Arsenic			Barium			Cadmium		
			[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_WH01_B01@5'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	4/18/2023	312345_WH01_B02@10'	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_E01@5'	<0.00600	UJ	H	<0.0200	U		<0.0200	U		0.106			0.734			8.52	J	H	0.374			2.75			153			<1.00	U	
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_N01@5'	<0.00600	UJ	H	<0.0200	U		<0.0200	U		0.16			2.32			8.71	J	H	0.485			3.42			207			<1.00	U	
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_S01@5'	<0.00600	UJ	H	<0.0200	U		<0.0200	U		0.159			0.94			8.35	J	H	0.313			2.73			166			<1.00	U	
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_FL01@5'	<0.00600	UJ	H	<0.0200	U		<0.0200	U		0.297			5.96			8.41	J	H	0.687			3.17			200			<1.00	U	
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK01@3'	NA			NA			NA			0.365			0.156			6.77	T8		0.572			1.98			147			<1.00	U	
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK02@3'	NA			NA			NA			0.288			0.164			8.03	T8		0.311			3.05			210			<1.00	U	

Legend:
COGCC - Colorado Oil and Gas Conservation Commission
Orange Highlight - COGCC Table 915-1 TPH, BTEX, PAH, metal exceedance
Yellow Highlight - COGCC Table 915-1 soil suitability exceedance
Grey Highlight - below laboratory detection limit
NA - not analyzed
mg/kg - milligrams per kilogram
mmhos/com - millimhos per centimeter
[Conc] - reported concentration
Q - qualifier (reported by laboratory or data validation)
RC - reason code (reported by data validation)
Note - Refer to Data Validation Report for Q and RC definitions

Laboratory Results Summary Table
Logan J Sand Unit (OWP) #4-24
Soil Samples

COGCC Soil Analytical Table - Logan J Sand Unit (OWP) #4-24			Metals (mg/kg)																				
COGCC Allowable Concentration (Soil) -->			0.3			3100			400			1500			390			390			23000		
Site Specific Background Concentration -->																							
Location	Sample Date	Sample ID	Chromium (VI)			Copper			Lead			Nickel			Selenium			Silver			Zinc		
			[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC	[Conc]	Q	RC
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_WH01_B01@5'	NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	4/18/2023	312345_WH01_B02@10'	NA			NA			NA			NA			NA			NA			NA		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_E01@5'	<1.00	U		7.51			7.5			6.9			<2.50	U		<0.500	U		28.7		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_N01@5'	<1.00	U		9.9			9.44			8.2			<2.50	U		<0.500	U		37.6		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_PH01_S01@5'	<1.00	U		8.18			8.53			7.32			<2.50	U		<0.500	U		29.2		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_FL01@5'	<1.00	U		10.3			9.82			9.31			<2.50	U		<0.500	U		36.7		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK01@3'	<1.00	U		7.59			8.22			6.56			<2.50	U		<0.500	U		34.6		
Logan J Sand Unit (OWP) #4-24	2/13/2023	312345_BK02@3'	<1.00	U		10.4			11			9.23			<2.50	U		<0.500	U		43.8		

Legend:
COGCC - Colorado Oil and Gas Conservation Commission
Orange Highlight - COGCC Table 915-1 TPH, BTEX, PAH, metal exceedance
Yellow Highlight - COGCC Table 915-1 soil suitability exceedance
Grey Highlight - below laboratory detection limit
NA - not analyzed
mg/kg - milligrams per kilogram
mmhos/com - millimhos per centimeter
[Conc] - reported concentration
Q - qualifier (reported by laboratory or data validation)
RC - reason code (reported by data validation)
Note - Refer to Data Validation Report for Q and RC definitions

ATTACHMENT A

PHOTOLOG

Photo Report for Logan J Sand 4-24 (2/13/2023)



Photo Info		
Photo Type:	Overview	
Photo Name:	Pework Site Conditions	
Direction:	N	
Description:	Pump Jack and Pump House at Wellhead Location	
Photo Date/Time:	2/13/2023, 12:15:00 PM	
Photographer:	Zach Ashauer	
Photo Info		
Photo Type:	Overview	
Photo Name:	Pework Site Conditions	
Direction:	N	
Description:	Entrance Drive to Wellhead Before Drilling	
Photo Date/Time:	2/13/2023, 12:17:00 PM	
Photographer:	Zach Solow	



Photo Info		
Photo Type:	Overview	
Photo Name:	Pework Site Conditions	
Direction:	E	
Description:	Wellhead Location Before Drilling	
Photo Date/Time:	2/13/2023, 12:20:00 PM	
Photographer:	Zach Ashauer	
Photo Info		
Photo Type:	Overview	
Photo Name:	Pework Site Conditions	
Direction:	N	
Description:	Pump Jack and Pump House Before Drilling	
Photo Date/Time:	2/13/2023, 12:20:00 PM	
Photographer:	Zach Solow	



Photo Info		
Photo Type:	Overview	
Photo Name:	Preview Site Conditions	
Direction:	W	
Description:	Pumphouse	
Photo Date/Time:	2/13/2023, 12:21:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Preview Site Conditions	
Direction:	S	
Description:	Pump house and pump jack	
Photo Date/Time:	2/13/2023, 12:23:00 PM	
Photographer:	Zach Ashauer	



Photo Info		
Photo Type:	Overview	
Photo Name:	Pump House	
Direction:	S	
Description:	Equipment still in place at the pump house	
Photo Date/Time:	2/13/2023, 12:24:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Pump House	
Direction:	W	
Description:	Equipment still in place at the pump house	
Photo Date/Time:	2/13/2023, 12:24:00 PM	
Photographer:	Zach Solow	


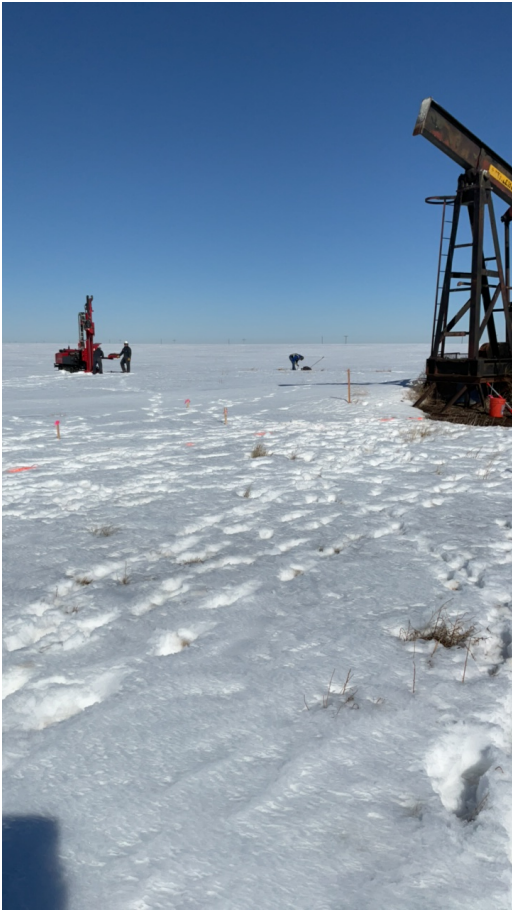
Photo Info		
Photo Type:	Overview	
Photo Name:	Utility Locate	
Direction:	N	
Description:	Utility located conducted by Kinetic showing a possible flowline.	
Photo Date/Time:	2/13/2023, 12:26:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Sample Location	
Photo Name:	Wellhead Boring Locations	
Direction:	NE	
Description:	Sample locations indicated by stakes with pink ribbon.	
Photo Date/Time:	2/13/2023, 1:11:00 PM	
Photographer:	Zach Solow	

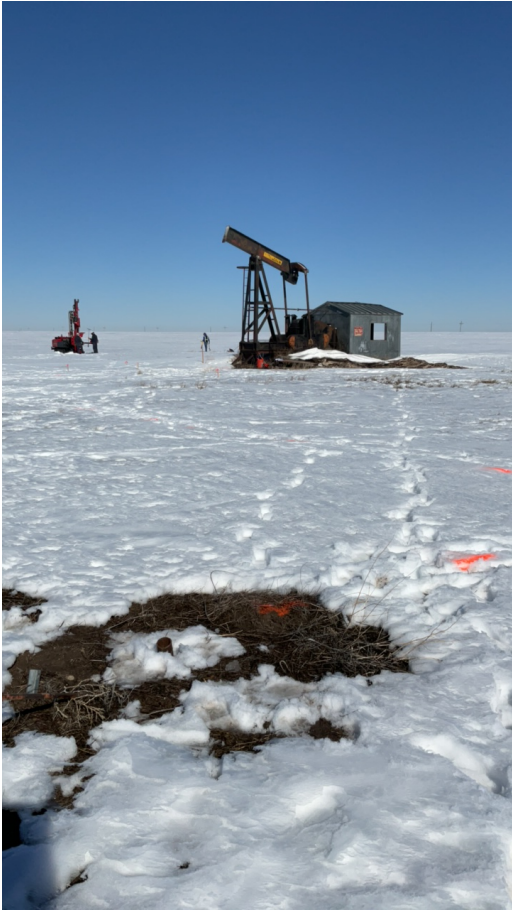

Photo Info		
Photo Type:	Overview	
Photo Name:	Flowline End	
Direction:	NE	
Description:	Flowline makes two 90 degree bends to the west of the wellhead location.	
Photo Date/Time:	2/13/2023, 1:12:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Pump House	
Direction:	N	
Description:	Tank inside the pump house.	
Photo Date/Time:	2/13/2023, 2:26:00 PM	
Photographer:	Zach Solow	



