

A.G. WASSENAAR

INC.

GEOTECHNICAL • ENVIRONMENTAL
CONSULTANTS

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Doc #2100099

June 21, 2019

Grand Mesa Operating Company
1700 North Waterfront Parkway
Building 600
Wichita, Kansas 67206

Attention: Ms. Phyllis Brewer

Subject: Dixie #1-5 Drill Site (COGCC Location ID: 460311)
Background and Pit Sampling
Lincoln County, Colorado
AGW Project Number: 180345

Dear Ms. Brewer:

As requested, A. G. Wassenaar, Inc. (AGW) collected mud samples from one unlined drill pit at the Dixie #1-5 drill site in Lincoln County, Colorado operated by Grand Mesa Operating Company (Grand Mesa). This letter summarizes the project activities and analytical results.

BACKGROUND

The subject site is located in an agricultural area in the southwest $\frac{1}{4}$ of the southeast $\frac{1}{4}$ of Section 5, Township 11 South, Range 54 West. It is approximately 0.2 mile north of Lincoln County Road 2V, and approximately 0.7 mile east of Lincoln County Road 32. Based on U.S. Geological Survey (USGS) Topographic Map data, the ground surface at the site generally slopes away from the site in all directions; and the larger general vicinity slopes to the north toward Big Sandy Creek, approximately 0.7 mile away. Figure 1 in Attachment A illustrates the site location and topography.

In January 2019, one (1) unlined drill pit and one lined water pit were constructed on the western portion of the site to facilitate drilling of the Dixie #1-5 well. To help restore the site after drilling and to comply with Colorado Oil and Gas Conservation Commission (COGCC) pit closure requirements, AGW was asked to collect mud samples from the base of the unlined pit. Samples were collected on two separate occasions. AGW visited the site on February 15, 2019, shortly after drilling, to collect samples from the east edge of the pit, following the recommendation of a COGCC inspector who observed possible oil staining. The pit was sampled again on May 13, 2019, after remediation activities were completed by a contractor for Grand Mesa and the pit had dried sufficiently to sample. All pit samples were analyzed for total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, and xylenes (BTEX); sodium adsorption ratio (SAR); specific conductance (EC); arsenic; and pH. In accordance with COGCC rules, the TPH values were derived by adding the concentrations of gasoline range organics (GRO) and diesel range organics (DRO). The lined pit was used exclusively for clean water, so soil beneath the liner was not sampled. AGW also collected background soil samples from the area surrounding the well pad.

BACKGROUND SOIL SAMPLING METHODS

On February 15, 2019, an AGW geologist visited the site to collect background soil samples for baseline characteristics. At that time, construction had been completed and the oil/gas well had been constructed. The site location consisted of grassland.

To evaluate the background soil conditions, AGW collected one composite sample from three discrete and random locations. The discrete samples were collected adjacent to the constructed well site location. To collect the discrete samples, AGW utilized a clean stainless-steel trowel. Prior to use, the trowel was cleaned in a solution of Alconox® detergent and municipal water followed by a municipal water rinse. To control potential cross contamination, the AGW geologist also wore new nitrile gloves for this sampling event. Each sample was collected from a depth ranging from two to six inches below ground surface (BGS).

Each discrete sample was immediately transferred into one Ziploc bag and sufficiently combined to create one representative composite sample. The final composited sample was transferred to clean, laboratory-supplied glass jars, labeled, and placed into a cooler with ice (a preservative) for laboratory submittal. During this project, AGW followed chain-of-custody procedures in general accordance with EPA guidelines. AGW delivered the samples to Origins Laboratory, Inc. (Origins) in Denver, Colorado for testing.

BACKGROUND ANALYTICAL RESULTS

Origins analyzed the composite soil sample for arsenic by EPA Method 6020A, EC by EPA Method 2510B-2011 MOD, pH by EPA Method 9045D, and SAR by methods from the USDA Handbook 60. The arsenic, EC, pH, and SAR results are included below in Table 1. The laboratory report is included in Attachment B.

Table 1: Background Soil Analytical Results
Dixie #1-5 Drill Site
February 15, 2019

Sample Number	Arsenic (mg/kg) ¹	Specific Conductance (mmhos/cm) ²	pH	Sodium Adsorption Ratio
0345-BG	3.21	2.44	9.70	0.65
COGCC Standard ³	0.39*	< 4	6 - 9	< 12

Legend:

1: mg/kg - milligrams per kilogram (parts per million)

2: mmhos/cm - millimhos per centimeter

3: Standards from Colorado Oil and Gas Conservation Commission Table 910-1, effective January 30, 2015

*: Naturally occurring elevated levels of arsenic are common in Colorado

PIT SAMPLING METHODS

After drilling was completed, a COGCC Inspector noted the possible presence of oil in the reserve pit, and AGW was requested to obtain samples to determine hydrocarbon levels in the pit. An AGW scientist visited the site on February 15, 2019 and collected three discrete mud samples from the eastern edge of the pit which still contained water. The first sample, 0345-1-P1, was collected from the southern east edge of the pit; the second sample, 0345-1-P2, was obtained from the center of the east edge of the pit; and 0345-1-P3 was collected from the northern east edge of the pit. The unlined pit measured approximately

120 feet by 140 feet across and was 2 to 3 feet deep. Exceedances of COGCC standards are discussed in the below.

AGW visited the site again, on May 13, 2019, once the base of the pit was sufficiently dry. Three discrete mud samples were collected. The first sample, 0345-2-P1, was collected from the northeast corner of the pit; the second sample, 0345-2-P2, was obtained from the southeast corner of the pit; and 0345-2-P3 was collected from the west center of the pit.

Prior to sampling, the AGW geologist wore new nitrile gloves at each sample location. Each sample was collected from a depth of approximately zero to six inches beneath the base of the pit.

Each sample was immediately transferred into three laboratory-supplied glass jars, labeled, and placed into a cooler with ice (a preservative) for laboratory submittal. During this project, AGW followed chain-of-custody procedures in general accordance with EPA guidelines. AGW delivered the samples to Origins for testing.

