

August 9, 2016

Extraction Oil and Gas, LLC
370 17th Street, Suite 5300
Denver, Colorado 80202

Attention: Josh Carlisle, Environmental Supervisor

Subject: Soil Sampling
Waag Middle SENW/Pad #1, Facility ID: 439215
Weld County, Colorado
Project Number 162486.EC

Mr. Carlisle,

As requested, A.G. Wassenaar, Inc. (AGW) has completed soil sampling at the Waag Middle facility in Weld County, Colorado. This letter summarizes the project activities and analytical results.

BACKGROUND

On A. G. Wassenaar, Inc. (AGW) conducted soil sampling at the Waag Middle facility in Weld County, Colorado. The site is located in the southeast $\frac{1}{4}$ of the northwest $\frac{1}{4}$ of Section 19, Township 7 North, Range 65 West in Weld County, Colorado. Figure 1 in Attachment B depicts the location of the site.

The site is a well pad that contains ten completed wellheads. On May 20, 2016, approximately 10 barrels of oil were released onto the ground surface while a workover rig was on the site. The spill was immediately contained and cleaned up on the day of discovery. The impacted area was initially estimated to extend 75 feet long by 10 feet wide; however, site visits and field interviews confirmed the impacted area to be 40 feet long by 10 feet wide.

On behalf of Extraction, AGW notified the Colorado Oil and Gas Conservation Commission (COGCC), Weld County, and the surface owner of the release on May 20 and May 23, 2016. A Form 19 Spill/Release Report was submitted on May 23, 2016. Supplemental Spill/Release reports were submitted on May 30 and June 9, 2016. Copies of all COGCC forms and notifications are included in Attachment A.

Following the June 9, 2016 request for closure, the COGCC requested confirmation soil sampling be conducted. On July 14, 2016, AGW completed soil sampling at the Waag Middle facility to determine the effectiveness of the cleanup. Details regarding the project methods along with a summary of the field results, laboratory results, and conclusions are presented below.

METHODS AND RESULTS

Health and Safety Plan Development

AGW created a site specific Health and Safety Plan for activities conducted by AGW employees at the site. The plan called for level D (lowest threat level) protection based on the anticipated chemicals of concern and their potential concentrations.

Soil Field Screening and Sampling Methods

On July 14, 2016, AGW collected two soil samples from the area of the spill using a clean metal hand shovel.

A portion of each soil sample was transferred into a sealable plastic bag for field evaluation and screening with a photoionization detector (PID). PID screening detects volatile organic compounds (VOCs) with an ionization potential of 10.6 electron volts (eV) or less, including many compounds found in petroleum. While the PID provides a semi-quantitative measurement, the instrument is a tool that provides more of a qualitative analysis of potential impacts from volatile hydrocarbons. Elevated soil moisture, humidity, and variations in contaminant composition, temperature, and soil type can affect the PID results. AGW accomplished the PID screening by inserting the PID probe into the individual sealed sample bags and recording the instrument response.

During this project, AGW followed sampling procedures, equipment decontamination methods, and chain-of-custody procedures in general accordance with U. S. Environmental Protection Agency (EPA) guidelines. On the day of collection, select soil samples were submitted to Origins Laboratory, Inc. (Origins) in Denver, Colorado for analysis.

Soil Analytical Methods

The soil samples were submitted for laboratory analysis of gasoline range organics (GRO), diesel range organics (DRO), oil range organics (ORO), and benzene, toluene, ethylbenzene, and total xylenes (BTEX). The GRO and DRO values were added together to obtain the total petroleum hydrocarbon (TPH) concentration for comparison to the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 TPH concentration.

Soil Analytical Results

The July 14, 2016 soil sample results are included in Table 1, below and are depicted on Figure 2 in Attachment B. The laboratory analytical report is included in Attachment C.

**Table 1:
Waag Middle Soil Analytical Results
July 14, 2016**

Sample	Depth (feet)	PID Result (ppm)	DRO	GRO	ORO	TPH	Benzene	Toluene	Ethyl-benzene	Xylenes
486-1	4 inches	0.0	ND	ND	ND	ND	ND	ND	ND	ND
486-2	5 inches	0.0	ND	ND	ND	ND	ND	ND	ND	ND
COGCC Standards*						500	0.17	85	100	175

All concentrations are in mg/kg = Milligrams per kilogram (parts per million).

ND = Not detected above the laboratory Method Detection Limit

* Standards based on COGCC Table 910-1, effective January 30, 2015.