Photo Info		
Photo Type:	Overview	
Photo Name:	Pump House	
Direction:	W	
Description:	Empty Plastic Containers in Pump House	
Photo Date/Time:	2/13/2023, 2:27:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Pump House	
Direction:	W	
Description:	Broken Window in Pump House	
Photo Date/Time:	2/13/2023, 2:29:00 PM	
Photographer:	Zach Solow	





Photo Info		
Photo Type:	Overview	
Photo Name:	Utility Locate	
Direction:	E	
Description:	Utility Located South of Pump House	
Photo Date/Time:	2/13/2023, 3:04:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Post Work Site Condition	
Direction:	E	
Description:	Wellhead Location After Drilling	
Photo Date/Time:	2/13/2023, 3:05:00 PM	
Photographer:	Zach Solow	

Photo Info		
Photo Type:	Overview	
Photo Name:	Post Work Site Condition	
Direction:	NE	
Description:	Access point after work was completed.	
Photo Date/Time:	2/13/2023, 3:33:00 PM	
Photographer:	Zach Solow	
Photo Info		
Photo Type:	Overview	
Photo Name:	Post Work Site Conditions	
Direction:	W	
Description:	Entrance to Driveway from CR 36 After Drilling	
Photo Date/Time:	2/13/2023, 3:35:00 PM	
Photographer:	Zach Solow	

ATTACHMENT B

DATA VALIDATION REPORT

DATA VALIDATION REPORT

Colorado Oil & Gas Conservation Commission Orphan Well Program

SAMPLE DELIVERY GROUP: L1587573

Prepared by
Weston Solutions, Inc
1536 Cole Blvd., Suite 375
Lakewood, CO 80401

March 14, 2023



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I. INTRODUCTION

Task Order Title: Logan J Sand 4-24

Contract: 176679

Weston Work Order No.: 15970.001.006

Sample Delivery Group: L1587573

Project Manager: Sammy Allen

Matrix: Soil

QC Level: 2A

No. of Samples: 8

No. of Reanalyses/Dilutions: 0

Laboratory: Pace Analytical

TABLE I – SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection Time	Method
312345-BK01@3'	L1587573-01	Soil	02/13/2023 13:35	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020)
312345-BK02@3'	L1587573-02	Soil	02/13/2023 13:40	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020)
312345-WH01_B01@5'	L1587573-03	Soil	02/13/2023 13:40	TPH-GRO & VOCs (8260B) DRO/ORO (8015M)
312345-TB02	L1587573-05	Water	02/13/2023	TPH-GRO & VOCs (8260B)
312345-PH01-E01@5'	L1587573-06	Soil	02/13/2023 14:30	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020) TPH-GRO & VOCs (8260B) DRO/ORO (8015M) SVOCs (PAHs by 8270C-SIM)



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312345-PH01-S01@5'	L1587573-07	Soil	02/13/2023 14:20	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020) TPH-GRO & VOCs (8260B) DRO/ORO (8015M) SVOCs (PAHs by 8270C-SIM)
312345-PH01-N01@5'	L1587573-08	Soil	02/13/2023 14:50	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020) TPH-GRO & VOCs (8260B) DRO/ORO (8015M) SVOCs (PAHs by 8270C-SIM)
312345-FL01@5'	L1587573-09	Soil	02/13/2023 14:40	Hexavalent Chromium (7199) pH (9045D) Specific Conductance (9050AMod) Metals (6010B-NE493 Ch 2) ICP-MS Metals (6020) TPH-GRO & VOCs (8260B) DRO/ORO (8015M) SVOCs (PAHs by 8270C-SIM)



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II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form, and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) L1587573:

- The laboratory received samples in this SDG on ice and within the temperature limits of less than 6 degrees Celsius (°C) and greater than 0°C.
- The laboratory received the sample containers intact and properly preserved, as applicable.
- Field and laboratory personnel signed and dated the COC.
- Custody seals were present and intact on the cooler.



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TABLE II – DATA QUALIFIER REFERENCE

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected, as noted in the quantitation section of each method reviewed.	The analyte was analyzed for but was not detected, as noted in the sample results verification section of each method reviewed.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analyte has been "tentatively identified" or "presumptively" as present, and the associated numerical value is the estimated concentration in the sample.	Not applicable.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.



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TABLE III – REASON CODE REFERENCE

Reason Code	Organic	Inorganic
H	Holding time was exceeded.	Holding time was exceeded.
S	Surrogate recovery was outside control limits.	Not applicable.
C	Calibration percent relative standard deviation (%RSD) or percent deviation (%D) were noncompliant, or coefficient of determination (r^2) was <0.990.	Correlation coefficient (r) was <0.995.
R	Calibration relative response factor (RRF) was <0.05.	Percent recovery (%R) for calibration was outside control limits.
B	The analyte was detected in an associated blank as well as in the sample.	The analyte was detected in an associated blank as well as in the sample.
L	Laboratory control sample (LCS) or LCS duplicate (LCSD) %R was outside the control limits.	LCS or LCSD %R was outside the control limits.
L1	LCS/LCSD relative percent difference (RPD) was outside the control limit.	LCS/LCSD RPD was outside the control limit.
Q	Matrix spike/matrix spike duplicate (MS/MSD) %R was outside control limits.	MS or MSD %R was outside the control limit.
Q1	MS/MSD RPD was outside the control limit.	MS/MSD RPD was outside the control limit.
E	Result was reported as an estimated maximum possible concentration (EMPC).	Laboratory duplicate RPD was outside the control limit.
I	Internal standard recovery was outside control limits.	Inductively coupled plasma (ICP) interference check standard (ICS-A/ICS-AB) result was outside control limits.
I1	Not applicable.	Inductively coupled plasma-mass spectrometer (ICP-MS) internal standard recovery was outside control limits.
A	Not applicable.	Serial dilution %D was outside control limits.
M	Tuning (bromofluorobenzene [BFB] or difluorotriphenyl phosphine [DFTPP]) was not compliant.	ICP-MS tune was not compliant.
T	The analyte was detected in an associated trip blank as well as in the sample.	Not applicable.
+	False positive – reported compound was not present.	False positive – reported compound was not present.
-	False negative – compound was present but not reported.	False negative – compound was present but not reported.



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Reason Code	Organic	Inorganic
F	The analyte was detected in an associated field blank (FB) or equipment blank (EB) as well as in the sample.	The analyte was detected in an associated FB or EB as well as in the sample.
F1	Field duplicate RPD was outside the control limit.	Field duplicate RPD was outside the control limit.
\$	The reviewer corrected the reported result and/or other information.	The reviewer corrected the reported result and/or other information.
D	The analysis was not used because another more technically sound analysis was available.	The analysis was not used because another more technically sound analysis was available.
P	Instrument performance not compliant.	Post digestion spike recovery was outside of control limits.
*II, *III	Other problems identified in the data are described in Section II "Sample Management," or Section III "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.	Other problems identified in the data are described in Section II "Sample Management," or Section III "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.



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III. EPA METHODS: 7199, 9045D, 9050AMod, 6010B-NE493 Ch 2, 6020, 8260B, 8015M, 8270C-SIM

Z. Lawson of Weston Solutions reviewed the SDG on March 14, 2023.

The samples listed in Table 1 for this analysis were validated based on the guidelines outlined in the *Colorado Department of Natural Resources Colorado Oil and Gas Conservation Commission Orphan Well Program Quality Assurance Project Plan (QAPP) Revision 1 (2023)*, *EPA Method 7199*, *EPA Method 9045D*, *EPA Method 9050AMod*, *EPA Method 6010B-NE493 Ch 2*, *EPA Method 6020*, *EPA Method 8260B*, *EPA Method 8015M*, *EPA Method 8270C-SIM*, *National Functional Guidelines for Inorganic Superfund Data Review (2020)*, and *National Functional Guidelines for Organic Superfund Data Review (2020)*.

III.1. HOLDING TIMES

Analytical holding time for all analyses were met with the following exception(s):

Samples analyzed for pH (EPA Method 9045D) were analyzed outside of holding time. The pH value recorded for all associated samples is qualified as estimated (J).

Samples analyzed for PAHs (EPA Method 8270C-SIM) were analyzed outside of holding time. The associated samples were non-detect for all analytes. Using professional judgement, the non-detected results for the associated samples are qualified as estimated non-detects (UJ).

III.2. TUNING AND CALIBRATION

Tuning and calibration is not verified at Level 2A validation.