ANALYTICAL RESULTS

Origins analyzed each pit sample for DRO and GRO by EPA Method 8015B, BTEX by EPA Method 8260B, and arsenic, EC, pH, and SAR by EPA Methods listed above for the background soil sample. In accordance with COGCC requirements as published in Table 910-1 of their Rules, each set of DRO and GRO values were added together to obtain the TPH concentration for comparison to the COGCC TPH standard. The DRO, GRO, TPH, BTEX, EC, pH, and SAR results are included below. Table 2 contains results for February 15, 2019 and Table 3 contains results for May 13, 2019. The results are also illustrated on Figure 2 in Attachment A. The laboratory reports are included in Attachment B.

**Table 2: Pit Sampling Results
Dixie #1-5 Drill Site
February 15, 2019**

Sample Number	0345-BG¹	0345-1-P1	0345-1-P2	0345-1-P3	COGCC Standard²
DRO (mg/kg)³	NA ⁴	1190⁶	853	1040	500
GRO (mg/kg)	NA ⁴	151	162	461	
TPH⁵ (mg/kg)	NA ⁴	1341	1015	1501	
Benzene (mg/kg)	NA ⁴	ND	ND	0.332	0.17
Toluene (mg/kg)	NA ⁴	0.119	0.210	1.74	85
Ethylbenzene (mg/kg)	NA ⁴	0.124	0.277	1.49	100
Xylenes (mg/kg)	NA ⁴	0.166	0.384	1.92	175

Sample Number	0345-BG ¹	0345-1-P1	0345-1-P2	0345-1-P3	COGCC Standard ²
Arsenic (mg/kg)	3.21	2.88	4.45	4.44	0.39 ⁷
Specific Conductance (mmhos/cm) ⁸	2.44	0.0235	0.0884	0.0366	< 4
pH	9.70	8.60	8.11	8.03	6 – 9
Sodium Adsorption Ratio	0.65	97.76	80.61	124.19	< 12

Legend:

1: Background sample collected from surficial soil on February 15, 2019

2: Standards from Colorado Oil and Gas Conservation Commission Table 910-1, effective January 30, 2015

3: mg/kg - Milligrams per kilogram

4: NA - Not analyzed

5: TPH - Total petroleum hydrocarbons. Value determined by adding DRO and GRO per COGCC Table 910-1 Rules

6: ND - Not detected at or above laboratory reporting limit

7: Naturally occurring elevated levels of arsenic are common in Colorado

8: mmhos/cm - millimhos per centimeter

**Table 3: Pit Sampling Results
Dixie #1-5 Drill Site
May 13, 2019**

Sample Number	0345-BG ¹	0345-2-P1	0345-2-P2	0345-2-P3	COGCC Standard ²
DRO (mg/kg) ³	NA ⁴	ND	ND	ND	500
GRO (mg/kg)	NA ⁴	ND	ND	ND	
TPH ⁵ (mg/kg)	NA ⁴	ND	ND	ND	
Benzene (mg/kg)	NA ⁴	0.007	ND	0.002	0.17
Toluene (mg/kg)	NA ⁴	0.026	ND	0.003	85
Ethylbenzene (mg/kg)	NA ⁴	0.029	ND	0.004	100
Xylenes (mg/kg)	NA ⁴	0.042	ND	0.006	175
Arsenic (mg/kg)	3.21	1.91	1.82	1.91	0.39 ⁷
Specific Conductance (mmhos/cm) ⁸	2.44	0.680	0.0598	1.38	< 4
pH	9.70	8.72	8.06	7.65	6 – 9

Sample Number	0345-BG ¹	0345-2-P1	0345-2-P2	0345-2-P3	COGCC Standard ²
Sodium Adsorption Ratio	0.65	33.82	5.08	27.27	< 12

Legend:

- 1: Background sample collected from surficial soil on February 15, 2019
- 2: Standards from Colorado Oil and Gas Conservation Commission Table 910-1, effective January 30, 2015
- 3: mg/kg - Milligrams per kilogram
- 4: NA - Not analyzed
- 5: TPH - Total petroleum hydrocarbons. Value determined by adding DRO and GRO per COGCC Table 910-1 Rules
- 6: ND - Not detected at or above laboratory reporting limit
- 7: Naturally occurring elevated levels of arsenic are common in Colorado
- 8: mmhos/cm - millimhos per centimeter

To evaluate the analytical results, AGW compared detected concentrations to the regulatory standards published in Table 910-1 of the COGCC Series 900 Rules.

In February 2019, elevated levels of TPH and SAR were detected in all three samples and elevated levels of benzene were detected in 0345-1-P3. Based on these results, Grand Mesa completed remediation activities at the site through mechanical aeration of the impacted soil.

In May 2019, TPH was not detected in any of the samples, and all BTEX levels were below COGCC standards. The locations of the samples taken in May 2019 were near to previous February 2019 samples taken on the northeast and southeast portions of the pit. The third sampling location was more centrally located in the pit. Elevated levels of SAR were detected in samples 0345-P2-1 (northeast) and 0345-P2-3 (central), however these levels were greatly reduced from those detected in February 2019.

Arsenic was also detected at levels greater than the COGCC Table 910-1 standard; however, elevated levels of arsenic are common in Colorado, as indicated by the background sample collected in February 2019 from surficial soil. The CDPHE has issued a risk management guidance document for evaluating arsenic concentrations in soil, reviewed/revised July 2014, which relies on an EPA study of background levels in Colorado. The data indicate arsenic concentrations commonly range from 3 to 14 mg/kg on native grassland, rangeland, and other agricultural uses. The arsenic concentrations in the samples collected from the pit are below this range and therefore do not require further action in this regard.

The analytical laboratory reports for the background and pit sampling are included in Attachment B.

CONCLUSIONS AND RECOMMENDATIONS

To help evaluate the condition of soils/bentonitic drilling mud at the base of pits at the Dixie #1-5 drill site, AGW visited the site on February 15 and May 13, 2019. During each visit, AGW collected a total of three discrete samples from the base of the pit for analytical testing. The samples were analyzed for TPH, BTEX, arsenic, EC, pH, and SAR.