To evaluate the soil analytical results, AGW compared the identified concentrations to Table 910-1 Concentration Levels provided within COGCC 900 Series Rules for Exploration and Production Waste Management. Based on the July 14, 2016 results, both samples were non-detect for all analytes.

DISCUSSION AND CONCLUSIONS

On July 14, 2016, AGW conducted soil sampling at the Waag Middle facility in Weld County, Colorado, following a release of oil at the site. Based on analytical results, no soil impact from the spill remains at the site.

Thank you for your review of this report. 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.
Project Manager

deh/RAP/

Attachments

ATTACHMENT A

COGCC SPILL REPORTS AND NOTIFICATIONS



Rachel Peterson

From: Rachel Peterson
Sent: Friday, May 20, 2016 10:53 AM
To: 'Allison - DNR, Rick'; 'Troy Swain'
Cc: 'Josh Carlisle'; 'gmarquez@weldgov.com'
Subject: spill notification

This email serves as notification of a release at the Waag Middle SENW/Pad #1 facility (Location ID 439215) operated by Extraction Oil & Gas, LLC (Operator #10459). Approximately 10-15 barrels of oil were released onto the ground surface while a workover rig was on the site. The spill is being cleaned up today. Further documentation of the cleanup will be provided. A spill report will also be submitted for this spill within 72 hours.

The site is located in Weld County, in the SENW Section 19, Township 7N, Range 65W, 6th p.m.

Sincerely,
Rachel Peterson

Rachel Peterson, P.G.
A. G. Wassenaar, Inc.
2180 South Ivanhoe Street
Denver, Colorado 80222
office 303.759.8373
cell 303.981.0292
fax 303.759.4874

Please note my new email address: petersonr@agwco.com
[LinkedIn](#)

Information contained herein may be subject to failure or corruption during transmission. Final stamped and signed documents govern. Use of this data is solely at the user's risk. By accessing the data contained in these files the user agrees to indemnify, hold harmless and defend A. G. Wassenaar, Inc. and its employees, officers, and agents from any and all claims arising from the use of the data.

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:

401052095

Date Received:

05/23/2016

Spill report taken by:

ALLISON, RICK

Spill/Release Point ID:

445802

SPILL/RELEASE REPORT (INITIAL)

This form is to be submitted by the party responsible for the oil and gas spill or release. Any spill or release which may impact waters of the State must be reported as soon as practicable; any spill over 20 bbls must be reported within 24 hours and all spills over five bbls must be reported within ten days. Submit a Site Investigation and Remediation Workplan (Form 27) when requested by the Director.

OPERATOR INFORMATION

Name of Operator: <u>EXTRACTION OIL & GAS LLC</u>	Operator No: <u>10459</u>	Phone Numbers
Address: <u>370 17TH STREET SUITE 5300</u>		Phone: <u>(720) 481-2372</u>
City: <u>DENVER</u> State: <u>CO</u> Zip: <u>80202</u>		Mobile: <u>(303) 618-0003</u>
Contact Person: <u>Josh Carlisle</u>		Email: <u>jcarlisle@extractionog.com</u>

INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 401052095

Initial Report Date: 05/23/2016 Date of Discovery: 05/20/2016 Spill Type: Recent Spill

Spill/Release Point Location:

Location of Spill/Release: QTRQTR SENW SEC 19 TWP 7N RNG 65W MERIDIAN 6

Latitude: 40.561680 Longitude: -104.706960

Municipality (if within municipal boundaries): _____ County: WELD

Reference Location:

Facility Type: TANK BATTERY Facility/Location ID No 439215
 No Existing Facility or Location ID No.
 Well API No. (Only if the reference facility is well) 05- -

Fluid(s) Spilled/Released (please answer Yes/No):

Was one (1) barrel or more spilled outside of berms or secondary containment? Yes

Secondary containment, including walls & floor regardless of construction material, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.

Were Five (5) barrels or more spilled? Yes

Estimated Total Spill Volume: use same ranges as others for values

Estimated Oil Spill Volume(bbl): >=5 and <100 Estimated Condensate Spill Volume(bbl): 0

Estimated Flow Back Fluid Spill Volume(bbl): 0 Estimated Produced Water Spill Volume(bbl): 0

Estimated Other E&P Waste Spill Volume(bbl): 0 Estimated Drilling Fluid Spill Volume(bbl): 0

Specify: _____

Land Use:

Current Land Use: OTHER Other(Specify): well pad

Weather Condition: clear

Surface Owner: FEE Other(Specify): _____

Check if impacted or threatened by spill/Release (please answer Yes/No to all that apply):

Waters of the State Residence/Occupied Structure Livestock Public Byway Surface Water Supply Area

As defined in COGCC 100-Series Rules

Describe what is known about the spill/release event (what happened -- including how it was stopped, contained, and recovered):

Approximately 10-15 barrels of oil were released onto the ground surface while a workover rig was on the site. The spill was immediately contained and cleaned up. Further documentation of the cleanup will be provided.