III.3. QUALITY CONTROL SAMPLES

III.3.1. METHOD BLANKS

All method blanks were free from target compound contamination with the following exception(s):

One of the method blanks analyzed for ICP-MS Metals (EPA Method 6020) had a trace detect for selenium. The associated samples were non-detect for selenium; therefore, no data qualification is required.

The method blank analyzed for TPH-DRO and ORO (EPA Method 8015M) has a trace detect for C28-C36 Motor Oil Range (ORO) compounds. The associated sample was non-detect for C28-C36 ORO; therefore, no data qualification is required.

III.3.2 INTERFERENCE CHECK SAMPLES

ICS-A and ICS-AB recoveries are not evaluated at Level 2A validation.

III.3.3. LABORATORY CONTROL SAMPLES

LCS and LCSD recoveries were within the laboratory control limits. LCSD RPDs were within the laboratory control limits. No data qualification is required.

III.3.4. LABORATORY DUPLICATES

Laboratory duplicate analyses were performed for hexavalent chromium (EPA Method 7199), and specific conductance (EPA Method 9050AMod). The samples met the duplicate RPD laboratory limits; therefore, no data qualification is required.



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III.3.5. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS analyses were not performed on samples from this SDG. Accuracy and precision were evaluated based upon LCS/LCSD results.

III.3.6. SERIAL DILUTION

Serial dilution analysis was not required for this SDG. No data qualification is required.

III.4. SURROGATES

Surrogates were within the laboratory control limits; no data qualification is required.

III.5. INTERNAL STANDARDS PERFORMANCE

The internal standard intensities are not evaluated at Level 2A validation.

III.6. SAMPLE RESULT VERIFICATION

Sample results were not verified at Level 2A validation. Reported non-detects are valid to the reported detection limit (RDL).

All sample dilutions are included in Table IV below, detection limits were appropriately adjusted.

TABLE IV – SAMPLE DILUTIONS

Sample ID	Method	Dilution Factor
312345-BK01@3'	ICP Metals (6010B-NE493 Ch 2)	2x
	ICP-MS Metals (6020)	20x Barium only and 5x for all other ICP-MS metals
312345-BK02@3'	ICP-MS Metals (6020)	20x Barium only and 5x for all other ICP-MS metals
312345-WH01_B01@5'	None	None
312345-TB02	None	None
312345-PH01-E01@5'	ICP-MS Metals (6020)	5x
312345-PH01-S01@5'	ICP-MS Metals (6020)	5x
312345-PH01-N01@5'	ICP-MS Metals (6020)	5x
312345-FL01@5'	ICP-MS Metals (6020)	5x

III.7. FIELD QC SAMPLES

Weston evaluated field quality control (QC) samples, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. Weston used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.7.1. TRIP BLANKS

Trip blanks were analyzed for TPH-GRO and VOCs. All analytes were non-detect; therefore, no data qualification is required.

III.7.2. FIELD AND EQUIPMENT BLANKS

No field blanks or equipment blanks were identified in this SDG.



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III.7.3. FIELD DUPLICATES

No field duplicate samples were identified in this SDG.

DATA VALIDATION REPORT

Colorado Oil & Gas Conservation Commission Orphan Well Program

SAMPLE DELIVERY GROUP: L1608367

Prepared by
Weston Solutions, Inc
1536 Cole Blvd., Suite 375
Lakewood, CO 80401

May 8, 2023



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I. INTRODUCTION

Task Order Title: Logan J Sand 4-24

Contract: 176679

Weston Work Order No.: 15970.001.006

Sample Delivery Group: L1608367

Project Manager: Sammy Allen

Matrix: Soil

QC Level: 2A

No. of Samples: 1

No. of Reanalyses/Dilutions: 0

Laboratory: Pace Analytical

TABLE I – SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection Time	Method
312345_WH01_B02@10'	L1608367-01	Soil	04/08/2023 13:20	TPH-GRO & VOCs (8260B) DRO/ORO (8015M)



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II. SAMPLE MANAGEMENT

According to the case narrative, sample condition upon receipt form, and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) L1608367:

- The laboratory received samples in this SDG on ice and within the temperature limits of less than 6 degrees Celsius (°C) and greater than 0 °C.
- The laboratory received the sample containers intact and properly preserved, as applicable.
- Field and laboratory personnel signed and dated the COC.



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TABLE II – DATA QUALIFIER REFERENCE

Qualifier	Organics	Inorganics
U	The analyte was analyzed for but was not detected, as noted in the quantitation section of each method reviewed.	The analyte was analyzed for but was not detected, as noted in the sample results verification section of each method reviewed.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analyte has been "tentatively identified" or "presumptively" as present, and the associated numerical value is the estimated concentration in the sample.	Not applicable.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.	The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.



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TABLE III – REASON CODE REFERENCE

Reason Code	Organic	Inorganic
H	Holding time was exceeded.	Holding time was exceeded.
S	Surrogate recovery was outside control limits.	Not applicable.
C	Calibration percent relative standard deviation (%RSD) or percent deviation (%D) were noncompliant, or coefficient of determination (r^2) was <0.990.	Correlation coefficient (r) was <0.995.
R	Calibration relative response factor (RRF) was <0.05.	Percent recovery (%R) for calibration was outside control limits.
B	The analyte was detected in an associated blank as well as in the sample.	The analyte was detected in an associated blank as well as in the sample.
L	Laboratory control sample (LCS) or LCS duplicate (LCSD) %R was outside the control limits.	LCS or LCSD %R was outside the control limits.
L1	LCS/LCSD relative percent difference (RPD) was outside the control limit.	LCS/LCSD RPD was outside the control limit.
Q	Matrix spike/matrix spike duplicate (MS/MSD) %R was outside control limits.	MS or MSD %R was outside the control limit.
Q1	MS/MSD RPD was outside the control limit.	MS/MSD RPD was outside the control limit.
E	Result was reported as an estimated maximum possible concentration (EMPC).	Laboratory duplicate RPD was outside the control limit.
I	Internal standard recovery was outside control limits.	Inductively coupled plasma (ICP) interference check standard (ICS-A/ICS-AB) result was outside control limits.
I1	Not applicable.	Inductively coupled plasma-mass spectrometer (ICP-MS) internal standard recovery was outside control limits.
A	Not applicable.	Serial dilution %D was outside control limits.
M	Tuning (bromofluorobenzene [BFB] or difluorotriphenyl phosphine [DFTPP]) was not compliant.	ICP-MS tune was not compliant.
T	The analyte was detected in an associated trip blank as well as in the sample.	Not applicable.
+	False positive – reported compound was not present.	False positive – reported compound was not present.



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Reason Code	Organic	Inorganic
-	False negative – compound was present but not reported.	False negative – compound was present but not reported.
F	The analyte was detected in an associated field blank (FB) or equipment blank (EB) as well as in the sample.	The analyte was detected in an associated FB or EB as well as in the sample.
F1	Field duplicate RPD was outside the control limit.	Field duplicate RPD was outside the control limit.
\$	The reviewer corrected the reported result and/or other information.	The reviewer corrected the reported result and/or other information.
D	The analysis was not used because another more technically sound analysis was available.	The analysis was not used because another more technically sound analysis was available.
P	Instrument performance not compliant.	Post digestion spike recovery was outside of control limits.
*II, *III	Other problems identified in the data are described in Section II "Sample Management" or Section III "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.	Other problems identified in the data are described in Section II "Sample Management" or Section III "Method Analyses." The number following the asterisk (*) will indicate the report section where a description of the problem can be found.



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III. EPA METHODS: 8260B, 8015M

Z. Lawson of Weston Solutions, Inc. reviewed the SDG on May 8, 2023.

The sample listed in Table 1 for this analysis was validated based on the guidelines outlined in the *Colorado Department of Natural Resources Colorado Oil and Gas Conservation Commission Orphan Well Program Quality Assurance Project Plan (QAPP) Revision 1 (2023)*, *EPA Method 8260B*, *EPA Method 8015M*, and *National Functional Guidelines for Organic Superfund Data Review (2020)*.

III.1. HOLDING TIMES

Analytical holding time for all analyses were met; no data qualification required.

III.2. TUNING AND CALIBRATION

Tuning and calibration is not verified at Level 2A validation.

III.3. QUALITY CONTROL SAMPLES

III.3.1. METHOD BLANKS

All method blanks were free from target compound contamination; no data qualification is required.

III.3.2 INTERFERENCE CHECK SAMPLES

Interference check standard (ICS-A/ICS-AB) recoveries are applicable to this review.

III.3.3. LABORATORY CONTROL SAMPLES

LCS recoveries were within the laboratory control limits. No data qualification is required.

III.3.4. LABORATORY DUPLICATES

Laboratory duplicate analyses were not performed on samples from this SDG. No data qualification is required.

III.3.5. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS analyses were not performed on samples from this SDG. Accuracy was evaluated based upon LCS results.

III.3.6. SERIAL DILUTION

Serial dilution analysis was not required for this SDG. No data qualification is required.

III.4. SURROGATES

Surrogates were within the laboratory control limits; therefore, no data qualification is required.

III.5. INTERNAL STANDARDS PERFORMANCE

The internal standard intensities are not evaluated at Level 2A validation.