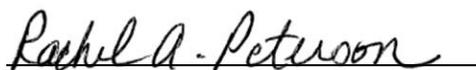
Based on the analytical results, in February 2019, elevated levels of TPH, SAR, and benzene were detected. Grand Mesa subsequently completed remediation activities at the site, and the pit was sampled again on May 13, 2019. In May 2019, SAR was detected at levels greater than background and regulatory guidance in samples 0345-P2-1 and 0345-P2-3.

Arsenic was detected at levels greater than the COGCC Table 910-1 standard in all samples, including the background sample; however, elevated levels of arsenic are common in Colorado. The Colorado Department of Public Health and Environment (CDPHE) has issued a risk management guidance document for evaluating arsenic concentrations in soil, reviewed/ revised July 2014, which relies on an EPA study of background levels in Colorado. The data indicate arsenic concentrations commonly range from 3 mg/kg to 14 mg/kg on native grassland, rangeland, and other agricultural uses. The arsenic concentrations in the samples collected from the pit are below this range and are consistent with background levels and therefore do not require further action.

Based on the depth of the pit (approximately 2-3 feet BGS) backfilling with native soils currently stockpiled on site should result in the pit material being completely buried. Based on the burial, the low level of SAR exceedance, and the land use as rangeland, the elevated SAR levels should not impact future uses of the site. Following approval from the COGCC, site reclamation activities can take place in order to return the site back to the surface owner.

Thank you for the opportunity to assist you with this project. If you have any questions or require further information, please call us at (303) 759-8373.

Sincerely,
A.G. Wassenaar, Inc.



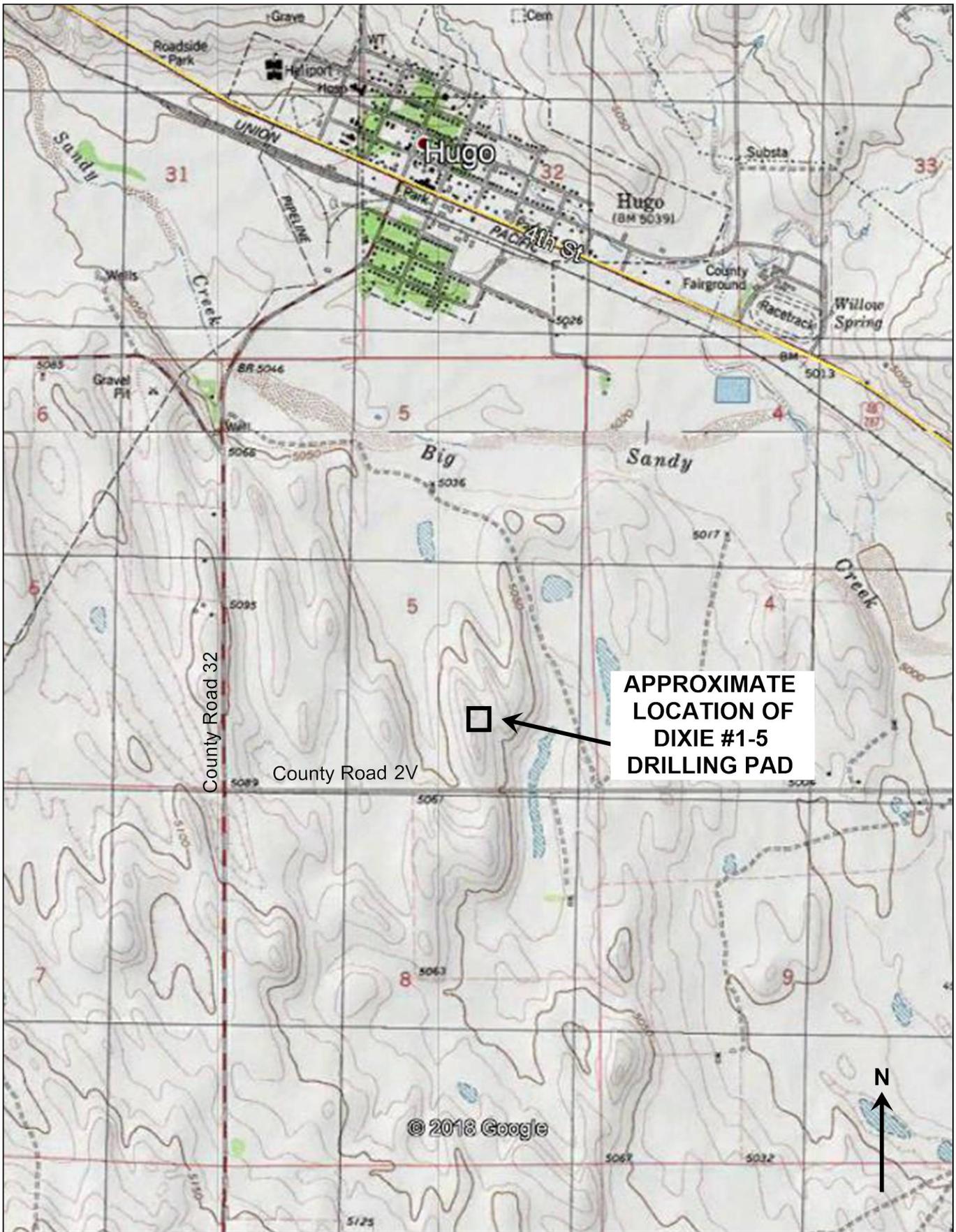
Rachel A. Peterson, P.G.
Principal Geologist