List Agencies and Other Parties Notified:

OTHER NOTIFICATIONS

<u>Date</u>	<u>Agency/Party</u>	<u>Contact</u>	<u>Phone</u>	<u>Response</u>
5/20/2016	COGCC	Rick Allison	-	notified by email
5/20/2016	Weld County	Troy Swain	-	notified by email
5/23/2016	landowner	Darrell Waag	-	notified

OPERATOR COMMENTS:

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I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: _____ Print Name: Rachel A. Peterson

Title: Project Manager Date: 05/23/2016 Email: petersonr@agwassenaar.com

COA Type

Description

	A Form 19 Supplemental Report - Spill/Release Detail Report with an accompanying topographic map or aerial image is due within 10 days of the release discovery date (by May 30, 2016).
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Attachment Check List

Att Doc Num

Name

2615264	24 HOUR NOTIFICATION
401052095	SPILL/RELEASE REPORT(INITIAL)
401052264	FORM 19 SUBMITTED

Total Attach: 3 Files

General Comments

User Group

Comment

Comment Date

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Total: 0 comment(s)

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:

401056432

Date Received:

06/02/2016

Spill report taken by:

ALLISON, RICK

Spill/Release Point ID:

445802

SPILL/RELEASE REPORT (SUPPLEMENTAL)

This form is to be submitted by the party responsible for the oil and gas spill or release. Any spill or release which may impact waters of the State must be reported as soon as practicable; any spill over 20 bbls must be reported within 24 hours and all spills over five bbls must be reported within ten days. Submit a Site Investigation and Remediation Workplan (Form 27) when requested by the Director.

OPERATOR INFORMATION

Name of Operator: <u>EXTRACTION OIL & GAS LLC</u>	Operator No: <u>10459</u>	Phone Numbers
Address: <u>370 17TH STREET SUITE 5300</u>		Phone: <u>(720) 481-2372</u>
City: <u>DENVER</u> State: <u>CO</u> Zip: <u>80202</u>		Mobile: <u>(303) 618-0003</u>
Contact Person: <u>Josh Carlisle</u>		Email: <u>jcarlisle@extractionog.com</u>

INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 401052095

Initial Report Date: 05/23/2016 Date of Discovery: 05/20/2016 Spill Type: Recent Spill

Spill/Release Point Location:

Location of Spill/Release: QTRQTR SENW SEC 19 TWP 7N RNG 65W MERIDIAN 6

Latitude: 40.561680 Longitude: -104.706960

Municipality (if within municipal boundaries): _____ County: WELD

Reference Location:

Facility Type: TANK BATTERY Facility/Location ID No 439215
 No Existing Facility or Location ID No.
 Well API No. (Only if the reference facility is well) 05- -

Fluid(s) Spilled/Released (please answer Yes/No):

Was one (1) barrel or more spilled outside of berms or secondary containment? Yes

Secondary containment, including walls & floor regardless of construction material, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.

Were Five (5) barrels or more spilled? Yes

Estimated Total Spill Volume: use same ranges as others for values

Estimated Oil Spill Volume(bbl): >=5 and <100 Estimated Condensate Spill Volume(bbl): 0

Estimated Flow Back Fluid Spill Volume(bbl): 0 Estimated Produced Water Spill Volume(bbl): 0

Estimated Other E&P Waste Spill Volume(bbl): 0 Estimated Drilling Fluid Spill Volume(bbl): 0

Specify: _____

Land Use:

Current Land Use: OTHER Other(Specify): well pad

Weather Condition: clear

Surface Owner: FEE Other(Specify): _____

Check if impacted or threatened by spill/Release (please answer Yes/No to all that apply):

Waters of the State Residence/Occupied Structure Livestock Public Byway Surface Water Supply Area
As defined in COGCC 100-Series Rules

Describe what is known about the spill/release event (what happened -- including how it was stopped, contained, and recovered):

Approximately 10-15 barrels of oil were released onto the ground surface while a workover rig was on the site. The spill was immediately contained and cleaned up. Further documentation of the cleanup will be provided.