III.6. SAMPLE RESULT VERIFICATION

Sample results were not verified at Level 2A validation. Reported non-detects are valid to the reporting detection limit (RDL).

Site sample 312345_WH01_B02@10' was diluted 20x for the analysis of diesel range and motor oil range organics. Detection limits were appropriately adjusted.



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III.7. FIELD QC SAMPLES

Weston evaluated field quality control (QC) samples and, if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. Weston used the remaining detects to evaluate the associated site samples. Findings associated with field QC samples are summarized below.

III.7.1. TRIP BLANKS

No trip blanks were identified in this SDG.

III.7.2. FIELD AND EQUIPMENT BLANKS

No field blanks or equipment blanks were identified in this SDG.

III.7.3. FIELD DUPLICATES

No field duplicate samples were identified in this SDG.

ATTACHMENT C

LABORATORY ANALYTICAL REPORTS

Colorado Oil & Gas Conservation

Sample Delivery Group: L1587573
Samples Received: 02/21/2023
Project Number:
Description: Logan J Sand 4-24
Site: LOGAN J SAND 4-24/312345
Report To: Sammy Allen
1536 Cole Blvd, Suite 375
Lakewood, CO 80401

Entire Report Reviewed By:



Chris Ward
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

312345-BK01@3' L1587573-01 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 13:35 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2009956	1	02/23/23 11:40	02/23/23 11:40	ABL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2010411	1	02/22/23 03:28	02/22/23 23:07	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2010159	1	02/21/23 16:00	02/21/23 18:23	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2011108	1	02/22/23 17:10	02/23/23 11:50	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2010528	2	02/22/23 11:24	02/25/23 00:25	ZSA	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2010524	20	02/22/23 07:30	02/22/23 17:26	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2010524	5	02/22/23 07:30	02/22/23 15:57	JPD	Mt. Juliet, TN



312345-BK02@3' L1587573-02 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 13:40 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2009956	1	02/23/23 11:43	02/23/23 11:43	ABL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2010411	1	02/22/23 03:28	02/22/23 13:33	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2010159	1	02/21/23 16:00	02/21/23 18:23	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2011108	1	02/22/23 17:10	02/23/23 11:50	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2010528	1	02/22/23 11:24	02/25/23 00:27	ZSA	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2010524	20	02/22/23 07:30	02/22/23 17:29	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2010524	5	02/22/23 07:30	02/22/23 16:10	JPD	Mt. Juliet, TN

312345-WH01_B01@5' L1587573-03 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 13:40 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2013175	1	02/21/23 22:00	02/26/23 16:49	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2011220	1	02/22/23 20:43	02/23/23 12:42	JAS	Mt. Juliet, TN

312345-TB02 L1587573-05 GW

Collected by Zach Solow/J. Collected date/time 02/13/23 00:00 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260/8260B	WG2008544	1	02/21/23 23:28	02/21/23 23:28	JAH	Mt. Juliet, TN

312345-PH01-E01@5' L1587573-06 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 14:30 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2014679	1	03/02/23 12:04	03/02/23 12:04	SPL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2014302	1	03/01/23 01:49	03/02/23 04:55	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2015017	1	03/01/23 14:02	03/01/23 15:05	DB	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2015737	1	03/04/23 12:00	03/04/23 14:05	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2014790	1	03/03/23 13:09	03/03/23 20:46	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2017660	5	03/06/23 10:40	03/06/23 17:14	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2013175	1	02/21/23 22:00	02/26/23 17:14	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2011220	1	02/22/23 20:43	02/23/23 10:49	KAP	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2017439	1	03/06/23 06:26	03/06/23 13:31	AGW	Mt. Juliet, TN

SAMPLE SUMMARY

312345-PH01-S01@5' L1587573-07 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 14:20 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2014679	1	03/02/23 12:07	03/02/23 12:07	SPL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2014302	1	03/01/23 01:49	03/02/23 05:07	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2015017	1	03/01/23 14:02	03/01/23 15:05	DB	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2015737	1	03/04/23 12:00	03/04/23 14:05	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2014790	1	03/03/23 13:09	03/03/23 20:49	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2017660	5	03/06/23 10:40	03/06/23 17:17	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2013175	1	02/21/23 22:00	02/26/23 17:38	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2011220	1	02/22/23 20:43	02/23/23 10:25	JAS	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2017439	1	03/06/23 06:26	03/06/23 13:48	AGW	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

312345-PH01-N01@5' L1587573-08 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 14:50 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2014679	1	03/02/23 12:10	03/02/23 12:10	SPL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2014302	1	03/01/23 01:49	03/02/23 05:12	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2015017	1	03/01/23 14:02	03/01/23 15:05	DB	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2015737	1	03/04/23 12:00	03/04/23 14:05	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2014790	1	03/03/23 13:09	03/03/23 20:52	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2017660	5	03/06/23 10:40	03/06/23 17:21	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2013175	1	02/21/23 22:00	02/26/23 18:02	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2011220	1	02/22/23 20:43	02/23/23 10:25	JAS	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2017439	1	03/06/23 06:26	03/06/23 14:06	AGW	Mt. Juliet, TN

⁷Gl

⁸Al

⁹Sc

312345-FL01@5' L1587573-09 Solid

Collected by Zach Solow/J. Collected date/time 02/13/23 14:40 Received date/time 02/21/23 09:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2014679	1	03/02/23 12:13	03/02/23 12:13	SPL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2014302	1	03/01/23 01:49	03/02/23 05:18	VSS	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2015017	1	03/01/23 14:02	03/01/23 15:05	DB	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2015737	1	03/04/23 12:00	03/04/23 14:05	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2014790	1	03/03/23 13:09	03/03/23 20:55	KMG	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2017660	5	03/06/23 10:40	03/06/23 17:34	JPD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2013175	1	02/21/23 22:00	02/26/23 18:27	DWR	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2011881	1	02/23/23 18:50	02/24/23 01:57	DMG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2017439	1	03/06/23 06:26	03/06/23 14:23	AGW	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris Ward
Project Manager



Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.156		1	02/23/2023 11:40	WG2009956

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	02/22/2023 23:07	WG2010411

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	6.77	T8	1	02/21/2023 18:23	WG2010159

Sample Narrative:

L1587573-01 WG2010159: 6.77 at 22.4C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	365		10.0	1	02/23/2023 11:50	WG2011108

Sample Narrative:

L1587573-01 WG2011108: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.572		0.400	2	02/25/2023 00:25	WG2010528

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	1.98		1.00	5	02/22/2023 15:57	WG2010524
Barium	147		10.0	20	02/22/2023 17:26	WG2010524
Cadmium	ND		1.00	5	02/22/2023 15:57	WG2010524
Copper	7.59		5.00	5	02/22/2023 15:57	WG2010524
Lead	8.22		2.00	5	02/22/2023 15:57	WG2010524
Nickel	6.56		2.50	5	02/22/2023 15:57	WG2010524
Selenium	ND		2.50	5	02/22/2023 15:57	WG2010524
Silver	ND		0.500	5	02/22/2023 15:57	WG2010524
Zinc	34.6		25.0	5	02/22/2023 15:57	WG2010524

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.164		1	02/23/2023 11:43	WG2009956

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	02/22/2023 13:33	WG2010411

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.03	T8	1	02/21/2023 18:23	WG2010159

Sample Narrative:

L1587573-02 WG2010159: 8.03 at 21.9C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	288		10.0	1	02/23/2023 11:50	WG2011108

Sample Narrative:

L1587573-02 WG2011108: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.311		0.200	1	02/25/2023 00:27	WG2010528

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.05		1.00	5	02/22/2023 16:10	WG2010524
Barium	210		10.0	20	02/22/2023 17:29	WG2010524
Cadmium	ND		1.00	5	02/22/2023 16:10	WG2010524
Copper	10.4		5.00	5	02/22/2023 16:10	WG2010524
Lead	11.0		2.00	5	02/22/2023 16:10	WG2010524
Nickel	9.23		2.50	5	02/22/2023 16:10	WG2010524
Selenium	ND		2.50	5	02/22/2023 16:10	WG2010524
Silver	ND		0.500	5	02/22/2023 16:10	WG2010524
Zinc	43.8		25.0	5	02/22/2023 16:10	WG2010524

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/26/2023 16:49	WG2013175
(S) Toluene-d8	94.6		75.0-131		02/26/2023 16:49	WG2013175
(S) 4-Bromofluorobenzene	90.4		67.0-138		02/26/2023 16:49	WG2013175
(S) 1,2-Dichloroethane-d4	98.9		70.0-130		02/26/2023 16:49	WG2013175

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	23.5		4.00	1	02/23/2023 12:42	WG2011220
C28-C36 Motor Oil Range	71.2		4.00	1	02/23/2023 12:42	WG2011220
(S) o-Terphenyl	61.7		18.0-148		02/23/2023 12:42	WG2011220