RAP/ALB

Attachments

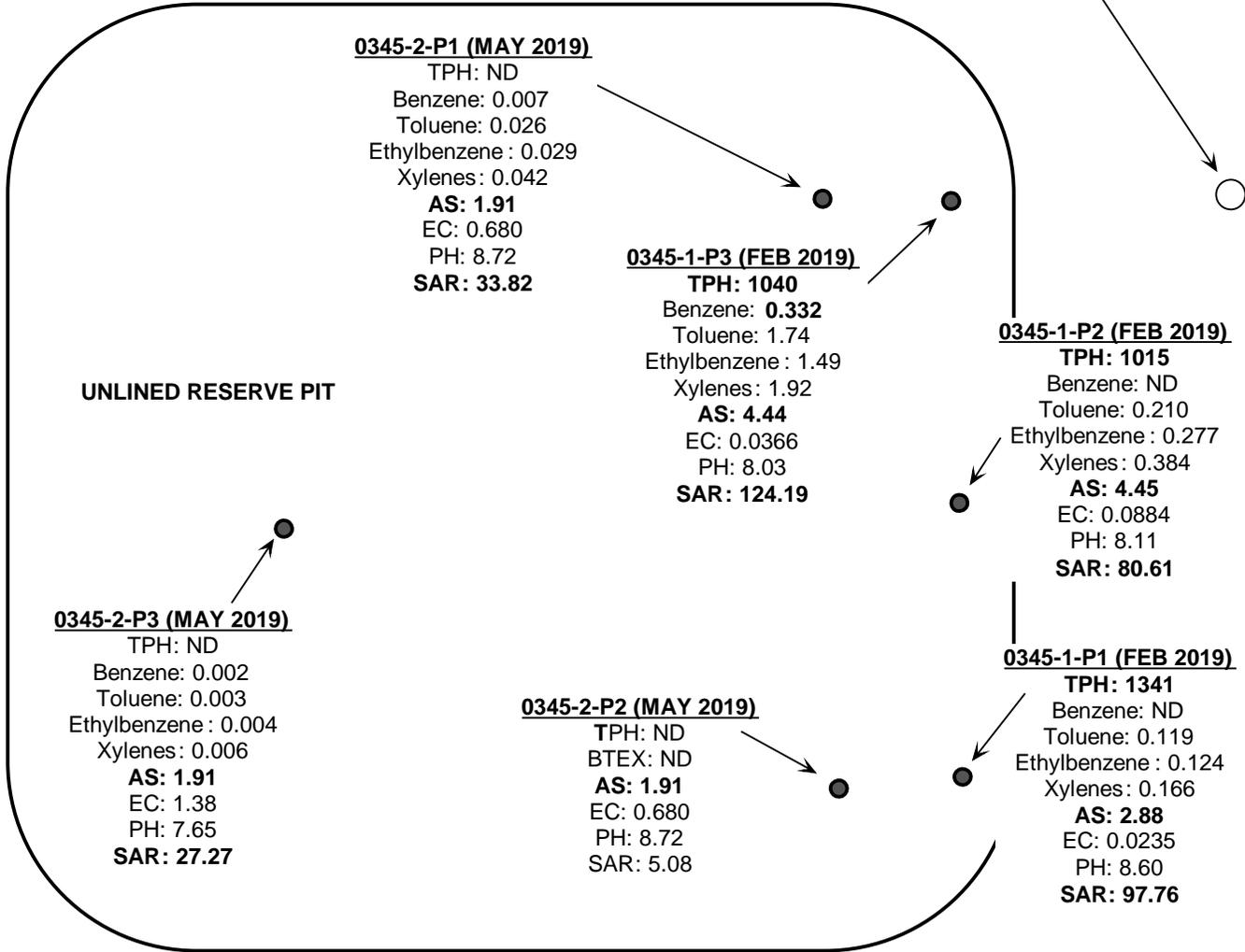
ATTACHMENT A
FIGURES





<p>A.G. WASSENAAR INC.</p> <p>GEOTECHNICAL · ENVIRONMENTAL CONSULTANTS</p>	
<p>DIXIE #1-5 WELL SITE LINCOLN COUNTY, COLORADO GRAND MESA OPERATING COMPANY</p>	<p>FIGURE 1 SITE TOPOGRAPHY AND LOCATION PROJECT: 180345</p>

APPROXIMATE LOCATION OF
DIXIE #1-5 WELL



LEGEND

- - SAMPLE LOCATION
- TPH- TOTAL PETROLEUM HYDROCARBONS
- B - BENZENE
- T - TOLUENE
- E - ETHYLBENZENE
- X - TOTAL XYLENE
- AS - ARSENIC
- EC - SPECIFIC CONDUCTIVITY
- SAR - SODIUM ADSORPTION RATIO
- ND - NOT DETECTED

NOTE: TPH, BTEX, AND ARSENIC CONCENTRATIONS ARE IN MILLIGRAMS PER KILOGRAM (mg/kg)
 EC CONCENTRATIONS ARE IN MILLIMHOS PER CENTIMETER
 VALUES IN BOLD ARE GREATER THAN THE RESPECTIVE COGCC TABLE 910-1 STANDARD
 ALL LOCATIONS ARE APPROXIMATE



A. G. WASSENAAR INC. <small>GEOTECHNICAL • ENVIRONMENTAL CONSULTANTS</small>	
DIXIE #1-5 WELL SITE LINCOLN COUNTY, COLORADO GRAND MESA OPERATING COMPANY	FIGURE 2 ANALYTICAL RESULTS FEB 15 & MAY 13, 2019 PROJECT #: 180345

ATTACHMENT B

LABORATORY REPORT





February 25, 2019

A.G. Wassenaar

Rachel Peterson

2180 South Ivanhoe Street - Suite 5

Denver

CO 80222

Project Name - Dixie #1-5

Project Number - 180345

Attached are your analytical results for Dixie #1-5 received by Origins Laboratory, Inc. February 18, 2019. This project is associated with Origins project number Y902235-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.
303.433.1322
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645

A.G. Wassenaar
2180 South Ivanhoe Street - Suite 5
Denver CO 80222

Rachel Peterson
Project Number: 180345
Project: Dixie #1-5

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
0345-BG	Y902235-01	Soil	February 15, 2019 17:00	02/18/2019 10:15
0345-1-P1	Y902235-02	Soil	February 15, 2019 15:40	02/18/2019 10:15
0345-1-P2	Y902235-03	Soil	February 15, 2019 15:55	02/18/2019 10:15
0345-1-P3	Y902235-04	Soil	February 15, 2019 16:10	02/18/2019 10:15

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Origins Laboratory

F-012207-01-R1
 Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: 1902235

Client: A.G. Wassenaar
 Client Project ID: Dixie #1-5

Checklist Completed by: JG
 Date/time completed: 2/18/2019

Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____ (Describe)