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (GC/MS) by Method 8260/8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/21/2023 23:28	WG2008544
Benzene	ND		0.00100	1	02/21/2023 23:28	WG2008544
Toluene	ND		0.00100	1	02/21/2023 23:28	WG2008544
Ethylbenzene	ND		0.00100	1	02/21/2023 23:28	WG2008544
Xylenes, Total	ND		0.00300	1	02/21/2023 23:28	WG2008544
1,2,4-Trimethylbenzene	ND		0.00100	1	02/21/2023 23:28	WG2008544
1,3,5-Trimethylbenzene	ND		0.00100	1	02/21/2023 23:28	WG2008544
(S) Toluene-d8	106		80.0-120		02/21/2023 23:28	WG2008544
(S) 4-Bromofluorobenzene	93.8		77.0-126		02/21/2023 23:28	WG2008544
(S) 1,2-Dichloroethane-d4	113		70.0-130		02/21/2023 23:28	WG2008544

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.734		1	03/02/2023 12:04	WG2014679

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	03/02/2023 04:55	WG2014302

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.52	T8	1	03/01/2023 15:05	WG2015017

Sample Narrative:

L1587573-06 WG2015017: 8.52 at 23.3C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	106		10.0	1	03/04/2023 14:05	WG2015737

Sample Narrative:

L1587573-06 WG2015737: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

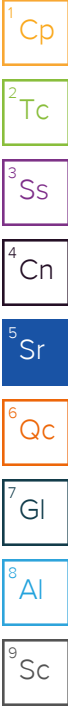
Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.374		0.200	1	03/03/2023 20:46	WG2014790

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	2.75		1.00	5	03/06/2023 17:14	WG2017660
Barium	153		2.50	5	03/06/2023 17:14	WG2017660
Cadmium	ND		1.00	5	03/06/2023 17:14	WG2017660
Copper	7.51		5.00	5	03/06/2023 17:14	WG2017660
Lead	7.50		2.00	5	03/06/2023 17:14	WG2017660
Nickel	6.90		2.50	5	03/06/2023 17:14	WG2017660
Selenium	ND		2.50	5	03/06/2023 17:14	WG2017660
Silver	ND		0.500	5	03/06/2023 17:14	WG2017660
Zinc	28.7		25.0	5	03/06/2023 17:14	WG2017660

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/26/2023 17:14	WG2013175
Benzene	ND		0.00100	1	02/26/2023 17:14	WG2013175
Toluene	ND		0.00500	1	02/26/2023 17:14	WG2013175
Ethylbenzene	ND		0.00100	1	02/26/2023 17:14	WG2013175
Xylenes, Total	ND		0.00300	1	02/26/2023 17:14	WG2013175
1,2,4-Trimethylbenzene	ND		0.00100	1	02/26/2023 17:14	WG2013175
1,3,5-Trimethylbenzene	ND		0.00100	1	02/26/2023 17:14	WG2013175
(S) Toluene-d8	114		75.0-131		02/26/2023 17:14	WG2013175
(S) 4-Bromofluorobenzene	108		67.0-138		02/26/2023 17:14	WG2013175



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 1,2-Dichloroethane-d4	97.4		70.0-130		02/26/2023 17:14	WG2013175

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	02/23/2023 10:49	WG2011220
C28-C36 Motor Oil Range	ND		4.00	1	02/23/2023 10:49	WG2011220
(S) o-Terphenyl	64.0		18.0-148		02/23/2023 10:49	WG2011220

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Acenaphthene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Acenaphthylene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Benzo(a)anthracene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Benzo(a)pyrene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Benzo(b)fluoranthene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Benzo(k)fluoranthene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Chrysene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Dibenz(a,h)anthracene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Fluoranthene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Fluorene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Indeno(1,2,3-cd)pyrene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
Naphthalene	ND	T8	0.0200	1	03/06/2023 13:31	WG2017439
Pyrene	ND	T8	0.00600	1	03/06/2023 13:31	WG2017439
1-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 13:31	WG2017439
2-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 13:31	WG2017439
(S) p-Terphenyl-d14	73.5		23.0-120		03/06/2023 13:31	WG2017439
(S) Nitrobenzene-d5	71.2		14.0-149		03/06/2023 13:31	WG2017439
(S) 2-Fluorobiphenyl	71.5		34.0-125		03/06/2023 13:31	WG2017439

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.940		1	03/02/2023 12:07	WG2014679

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	03/02/2023 05:07	WG2014302

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.35	T8	1	03/01/2023 15:05	WG2015017

Sample Narrative:

L1587573-07 WG2015017: 8.35 at 23.1C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	159		10.0	1	03/04/2023 14:05	WG2015737

Sample Narrative:

L1587573-07 WG2015737: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.313		0.200	1	03/03/2023 20:49	WG2014790

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	2.73		1.00	5	03/06/2023 17:17	WG2017660
Barium	166		2.50	5	03/06/2023 17:17	WG2017660
Cadmium	ND		1.00	5	03/06/2023 17:17	WG2017660
Copper	8.18		5.00	5	03/06/2023 17:17	WG2017660
Lead	8.53		2.00	5	03/06/2023 17:17	WG2017660
Nickel	7.32		2.50	5	03/06/2023 17:17	WG2017660
Selenium	ND		2.50	5	03/06/2023 17:17	WG2017660
Silver	ND		0.500	5	03/06/2023 17:17	WG2017660
Zinc	29.2		25.0	5	03/06/2023 17:17	WG2017660

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/26/2023 17:38	WG2013175
Benzene	ND		0.00100	1	02/26/2023 17:38	WG2013175
Toluene	ND		0.00500	1	02/26/2023 17:38	WG2013175
Ethylbenzene	ND		0.00100	1	02/26/2023 17:38	WG2013175
Xylenes, Total	ND		0.00300	1	02/26/2023 17:38	WG2013175
1,2,4-Trimethylbenzene	ND		0.00100	1	02/26/2023 17:38	WG2013175
1,3,5-Trimethylbenzene	ND		0.00100	1	02/26/2023 17:38	WG2013175
(S) Toluene-d8	104		75.0-131		02/26/2023 17:38	WG2013175
(S) 4-Bromofluorobenzene	94.2		67.0-138		02/26/2023 17:38	WG2013175

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 1,2-Dichloroethane-d4	97.4		70.0-130		02/26/2023 17:38	WG2013175

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	02/23/2023 10:25	WG2011220
C28-C36 Motor Oil Range	ND		4.00	1	02/23/2023 10:25	WG2011220
(S) o-Terphenyl	55.0		18.0-148		02/23/2023 10:25	WG2011220

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Acenaphthene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Acenaphthylene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Benzo(a)anthracene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Benzo(a)pyrene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Benzo(b)fluoranthene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Benzo(k)fluoranthene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Chrysene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Dibenz(a,h)anthracene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Fluoranthene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Fluorene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Indeno(1,2,3-cd)pyrene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
Naphthalene	ND	T8	0.0200	1	03/06/2023 13:48	WG2017439
Pyrene	ND	T8	0.00600	1	03/06/2023 13:48	WG2017439
1-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 13:48	WG2017439
2-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 13:48	WG2017439
(S) p-Terphenyl-d14	71.6		23.0-120		03/06/2023 13:48	WG2017439
(S) Nitrobenzene-d5	79.9		14.0-149		03/06/2023 13:48	WG2017439
(S) 2-Fluorobiphenyl	69.7		34.0-125		03/06/2023 13:48	WG2017439

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	2.32		1	03/02/2023 12:10	WG2014679

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	03/02/2023 05:12	WG2014302

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	RDL	Dilution	Analysis date / time	Batch
pH	8.71	T8		1	03/01/2023 15:05	WG2015017

Sample Narrative:

L1587573-08 WG2015017: 8.71 at 23C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	160		10.0	1	03/04/2023 14:05	WG2015737

Sample Narrative:

L1587573-08 WG2015737: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.485		0.200	1	03/03/2023 20:52	WG2014790

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.42		1.00	5	03/06/2023 17:21	WG2017660
Barium	207		2.50	5	03/06/2023 17:21	WG2017660
Cadmium	ND		1.00	5	03/06/2023 17:21	WG2017660
Copper	9.90		5.00	5	03/06/2023 17:21	WG2017660
Lead	9.44		2.00	5	03/06/2023 17:21	WG2017660
Nickel	8.20		2.50	5	03/06/2023 17:21	WG2017660
Selenium	ND		2.50	5	03/06/2023 17:21	WG2017660
Silver	ND		0.500	5	03/06/2023 17:21	WG2017660
Zinc	37.6		25.0	5	03/06/2023 17:21	WG2017660

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/26/2023 18:02	WG2013175
Benzene	ND		0.00100	1	02/26/2023 18:02	WG2013175
Toluene	ND		0.00500	1	02/26/2023 18:02	WG2013175
Ethylbenzene	ND		0.00100	1	02/26/2023 18:02	WG2013175
Xylenes, Total	ND		0.00300	1	02/26/2023 18:02	WG2013175
1,2,4-Trimethylbenzene	ND		0.00100	1	02/26/2023 18:02	WG2013175
1,3,5-Trimethylbenzene	ND		0.00100	1	02/26/2023 18:02	WG2013175
(S) Toluene-d8	107		75.0-131		02/26/2023 18:02	WG2013175
(S) 4-Bromofluorobenzene	103		67.0-138		02/26/2023 18:02	WG2013175

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 1,2-Dichloroethane-d4	101		70.0-130		02/26/2023 18:02	WG2013175

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	02/23/2023 10:25	WG2011220
C28-C36 Motor Oil Range	5.55		4.00	1	02/23/2023 10:25	WG2011220
(S) o-Terphenyl	63.1		18.0-148		02/23/2023 10:25	WG2011220

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Acenaphthene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Acenaphthylene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Benzo(a)anthracene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Benzo(a)pyrene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Benzo(b)fluoranthene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Benzo(k)fluoranthene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Chrysene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Dibenz(a,h)anthracene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Fluoranthene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Fluorene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Indeno(1,2,3-cd)pyrene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
Naphthalene	ND	T8	0.0200	1	03/06/2023 14:06	WG2017439
Pyrene	ND	T8	0.00600	1	03/06/2023 14:06	WG2017439
1-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 14:06	WG2017439
2-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 14:06	WG2017439
(S) p-Terphenyl-d14	76.0		23.0-120		03/06/2023 14:06	WG2017439
(S) Nitrobenzene-d5	74.3		14.0-149		03/06/2023 14:06	WG2017439
(S) 2-Fluorobiphenyl	75.9		34.0-125		03/06/2023 14:06	WG2017439

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.96		1	03/02/2023 12:13	WG2014679

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		1.00	1	03/02/2023 05:18	WG2014302

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.41	T8	1	03/01/2023 15:05	WG2015017

Sample Narrative:

L1587573-09 WG2015017: 8.41 at 23C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	297		10.0	1	03/04/2023 14:05	WG2015737

Sample Narrative:

L1587573-09 WG2015737: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.687		0.200	1	03/03/2023 20:55	WG2014790

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.17		1.00	5	03/06/2023 17:34	WG2017660
Barium	200		2.50	5	03/06/2023 17:34	WG2017660
Cadmium	ND		1.00	5	03/06/2023 17:34	WG2017660
Copper	10.3		5.00	5	03/06/2023 17:34	WG2017660
Lead	9.82		2.00	5	03/06/2023 17:34	WG2017660
Nickel	9.31		2.50	5	03/06/2023 17:34	WG2017660
Selenium	ND		2.50	5	03/06/2023 17:34	WG2017660
Silver	ND		0.500	5	03/06/2023 17:34	WG2017660
Zinc	36.7		25.0	5	03/06/2023 17:34	WG2017660

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	02/26/2023 18:27	WG2013175
Benzene	ND		0.00100	1	02/26/2023 18:27	WG2013175
Toluene	ND		0.00500	1	02/26/2023 18:27	WG2013175
Ethylbenzene	ND		0.00100	1	02/26/2023 18:27	WG2013175
Xylenes, Total	ND		0.00300	1	02/26/2023 18:27	WG2013175
1,2,4-Trimethylbenzene	ND		0.00100	1	02/26/2023 18:27	WG2013175
1,3,5-Trimethylbenzene	ND		0.00100	1	02/26/2023 18:27	WG2013175
(S) Toluene-d8	109		75.0-131		02/26/2023 18:27	WG2013175
(S) 4-Bromofluorobenzene	101		67.0-138		02/26/2023 18:27	WG2013175

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 1,2-Dichloroethane-d4	98.7		70.0-130		02/26/2023 18:27	WG2013175

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	02/24/2023 01:57	WG2011881
C28-C36 Motor Oil Range	ND		4.00	1	02/24/2023 01:57	WG2011881
(S) o-Terphenyl	69.8		18.0-148		02/24/2023 01:57	WG2011881

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Acenaphthene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Acenaphthylene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Benzo(a)anthracene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Benzo(a)pyrene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Benzo(b)fluoranthene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Benzo(k)fluoranthene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Chrysene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Dibenz(a,h)anthracene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Fluoranthene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Fluorene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Indeno(1,2,3-cd)pyrene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
Naphthalene	ND	T8	0.0200	1	03/06/2023 14:23	WG2017439
Pyrene	ND	T8	0.00600	1	03/06/2023 14:23	WG2017439
1-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 14:23	WG2017439
2-Methylnaphthalene	ND	T8	0.0200	1	03/06/2023 14:23	WG2017439
(S) p-Terphenyl-d14	80.4		23.0-120		03/06/2023 14:23	WG2017439
(S) Nitrobenzene-d5	74.9		14.0-149		03/06/2023 14:23	WG2017439
(S) 2-Fluorobiphenyl	77.0		34.0-125		03/06/2023 14:23	WG2017439

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Method Blank (MB)

(MB) R3893845-1 02/22/23 13:10

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Hexavalent Chromium	U		0.255	1.00

L1587618-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1587618-01 02/22/23 13:38 • (DUP) R3893845-3 02/22/23 13:43

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Hexavalent Chromium	ND	ND	1	0.000		20

L1587682-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1587682-15 02/22/23 15:38 • (DUP) R3893845-8 02/22/23 15:43

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Hexavalent Chromium	ND	1.10	1	85.6	P1	20

Laboratory Control Sample (LCS)

(LCS) R3893845-2 02/22/23 13:17

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Hexavalent Chromium	10.0	10.4	104	80.0-120	

L1587682-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1587682-05 02/22/23 14:20 • (MS) R3893845-4 02/22/23 14:25 • (MSD) R3893845-5 02/22/23 14:30

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Hexavalent Chromium	20.0	ND	21.1	20.3	102	97.7	1	75.0-125			3.85	20

L1587682-05 Original Sample (OS) • Matrix Spike (MS)

(OS) L1587682-05 02/22/23 14:20 • (MS) R3893845-6 02/22/23 14:35

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Hexavalent Chromium	646	ND	842	130	50	75.0-125	J5

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3896503-1 03/02/23 04:28

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Hexavalent Chromium	U		0.255	1.00

L1587573-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1587573-06 03/02/23 04:55 • (DUP) R3896503-3 03/02/23 05:02

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Hexavalent Chromium	ND	ND	1	0.000		20

L1587618-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1587618-06 03/02/23 05:33 • (DUP) R3896503-4 03/02/23 05:49

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Hexavalent Chromium	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3896503-2 03/02/23 04:36

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Hexavalent Chromium	10.0	10.9	109	80.0-120	

L1590031-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1590031-01 03/02/23 06:20 • (MS) R3896503-6 03/02/23 06:30 • (MSD) R3896503-7 03/02/23 06:35

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Hexavalent Chromium	20.0	ND	20.7	19.5	103	97.5	1	75.0-125			5.74	20

L1590031-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1590031-01 03/02/23 06:20 • (MS) R3896503-8 03/02/23 06:51

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Hexavalent Chromium	631	ND	708	112	50	75.0-125	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1587160-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1587160-01 02/21/23 18:23 • (DUP) R3893268-2 02/21/23 18:23

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	su	su		%		%
pH	5.95	5.94	1	0.168		1

Sample Narrative:

OS: 5.95 at 23.3C

DUP: 5.94 at 23.1C

L1587631-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1587631-01 02/21/23 18:23 • (DUP) R3893268-3 02/21/23 18:23

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	su	su		%		%
pH	8.15	8.16	1	0.123		1

Sample Narrative:

OS: 8.15 at 20.8C

DUP: 8.16 at 20.7C

Laboratory Control Sample (LCS)

(LCS) R3893268-1 02/21/23 18:23

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	su	su	%	%	
pH	10.0	9.92	99.2	99.0-101	

Sample Narrative:

LCS: 9.92 at 20C



L1590158-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1590158-11 03/01/23 15:05 • (DUP) R3896234-2 03/01/23 15:05

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	su	su		%		%
pH	8.32	8.28	1	0.482		1

Sample Narrative:

OS: 8.32 at 22.1C

DUP: 8.28 at 22.2C

Laboratory Control Sample (LCS)

(LCS) R3896234-1 03/01/23 15:05

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	su	su	%	%	
pH	10.0	9.95	99.5	99.0-101	

Sample Narrative:

LCS: 9.95 at 21.3C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3894048-1 02/23/23 11:50

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

Sample Narrative:
BLANK: at 25C

L1587307-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1587307-01 02/23/23 11:50 • (DUP) R3894048-3 02/23/23 11:50

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	482	491	1	1.85		20

Sample Narrative:
OS: at 25C
DUP: at 25C

L1587927-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1587927-01 02/23/23 11:50 • (DUP) R3894048-4 02/23/23 11:50

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	1890	1870	1	0.959		20

Sample Narrative:
OS: at 25C
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3894048-2 02/23/23 11:50

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	1120	1110	98.8	85.0-115	

Sample Narrative:
LCS: at 25C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3897336-1 03/04/23 14:05

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

Sample Narrative:

BLANK: at 25C

L1587573-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1587573-06 03/04/23 14:05 • (DUP) R3897336-3 03/04/23 14:05

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	106	107	1	0.848		20

Sample Narrative:

OS: at 25C

DUP: at 25C

L1587624-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1587624-08 03/04/23 14:05 • (DUP) R3897336-4 03/04/23 14:05

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	311	304	1	2.28		20

Sample Narrative:

OS: at 25C

DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3897336-2 03/04/23 14:05

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	1120	1060	94.3	85.0-115	

Sample Narrative:

LCS: at 25C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3895003-1 02/25/23 00:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hot Water Sol. Boron	U		0.0167	0.200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3895003-2 02/25/23 00:14 • (LCSD) R3895003-3 02/25/23 00:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hot Water Sol. Boron	1.00	1.07	1.08	107	108	80.0-120			1.23	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3897222-1 03/03/23 20:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hot Water Sol. Boron	U		0.0167	0.200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3897222-2 03/03/23 20:41 • (LCSD) R3897222-3 03/03/23 20:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hot Water Sol. Boron	1.00	1.18	1.14	118	114	80.0-120			3.20	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3893747-1 02/22/23 15:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.100	1.00
Barium	U		0.152	2.50
Cadmium	U		0.0855	1.00
Copper	U		0.133	5.00
Lead	U		0.0990	2.00
Nickel	U		0.197	2.50
Selenium	0.188	U	0.180	2.50
Silver	U		0.0865	0.500
Zinc	U		0.740	25.0

Laboratory Control Sample (LCS)

(LCS) R3893747-2 02/22/23 15:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	100	95.5	95.5	80.0-120	
Barium	100	97.7	97.7	80.0-120	
Cadmium	100	99.5	99.5	80.0-120	
Copper	100	87.1	87.1	80.0-120	
Lead	100	92.0	92.0	80.0-120	
Nickel	100	97.0	97.0	80.0-120	
Selenium	100	110	110	80.0-120	
Silver	20.0	19.9	99.4	80.0-120	
Zinc	100	95.0	95.0	80.0-120	

L1587781-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1587781-01 02/22/23 15:34 • (MS) R3893747-5 02/22/23 15:44 • (MSD) R3893747-6 02/22/23 15:47

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	ND	99.7	104	99.0	103	5	75.0-125			4.24	20
Barium	100	6.92	116	115	109	109	5	75.0-125	E	E	0.605	20
Cadmium	100	ND	112	112	112	112	5	75.0-125			0.104	20
Copper	100	ND	99.2	96.4	96.7	93.9	5	75.0-125			2.83	20
Lead	100	ND	102	101	101	100	5	75.0-125			1.04	20
Nickel	100	2.94	102	106	99.5	103	5	75.0-125			3.46	20
Selenium	100	ND	125	122	125	122	5	75.0-125			2.51	20
Silver	20.0	ND	22.2	22.3	111	112	5	75.0-125			0.561	20
Zinc	100	ND	102	107	98.0	102	5	75.0-125			4.18	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3897859-1 03/06/23 16:51

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.100	1.00
Barium	U		0.152	2.50
Cadmium	U		0.0855	1.00
Copper	U		0.133	5.00
Lead	U		0.0990	2.00
Nickel	U		0.197	2.50
Selenium	U		0.180	2.50
Silver	U		0.0865	0.500
Zinc	U		0.740	25.0

Laboratory Control Sample (LCS)

(LCS) R3897859-2 03/06/23 16:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	100	90.4	90.4	80.0-120	
Barium	100	91.5	91.5	80.0-120	
Cadmium	100	92.8	92.8	80.0-120	
Copper	100	91.9	91.9	80.0-120	
Lead	100	88.9	88.9	80.0-120	
Nickel	100	92.2	92.2	80.0-120	
Selenium	100	95.7	95.7	80.0-120	
Silver	20.0	19.3	96.7	80.0-120	
Zinc	100	88.6	88.6	80.0-120	

L1587810-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1587810-06 03/06/23 16:58 • (MS) R3897859-5 03/06/23 17:08 • (MSD) R3897859-6 03/06/23 17:11

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	100	3.53	85.8	85.9	82.2	82.4	5	75.0-125			0.167	20
Barium	100	124	223	235	98.9	111	5	75.0-125			5.18	20
Cadmium	100	ND	87.3	87.1	87.2	87.1	5	75.0-125			0.131	20
Copper	100	5.21	83.7	86.2	78.4	80.9	5	75.0-125			2.95	20
Lead	100	5.58	86.4	87.4	80.8	81.8	5	75.0-125			1.15	20
Nickel	100	5.91	89.5	89.1	83.6	83.2	5	75.0-125			0.503	20
Selenium	100	ND	90.7	88.5	90.4	88.3	5	75.0-125			2.41	20
Silver	20.0	ND	17.8	18.1	88.8	90.3	5	75.0-125			1.66	20
Zinc	100	ND	102	100	80.2	78.5	5	75.0-125			1.72	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3893427-4 02/21/23 22:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/MS) Low Fraction	U		0.108	0.500
Benzene	U		0.0000941	0.00100
Toluene	U		0.000278	0.00100
Ethylbenzene	U		0.000137	0.00100
Xylenes, Total	U		0.000174	0.00300
1,2,4-Trimethylbenzene	U		0.000322	0.00100
1,3,5-Trimethylbenzene	U		0.000104	0.00100
(S) Toluene-d8	106			80.0-120
(S) 4-Bromofluorobenzene	94.6			77.0-126
(S) 1,2-Dichloroethane-d4	117			70.0-130

Laboratory Control Sample (LCS)

(LCS) R3893427-1 02/21/23 21:17

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00579	116	70.0-123	
Toluene	0.00500	0.00487	97.4	79.0-120	
Ethylbenzene	0.00500	0.00495	99.0	79.0-123	
Xylenes, Total	0.0150	0.0150	100	79.0-123	
1,2,4-Trimethylbenzene	0.00500	0.00509	102	76.0-121	
1,3,5-Trimethylbenzene	0.00500	0.00548	110	76.0-122	
(S) Toluene-d8			101	80.0-120	
(S) 4-Bromofluorobenzene			97.8	77.0-126	
(S) 1,2-Dichloroethane-d4			113	70.0-130	

Laboratory Control Sample (LCS)

(LCS) R3893427-2 02/21/23 21:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/MS) Low Fraction	5.00	5.14	103	66.0-132	
(S) Toluene-d8			107	80.0-120	
(S) 4-Bromofluorobenzene			113	77.0-126	
(S) 1,2-Dichloroethane-d4			107	70.0-130	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1586578-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1586578-04 02/22/23 03:20 • (MS) R3893427-5 02/22/23 05:26 • (MSD) R3893427-6 02/22/23 05:47

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.00500	ND	0.00416	0.00430	83.2	86.0	1	17.0-158			3.31	27
Toluene	0.00500	ND	0.00370	0.00371	74.0	74.2	1	26.0-154			0.270	28
Ethylbenzene	0.00500	ND	0.00421	0.00419	84.2	83.8	1	30.0-155			0.476	27
Xylenes, Total	0.0150	ND	0.0124	0.0125	82.7	83.3	1	29.0-154			0.803	28
1,2,4-Trimethylbenzene	0.00500	ND	0.00442	0.00473	88.4	94.6	1	26.0-154			6.78	27
1,3,5-Trimethylbenzene	0.00500	ND	0.00453	0.00494	90.6	98.8	1	28.0-153			8.66	27
(S) Toluene-d8					102	101		80.0-120				
(S) 4-Bromofluorobenzene					94.6	94.4		77.0-126				
(S) 1,2-Dichloroethane-d4					112	110		70.0-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3895241-3 02/26/23 15:11

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/MS) Low Fraction	U		0.183	0.500
Benzene	U		0.000375	0.00100
Toluene	U		0.00123	0.00500
Ethylbenzene	U		0.000300	0.00100
Xylenes, Total	U		0.000500	0.00300
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
(S) Toluene-d8	105			75.0-131
(S) 4-Bromofluorobenzene	104			67.0-138
(S) 1,2-Dichloroethane-d4	86.6			70.0-130

Laboratory Control Sample (LCS)

(LCS) R3895241-1 02/26/23 13:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/MS) Low Fraction	5.00	4.05	81.0	52.0-154	
(S) Toluene-d8			105	75.0-131	
(S) 4-Bromofluorobenzene			116	67.0-138	
(S) 1,2-Dichloroethane-d4			91.5	70.0-130	

Laboratory Control Sample (LCS)

(LCS) R3895241-2 02/26/23 14:23

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0250	0.0286	114	70.0-123	
Toluene	0.0250	0.0239	95.6	75.0-121	
Ethylbenzene	0.0250	0.0288	115	74.0-126	
Xylenes, Total	0.0750	0.0889	119	72.0-127	
1,2,4-Trimethylbenzene	0.0250	0.0285	114	70.0-126	
1,3,5-Trimethylbenzene	0.0250	0.0270	108	73.0-127	
(S) Toluene-d8			93.2	75.0-131	
(S) 4-Bromofluorobenzene			94.1	67.0-138	
(S) 1,2-Dichloroethane-d4			95.8	70.0-130	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3893965-1 02/23/23 00:27