Cooler Number/Temperature: 1 / 4.4 °C _____ / _____ °C _____ / _____ °C _____ / _____ °C

Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO ₃ , HCL, H ₂ SO ₄) / (pH >10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)		<input checked="" type="checkbox"/>		
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) JG

Date/Time Reviewed 2/19/19

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-BG

2/15/2019 5:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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AAL, Inc.
Y902235-01 (Soil)

Metals (Saturated Paste Prep)

Calcium	1.24		me/L	1	'[none]'		02/19/2019	02/22/2019	
Magnesium	0.23		"	"	"		"	"	
Sodium	0.56		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	9.70		pH Units	1	B9B1807	OLAB	02/18/2019	02/18/2019	
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SAR by 20B Saturated Paste

SAR	0.65			1	'[none]'		02/19/2019	02/22/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	2.44	0.00500	mmhos/cm	1	B9B1808	OLAB	02/18/2019	02/19/2019	
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Total Metals by 6010C

Arsenic	3.21	3.02	mg/kg dry	1	1850579	TXT1	02/19/2019	02/20/2019	
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Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P1

2/15/2019 3:40:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-02 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.050	mg/kg	25	B9B1805	KDK	02/18/2019	02/20/2019	Ua
Toluene	0.119	0.050	"	"	"	KDK	"	"	
Ethylbenzene	0.124	0.050	"	"	"	KDK	"	"	
Xylenes, total	0.166	0.050	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	84.3 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	95.6 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	96.4 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	1.37		me/L	1	'[none]'		02/19/2019	02/22/2019	
Magnesium	0.58		"	"	"		"	"	
Sodium	96.53		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	8.60		pH Units	1	B9B1807	OLAB	02/18/2019	02/18/2019	
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SAR by 20B Saturated Paste

SAR	97.76			1	'[none]'		02/19/2019	02/22/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0235	0.00500	mmhos/cm	1	B9B1808	OLAB	02/18/2019	02/19/2019	
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Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P1

2/15/2019 3:40:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-02 (Soil)

Total Metals by 6010C

Arsenic	2.88	6.21	mg/kg dry	1	1850579	TXT1	02/19/2019	02/20/2019	J
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	151	50.0	mg/kg	1	B9B1806	JTD	02/18/2019	02/18/2019	
Diesel (C10-C28)	1190	50.0	"	"	"	JTD	"	"	
Residual Range Organics (C28-C40)	3320	200	"	"	"	JTD	"	"	

Surrogate: o-Terphenyl	90.9 %	65-146			"	"	"	"	
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Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P2

2/15/2019 3:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-03 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.050	mg/kg	25	B9B1805	KDK	02/18/2019	02/20/2019	Ua
Toluene	0.210	0.050	"	"	"	KDK	"	"	
Ethylbenzene	0.277	0.050	"	"	"	KDK	"	"	
Xylenes, total	0.384	0.050	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	81.9 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	96.8 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	97.2 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	1.26		me/L	1	'[none]'		02/19/2019	02/22/2019	
Magnesium	0.85		"	"	"		"	"	
Sodium	82.80		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	8.11		pH Units	1	B9B1807	OLAB	02/18/2019	02/18/2019	
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SAR by 20B Saturated Paste

SAR	80.61			1	'[none]'		02/19/2019	02/22/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0884	0.00500	mmhos/cm	1	B9B1808	OLAB	02/18/2019	02/19/2019	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P2

2/15/2019 3:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-03 (Soil)

Total Metals by 6010C

Arsenic	4.45	5.98	mg/kg dry	1	1850579	TXT1	02/19/2019	02/20/2019	J
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	162	50.0	mg/kg	1	B9B1806	JTD	02/18/2019	02/18/2019	
Diesel (C10-C28)	853	50.0	"	"	"	JTD	"	"	
Residual Range Organics (C28-C40)	1290	200	"	"	"	JTD	"	"	

Surrogate: o-Terphenyl	84.8 %	65-146			"	"	"	"	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P3

2/15/2019 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-04 (Soil)

BTEX by EPA 8260C

Benzene	0.332	0.050	mg/kg	25	B9B1805	KDK	02/18/2019	02/20/2019	
Toluene	1.74	0.050	"	"	"	KDK	"	"	
Ethylbenzene	1.49	0.050	"	"	"	KDK	"	"	
Xylenes, total	1.92	0.050	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	84.9 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	97.9 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	100 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	1.46		me/L	1	'[none]'		02/19/2019	02/22/2019	
Magnesium	1.29		"	"	"		"	"	
Sodium	145.63		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	8.03		pH Units	1	B9B1807	OLAB	02/18/2019	02/18/2019	
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SAR by 20B Saturated Paste

SAR	124.19			1	'[none]'		02/19/2019	02/22/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0366	0.00501	mmhos/cm	1	B9B1808	OLAB	02/18/2019	02/19/2019	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

0345-1-P3

2/15/2019 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y902235-04 (Soil)

Total Metals by 6010C

Arsenic	4.44	6.07	mg/kg dry	1	1850579	TXT1	02/19/2019	02/20/2019	J
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	461	50.0	mg/kg	1	B9B1806	JTD	02/18/2019	02/18/2019	
Diesel (C10-C28)	1040	50.0	"	"	"	JTD	"	"	
Residual Range Organics (C28-C40)	392	200	"	"	"	JTD	"	"	

Surrogate: o-Terphenyl	90.2 %	65-146			"	"	"	"	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9B1805 - EPA 5030 (soil)

Blank (B9B1805-BLK1)

Prepared: 02/18/2019 Analyzed: 02/18/2019

Benzene	ND	0.002	mg/kg							Ua
Toluene	ND	0.002	"							Ua
Ethylbenzene	ND	0.002	"							Ua
Xylenes, total	ND	0.002	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	0.13		"	0.125	101		70-130			
<i>Surrogate: Toluene-d8</i>	0.12		"	0.125	98.2		70-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	0.12		"	0.125	99.1		70-130			

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9B1805 - EPA 5030 (soil)

LCS (B9B1805-BS1)

Prepared: 02/18/2019 Analyzed: 02/18/2019

Benzene	0.105	0.002	mg/kg	0.100		105	77.1-124			
Toluene	0.105	0.002	"	0.100		105	74.5-128			
Ethylbenzene	0.099	0.002	"	0.100		98.6	66.4-127			
m,p-Xylene	0.213	0.004	"	0.200		107	76.6-124			
o-Xylene	0.097	0.002	"	0.100		97.4	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		98.8	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		100	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	70-130			

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9B1805 - EPA 5030 (soil)

Matrix Spike (B9B1805-MS1)	Source: Y902220-01			Prepared: 02/18/2019 Analyzed: 02/18/2019						
Benzene	0.091	0.002	mg/kg	0.100	ND	90.6	71.8-126			
Toluene	0.089	0.002	"	0.100	ND	88.6	65.1-130			
Ethylbenzene	0.084	0.002	"	0.100	ND	83.6	62.2-130			
m,p-Xylene	0.178	0.004	"	0.200	ND	88.9	46.5-137			
o-Xylene	0.084	0.002	"	0.100	ND	83.8	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		102	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		99.7	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		107	70-130			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9B1805 - EPA 5030 (soil)

Matrix Spike Dup (B9B1805-MSD1)	Source: Y902220-01			Prepared: 02/18/2019 Analyzed: 02/18/2019						
Benzene	0.097	0.002	mg/kg	0.100	ND	97.5	71.8-126	7.27	11.3	
Toluene	0.091	0.002	"	0.100	ND	90.5	65.1-130	2.14	15.4	
Ethylbenzene	0.080	0.002	"	0.100	ND	79.6	62.2-130	4.88	19.6	
m,p-Xylene	0.168	0.004	"	0.200	ND	84.1	46.5-137	5.50	19.2	
o-Xylene	0.080	0.002	"	0.100	ND	79.6	54.2-134	5.21	17.9	
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		105	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		96.9	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	70-130			

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Extractable Petroleum Hydrocarbons by 8015C - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9B1806 - EPA 3580

Blank (B9B1806-BLK1)

Prepared: 02/18/2019 Analyzed: 02/18/2019

Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Residual Range Organics (C28-C40)	ND	200	"							Ua

Surrogate: o-Terphenyl

39.2

"

50.0

78.4

65-146

LCS (B9B1806-BS1)

Prepared: 02/18/2019 Analyzed: 02/18/2019

Gasoline (C6-C10)	1010	50.0	mg/kg	1000		101	66.7-119			
Diesel (C10-C28)	1010	50.0	"	1000		101	70.1-127			
Residual Range Organics (C28-C40)	996	200	"	1000		99.6	54.5-139			

Surrogate: o-Terphenyl

51.9

"

50.0

104

65-146

Matrix Spike (B9B1806-MS1)

Source: Y902220-01

Prepared: 02/18/2019 Analyzed: 02/18/2019

Gasoline (C6-C10)	835	50.0	mg/kg	1000	ND	83.5	56.4-132			
Diesel (C10-C28)	820	50.0	"	1000	ND	82.0	57.4-138			
Residual Range Organics (C28-C40)	935	200	"	1000	85.4	84.9	47.7-129			

Surrogate: o-Terphenyl

43.0

"

50.0

86.0

65-146

Matrix Spike Dup (B9B1806-MSD1)

Source: Y902220-01

Prepared: 02/18/2019 Analyzed: 02/18/2019

Gasoline (C6-C10)	885	50.0	mg/kg	1000	ND	88.5	56.4-132	5.86	22	
Diesel (C10-C28)	863	50.0	"	1000	ND	86.3	57.4-138	5.16	18.3	
Residual Range Organics (C28-C40)	932	200	"	1000	85.4	84.7	47.7-129	0.253	30.1	

Surrogate: o-Terphenyl

42.9

"

50.0

85.9

65-146

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Classical Chemistry Parameters - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B9B1807 - NO PREP										
Duplicate (B9B1807-DUP1)		Source: Y902228-02			Prepared: 02/18/2019 Analyzed: 02/19/2019					
pH	7.24		pH Units		7.42			2.46	25	
Batch B9B1808 - NO PREP										
Blank (B9B1808-BLK1)		Prepared: 02/18/2019 Analyzed: 02/19/2019								
Specific Conductance (EC)	0.00200	0.00500	mmhos/cm							
Duplicate (B9B1808-DUP1)		Source: Y902228-02			Prepared: 02/18/2019 Analyzed: 02/19/2019					
Specific Conductance (EC)	0.0170	0.00506	mmhos/cm		0.0150			12.5	25	

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: Dixie #1-5

Total Metals by 6010C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1850579 - SW846 3050B										
BLANK (1204222372-BLK)					Prepared: 02/19/2019 Analyzed: 02/20/2019					
Arsenic	ND	2.98	mg/kg				-			U
LCS (1204222373-BKS)					Prepared: 02/19/2019 Analyzed: 02/20/2019					
Arsenic	45.8	2.99	mg/kg	49.8		92	80-120			
DUP (1204222374 D)					Prepared: 02/19/2019 Analyzed: 02/20/2019					
		Source: 471597001								
Arsenic	1.57	2.90	mg/kg dry		2.12		0-20	29.7	20	J
MS (1204222375 S)					Prepared: 02/19/2019 Analyzed: 02/20/2019					
		Source: 471597001								
Arsenic	44.6	2.82	mg/kg dry	47.1	2.12	90.2	75-125			

Origins Laboratory, Inc.