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C36 Motor Oil Range	U		0.274	4.00
(S) o-Terphenyl	79.4			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3893965-2 02/23/23 00:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	40.0	80.0	50.0-150	
(S) o-Terphenyl			88.7	18.0-148	

L1587624-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1587624-05 02/23/23 11:28 • (MS) R3893965-3 02/23/23 11:41 • (MSD) R3893965-4 02/23/23 11:54

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	48.8	4.25	22.7	32.7	37.8	58.3	1	50.0-150	J6	J3	36.1	20
(S) o-Terphenyl					44.5	64.0		18.0-148				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3894434-2 02/24/23 01:05

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C36 Motor Oil Range	0.349	⬇	0.274	4.00
(S) o-Terphenyl	89.2			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3894434-1 02/24/23 00:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	37.5	75.0	50.0-150	
(S) o-Terphenyl			91.6	18.0-148	

L1587376-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1587376-04 02/24/23 04:20 • (MS) R3894434-3 02/24/23 04:33 • (MSD) R3894434-4 02/24/23 04:46

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	48.8	7.61	43.3	39.5	73.1	66.2	1	50.0-150			9.18	20
(S) o-Terphenyl					82.9	76.8		18.0-148				

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R3897983-2 03/06/23 13:14

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.00230	0.00600
Acenaphthene	U		0.00209	0.00600
Acenaphthylene	U		0.00216	0.00600
Benzo(a)anthracene	U		0.00173	0.00600
Benzo(a)pyrene	U		0.00179	0.00600
Benzo(b)fluoranthene	U		0.00153	0.00600
Benzo(k)fluoranthene	U		0.00215	0.00600
Chrysene	U		0.00232	0.00600
Dibenz(a,h)anthracene	U		0.00172	0.00600
Fluoranthene	U		0.00227	0.00600
Fluorene	U		0.00205	0.00600
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600
Naphthalene	U		0.00408	0.0200
Pyrene	U		0.00200	0.00600
1-Methylnaphthalene	U		0.00449	0.0200
2-Methylnaphthalene	U		0.00427	0.0200
(S) p-Terphenyl-d14	95.0			23.0-120
(S) Nitrobenzene-d5	88.0			14.0-149
(S) 2-Fluorobiphenyl	90.4			34.0-125

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3897983-1 03/06/23 12:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0760	95.0	50.0-126	
Acenaphthene	0.0800	0.0753	94.1	50.0-120	
Acenaphthylene	0.0800	0.0760	95.0	50.0-120	
Benzo(a)anthracene	0.0800	0.0764	95.5	45.0-120	
Benzo(a)pyrene	0.0800	0.0657	82.1	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0758	94.8	42.0-121	
Benzo(k)fluoranthene	0.0800	0.0764	95.5	49.0-125	
Chrysene	0.0800	0.0789	98.6	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0766	95.8	47.0-125	
Fluoranthene	0.0800	0.0789	98.6	49.0-129	
Fluorene	0.0800	0.0778	97.3	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0734	91.8	46.0-125	
Naphthalene	0.0800	0.0732	91.5	50.0-120	
Pyrene	0.0800	0.0786	98.2	43.0-123	

Laboratory Control Sample (LCS)

(LCS) R3897983-1 03/06/23 12:57

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
1-Methylnaphthalene	0.0800	0.0748	93.5	51.0-121	
2-Methylnaphthalene	0.0800	0.0794	99.3	50.0-120	
(S) p-Terphenyl-d14			98.1	23.0-120	
(S) Nitrobenzene-d5			106	14.0-149	
(S) 2-Fluorobiphenyl			101	34.0-125	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

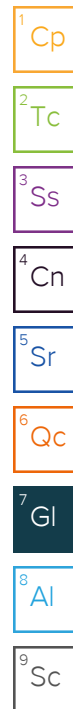
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
T8	Sample(s) received past/too close to holding time expiration.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



0202 1000 2110

Colorado Oil & Gas Conservation

Sample Delivery Group: L1608367
Samples Received: 04/22/2023
Project Number:
Description: Logan J Sand 4-24
Site: 312345
Report To: Jess Zielinski
1536 Cole Blvd, Suite 375
Lakewood, CO 80401

Entire Report Reviewed By:



Chris Ward
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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¹ Cp
² Tc
³ Ss
⁴ Cn
⁵ Sr
⁶ Qc
⁷ Gl
⁸ Al
⁹ Sc

SAMPLE SUMMARY

312345_WH01_B02@10' L1608367-01 Solid

Collected by

Collected date/time

Received date/time

04/18/23 13:20

04/22/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2051993	1	05/01/23 11:01	05/01/23 17:21	ADM	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2049654	20	04/28/23 16:47	04/29/23 05:45	JAS	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

ACCOUNT:

Colorado Oil & Gas Conservation

PROJECT:

SDG:

L1608367

DATE/TIME:

05/03/23 10:55

PAGE:

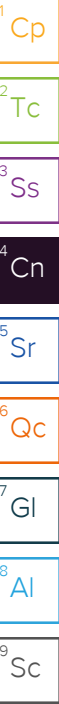
3 of 10

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Chris Ward
Project Manager



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/MS) Low Fraction	ND		0.500	1	05/01/2023 17:21	WG2051993
Benzene	ND		0.00100	1	05/01/2023 17:21	WG2051993
Toluene	ND		0.00500	1	05/01/2023 17:21	WG2051993
Ethylbenzene	ND		0.00100	1	05/01/2023 17:21	WG2051993
Xylenes, Total	ND		0.00300	1	05/01/2023 17:21	WG2051993
1,2,4-Trimethylbenzene	ND		0.00100	1	05/01/2023 17:21	WG2051993
1,3,5-Trimethylbenzene	ND		0.00100	1	05/01/2023 17:21	WG2051993
(S) Toluene-d8	112		75.0-131		05/01/2023 17:21	WG2051993
(S) 4-Bromofluorobenzene	103		67.0-138		05/01/2023 17:21	WG2051993
(S) 1,2-Dichloroethane-d4	109		70.0-130		05/01/2023 17:21	WG2051993

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	196		80.0	20	04/29/2023 05:45	WG2049654
C28-C36 Motor Oil Range	403		80.0	20	04/29/2023 05:45	WG2049654
(S) o-Terphenyl	87.7	J7	18.0-148		04/29/2023 05:45	WG2049654

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Method Blank (MB)

(MB) R3919722-3 05/01/23 14:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/MS) Low Fraction	U		0.183	0.500
Benzene	U		0.000375	0.00100
Toluene	U		0.00123	0.00500
Ethylbenzene	U		0.000300	0.00100
Xylenes, Total	U		0.000500	0.00300
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
(S) Toluene-d8	111			75.0-131
(S) 4-Bromofluorobenzene	105			67.0-138
(S) 1,2-Dichloroethane-d4	106			70.0-130

Laboratory Control Sample (LCS)

(LCS) R3919722-1 05/01/23 13:12

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/MS) Low Fraction	5.00	4.24	84.8	52.0-154	
(S) Toluene-d8			107	75.0-131	
(S) 4-Bromofluorobenzene			112	67.0-138	
(S) 1,2-Dichloroethane-d4			117	70.0-130	

Laboratory Control Sample (LCS)

(LCS) R3919722-2 05/01/23 13:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0250	0.0226	90.4	70.0-123	
Toluene	0.0250	0.0230	92.0	75.0-121	
Ethylbenzene	0.0250	0.0219	87.6	74.0-126	
Xylenes, Total	0.0750	0.0664	88.5	72.0-127	
1,2,4-Trimethylbenzene	0.0250	0.0223	89.2	70.0-126	
1,3,5-Trimethylbenzene	0.0250	0.0228	91.2	73.0-127	
(S) Toluene-d8			110	75.0-131	
(S) 4-Bromofluorobenzene			113	67.0-138	
(S) 1,2-Dichloroethane-d4			109	70.0-130	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3919044-1 04/29/23 01:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C36 Motor Oil Range	U		0.274	4.00
(S) o-Terphenyl	51.1			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3919044-2 04/29/23 01:49

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	41.1	82.2	50.0-150	
(S) o-Terphenyl			82.0	18.0-148	

L1608336-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1608336-13 04/29/23 09:33 • (MS) R3919044-3 04/29/23 09:58 • (MSD) R3919044-4 04/29/23 10:23

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	49.2	35.3	52.9	61.5	35.8	55.4	2	50.0-150	J6		15.0	20
(S) o-Terphenyl					53.5	62.4		18.0-148				

Sample Narrative:

OS: Sample resembles laboratory standard for Hydraulic Oil.

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

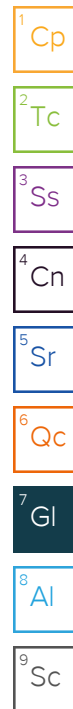
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
J7	Surrogate recovery cannot be used for control limit evaluation due to dilution.



ACCREDITATIONS & LOCATIONS

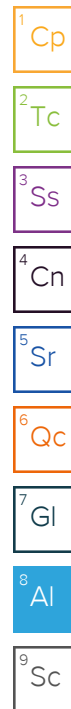
Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey--NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio--VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA -- ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA -- ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA--Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



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