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A.G. Wassenaar
2180 South Ivanhoe Street - Suite 5
Denver CO 80222

Rachel Peterson
Project Number: 180345
Project: Dixie #1-5

Notes and Definitions

- Ua Sample is Non-Detect.
- U Result not detected above the detection limit
- J Greater than the detection limit but less than the reporting limit
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

May 17, 2019

A.G. Wassenaar

Rachel Peterson

2180 South Ivanhoe Street - Suite 5

Denver

CO 80222

Project Name - 180345 Dixie-1-5

Project Number - 180345

Attached are your analytical results for 180345 Dixie-1-5 received by Origins Laboratory, Inc. May 14, 2019. This project is associated with Origins project number Y905199-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.
303.433.1322
o-squad@oelabinc.com



A.G. Wassenaar
2180 South Ivanhoe Street - Suite 5
Denver CO 80222

Rachel Peterson
Project Number: 180345
Project: 180345 Dixie-1-5

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
0345-2-P1	Y905199-01	Soil	May 13, 2019 13:50	05/14/2019 08:27
0345-2-P2	Y905199-02	Soil	May 13, 2019 14:00	05/14/2019 08:27
0345-2-P3	Y905199-03	Soil	May 13, 2019 14:05	05/14/2019 08:27

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Origins Laboratory

F-012207-01-R1
 Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: Y905199

Client: A.G. Wassenaar
 Client Project ID: 180345 Dixie 1-5

Checklist Completed by: JG
 Date/time completed: 5/14/2019

Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

Matrix(s) Received: (Check all that apply): Soil/Solid _____ Water _____ Other: _____
 Cooler Number/Temperature: 1 / 3.8 °C _____ °C _____ °C _____ °C
 Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.			<input checked="" type="checkbox"/>	
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH <2 for samples preserved with HNO ₃ , HCl, H ₂ SO ₄) / (pH >10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) JG

Date/Time Reviewed 5/15/19

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P1

5/13/2019 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y905199-01 (Soil)

BTEX by EPA 8260D

Benzene	0.007	0.002	mg/kg	1	B9E1411	KDK	05/14/2019	05/16/2019	
Toluene	0.026	0.002	"	"	"	KDK	"	"	
Ethylbenzene	0.029	0.002	"	"	"	KDK	"	"	
Xylenes, total	0.042	0.002	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	103 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	96.8 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	107 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	8.39		me/L	1	'[none]'		05/15/2019	05/17/2019	
Magnesium	2.65		"	"	"		"	"	
Sodium	79.46		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	8.72		pH Units	1	B9E1406	OLAB	05/14/2019	05/14/2019	
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SAR by 20B Saturated Paste

SAR	33.82			1	'[none]'		05/15/2019	05/17/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.680	0.00501	mmhos/cm	1	B9E1407	OLAB	05/14/2019	05/14/2019	
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Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P1

5/13/2019 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y905199-01 (Soil)

Total Metals by 6010C

Arsenic	1.91	3.38	mg/kg dry	1	1877377	LS	05/16/2019	05/17/2019	J
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TPH-Carbon Chain by EPA 8015D

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B9E1409	JTD	05/14/2019	05/15/2019	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	JTD	"	"	Ua
Residual Range Organics (C28-C40)	ND	200	"	"	"	JTD	"	"	Ua
Surrogate: o-Terphenyl	106 %	50-150			"	"	"	"	

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P2

5/13/2019 2:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y905199-02 (Soil)

BTEX by EPA 8260D

Benzene	ND	0.002	mg/kg	1	B9E1411	KDK	05/14/2019	05/16/2019	Ua
Toluene	ND	0.002	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	0.002	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	0.002	"	"	"	KDK	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	104 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	96.8 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	103 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	24.71		me/L	1	'[none]'		05/15/2019	05/17/2019	
Magnesium	6.11		"	"	"		"	"	
Sodium	19.94		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	8.06		pH Units	1	B9E1406	OLAB	05/14/2019	05/14/2019	
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SAR by 20B Saturated Paste

SAR	5.08			1	'[none]'		05/15/2019	05/17/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0598	0.00501	mmhos/cm	1	B9E1407	OLAB	05/14/2019	05/14/2019	
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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P2

5/13/2019 2:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y905199-02 (Soil)

Total Metals by 6010C

Arsenic	1.82	3.07	mg/kg dry	1	1877377	LS	05/16/2019	05/17/2019	J
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TPH-Carbon Chain by EPA 8015D

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B9E1409	JTD	05/14/2019	05/15/2019	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	JTD	"	"	Ua
Residual Range Organics (C28-C40)	ND	200	"	"	"	JTD	"	"	Ua
Surrogate: o-Terphenyl	103 %	50-150			"	"	"	"	

Origins Laboratory, Inc.



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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P3

5/13/2019 2:05:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y905199-03 (Soil)

BTEX by EPA 8260D

Benzene	0.002	0.002	mg/kg	1	B9E1411	KDK	05/14/2019	05/16/2019	
Toluene	0.003	0.002	"	"	"	KDK	"	"	
Ethylbenzene	0.004	0.002	"	"	"	KDK	"	"	
Xylenes, total	0.006	0.002	"	"	"	KDK	"	"	

Surrogate: 1,2-Dichloroethane-d4	105 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	97.4 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	109 %	70-130			"	"	"	"	

Metals (Saturated Paste Prep)

Calcium	23.96		me/L	1	'[none]'		05/15/2019	05/17/2019	
Magnesium	7.19		"	"	"		"	"	
Sodium	107.61		"	"	"		"	"	

pH in Soil by EPA 9045D

pH	7.65		pH Units	1	B9E1406	OLAB	05/14/2019	05/14/2019	
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SAR by 20B Saturated Paste

SAR	27.27			1	'[none]'		05/15/2019	05/17/2019	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1.38	0.00500	mmhos/cm	1	B9E1407	OLAB	05/14/2019	05/14/2019	
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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

0345-2-P3

5/13/2019 2:05:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
 Y905199-03 (Soil)

Total Metals by 6010C

Arsenic	1.91	3.54	mg/kg dry	1	1877377	LS	05/16/2019	05/17/2019	J
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TPH-Carbon Chain by EPA 8015D

Gasoline (C6-C10)	ND	50.0	mg/kg	1	B9E1409	JTD	05/14/2019	05/15/2019	Ua
Diesel (C10-C28)	ND	50.0	"	"	"	JTD	"	"	Ua
Residual Range Organics (C28-C40)	ND	200	"	"	"	JTD	"	"	Ua

Surrogate: o-Terphenyl	102 %	50-150			"	"	"	"	
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A.G. Wassenaar
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 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B9E1409 - EPA 3580										
Blank (B9E1409-BLK1)										
					Prepared: 05/14/2019 Analyzed: 05/14/2019					
Gasoline (C6-C10)	ND	50.0	mg/kg							Ua
Diesel (C10-C28)	ND	50.0	"							Ua
Residual Range Organics (C28-C40)	ND	200	"							Ua
Surrogate: o-Terphenyl	50.5		"	50.0		101	50-150			

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 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1409 - EPA 3580

LCS (B9E1409-BS1)

Prepared: 05/14/2019 Analyzed: 05/14/2019

Gasoline (C6-C10)	1070	50.0	mg/kg	1000		107	70-130			
Diesel (C10-C28)	1070	50.0	"	1000		107	70-130			
Residual Range Organics (C28-C40)	1060	200	"	1000		106	70-130			
Surrogate: o-Terphenyl	60.4		"	50.0		121	50-150			

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Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1409 - EPA 3580

Matrix Spike (B9E1409-MS1)	Source: Y905208-01			Prepared: 05/14/2019 Analyzed: 05/14/2019						
Gasoline (C6-C10)	859	50.0	mg/kg	1000	ND	85.9	70-130			
Diesel (C10-C28)	860	50.0	"	1000	ND	86.0	70-130			
Residual Range Organics (C28-C40)	817	200	"	1000	ND	81.7	70-130			
Surrogate: o-Terphenyl	47.5		"	50.0		95.1	50-150			

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 2180 South Ivanhoe Street - Suite 5
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Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1409 - EPA 3580

Matrix Spike Dup (B9E1409-MSD1)	Source: Y905208-01			Prepared: 05/14/2019 Analyzed: 05/14/2019						
Gasoline (C6-C10)	1100	50.0	mg/kg	1000	ND	110	70-130	24.2	35	
Diesel (C10-C28)	1100	50.0	"	1000	ND	110	70-130	24.3	35	
Residual Range Organics (C28-C40)	1070	200	"	1000	ND	107	70-130	26.9	35	
Surrogate: o-Terphenyl	59.5		"	50.0		119	50-150			

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Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Extractable Petroleum Hydrocarbons by 8015D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1411 - EPA 5030 (soil)

Blank (B9E1411-BLK1)

Prepared: 05/14/2019 Analyzed: 05/14/2019

Benzene	ND	0.002	mg/kg							Ua
Toluene	ND	0.002	"							Ua
Ethylbenzene	ND	0.002	"							Ua
Xylenes, total	ND	0.002	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.12</i>		<i>"</i>	<i>0.125</i>		<i>96.2</i>	<i>70-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.12</i>		<i>"</i>	<i>0.125</i>		<i>99.5</i>	<i>70-130</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.13</i>		<i>"</i>	<i>0.125</i>		<i>106</i>	<i>70-130</i>			

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A.G. Wassenaar
 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1411 - EPA 5030 (soil)

LCS (B9E1411-BS1)

Prepared: 05/14/2019 Analyzed: 05/14/2019

Benzene	0.117	0.002	mg/kg	0.100		117	70-130			
Toluene	0.110	0.002	"	0.100		110	70-130			
Ethylbenzene	0.117	0.002	"	0.100		117	70-130			
m,p-Xylene	0.187	0.004	"	0.200		93.3	70-130			
o-Xylene	0.104	0.002	"	0.100		104	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		99.9	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		100	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

Origins Laboratory, Inc.



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 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1411 - EPA 5030 (soil)

Matrix Spike (B9E1411-MS1)	Source: Y905196-05			Prepared: 05/14/2019 Analyzed: 05/15/2019						
Benzene	0.087	0.002	mg/kg	0.100	ND	87.0	70-130			
Toluene	0.092	0.002	"	0.100	ND	92.1	70-130			
Ethylbenzene	0.097	0.002	"	0.100	ND	96.6	70-130			
m,p-Xylene	0.151	0.004	"	0.200	ND	75.6	70-130			
o-Xylene	0.086	0.002	"	0.100	0.001	85.2	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		96.0	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		102	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

Origins Laboratory, Inc.



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 2180 South Ivanhoe Street - Suite 5
 Denver CO 80222

Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B9E1411 - EPA 5030 (soil)

Matrix Spike Dup (B9E1411-MSD1)	Source: Y905196-05			Prepared: 05/14/2019 Analyzed: 05/15/2019						
Benzene	0.084	0.002	mg/kg	0.100	ND	83.6	70-130	3.94	20	
Toluene	0.088	0.002	"	0.100	ND	87.6	70-130	4.99	20	
Ethylbenzene	0.093	0.002	"	0.100	ND	92.7	70-130	4.18	20	
m,p-Xylene	0.145	0.004	"	0.200	ND	72.4	70-130	4.38	20	
o-Xylene	0.084	0.002	"	0.100	0.001	83.0	70-130	2.58	20	
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		94.7	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		101	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	70-130			

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 2180 South Ivanhoe Street - Suite 5
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Rachel Peterson
 Project Number: 180345
 Project: 180345 Dixie-1-5

Total Metals by 6010C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1877377 - SW846 3050B										
BLANK (1204284834-BLK)					Prepared: 05/16/2019 Analyzed: 05/17/2019					
Arsenic	ND	2.88	mg/kg				-			U
LCS (1204284835-BKS)					Prepared: 05/16/2019 Analyzed: 05/17/2019					
Arsenic	39.0	2.76	mg/kg	46.0		84.7	80-120			
DUP (1204284836 D)					Prepared: 05/16/2019 Analyzed: 05/17/2019					
		Source: 479167001								
Arsenic	2.99	3.59	mg/kg dry		4.87		0-20	47.9	20	J
MS (1204284837 S)					Prepared: 05/16/2019 Analyzed: 05/17/2019					
		Source: 479167001								
Arsenic	51.3	3.57	mg/kg dry	59.6	4.87	78	75-125			

Origins Laboratory, Inc.



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2180 South Ivanhoe Street - Suite 5
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Rachel Peterson
Project Number: 180345
Project: 180345 Dixie-1-5

Notes and Definitions

- Ua Sample is Non-Detect.
- U Result not detected above the detection limit
- J Greater than the detection limit but less than the reporting limit
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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