List Agencies and Other Parties Notified:

OTHER NOTIFICATIONS

Date	Agency/Party	Contact	Phone	Response
5/20/2016	COGCC	Rick Allison	-	notified by email
5/20/2016	Weld County	Troy Swain	-	notified by email
5/23/2016	landowner	Darrell Waag	-	notified

SPILL/RELEASE DETAIL REPORTS

#1 Supplemental Report Date: 05/30/2016

FLUIDS	BBL's SPILLED	BBL's RECOVERED	Unknown
OIL	10	10	<input type="checkbox"/>
CONDENSATE	0	0	<input type="checkbox"/>
PRODUCED WATER	0	0	<input type="checkbox"/>
DRILLING FLUID	0	0	<input type="checkbox"/>
FLOW BACK FLUID	0	0	<input type="checkbox"/>
OTHER E&P WASTE	0	0	<input type="checkbox"/>

specify: _____

Was spill/release completely contained within berms or secondary containment? NO Was an Emergency Pit constructed? NO

Secondary containment, including walls & floor regardless of construction material, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.

A Form 15 Pit Report shall be submitted within 30 calendar days after the construction of an emergency pit

Impacted Media (Check all that apply) Soil Groundwater Surface Water Dry Drainage Feature

Surface Area Impacted: Length of Impact (feet): 75 Width of Impact (feet): 10

Depth of Impact (feet BGS): 0 Depth of Impact (inches BGS): _____

How was extent determined?

Visual determination

Soil/Geology Description:

Kim Loam, 1 to 3 percent slopes

Depth to Groundwater (feet BGS) 25 Number Water Wells within 1/2 mile radius: 3

If less than 1 mile, distance in feet to nearest

Water Well	<u>965</u>	None <input type="checkbox"/>	Surface Water	<u>1490</u>	None <input type="checkbox"/>
Wetlands	<u>1490</u>	None <input type="checkbox"/>	Springs	_____	None <input checked="" type="checkbox"/>
Livestock	_____	None <input checked="" type="checkbox"/>	Occupied Building	_____	None <input checked="" type="checkbox"/>

Additional Spill Details Not Provided Above:

Spill occurred from an overflow tank on the workover rig. Flow to the tank was immediately shut off and a vacuum truck was used to recover the spilled oil. All impacted soils were hauled offsite.

REQUEST FOR CLOSURE

Spill/Release Reports should be closed when impacts have been remediated or when further investigation and corrective actions will take place under an approved Form 27.

Basis for Closure: Corrective Actions Completed (documentation attached)

Work proceeding under an approved Form 27

Form 27 Remediation Project No: _____

OPERATOR COMMENTS:

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: _____ Print Name: Rachel Peterson

Title: Project Manager Date: 06/02/2016 Email: petersonr@agwassenaar.com

COA Type

Description

COA Type	Description

Attachment Check List

Att Doc Num

Name

401056432	SPILL/RELEASE REPORT(SUPPLEMENTAL)
401057285	TOPOGRAPHIC MAP
401059045	FORM 19 SUBMITTED

Total Attach: 3 Files

General Comments

User Group

Comment

Comment Date

Environmental	The Operator has attached the required Topographic Map.	3/7/2016 8:00:18 AM
Environmental	Form 19 Supplemental Report was first received on June 1, 2016. COGCC returned the Form 19 to Draft status on June 2, 2016 for the Operator to attach the aerial image or topographic map required by Rule 906.b.	3/2/2016 8:51:25 AM

Total: 2 comment(s)

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109



Document Number:

401060732

Date Received:

06/09/2016

Spill report taken by:

ALLISON, RICK

Spill/Release Point ID:

445802

SPILL/RELEASE REPORT (SUPPLEMENTAL)

This form is to be submitted by the party responsible for the oil and gas spill or release. Any spill or release which may impact waters of the State must be reported as soon as practicable; any spill over 20 bbls must be reported within 24 hours and all spills over five bbls must be reported within ten days. Submit a Site Investigation and Remediation Workplan (Form 27) when requested by the Director.

OPERATOR INFORMATION

Name of Operator: <u>EXTRACTION OIL & GAS LLC</u>	Operator No: <u>10459</u>	Phone Numbers Phone: <u>(720) 481-2372</u> Mobile: <u>(303) 618-0003</u> Email: <u>jcarlisle@extractionog.com</u>
Address: <u>370 17TH STREET SUITE 5300</u>		
City: <u>DENVER</u>	State: <u>CO</u> Zip: <u>80202</u>	
Contact Person: <u>Josh Carlisle</u>		

INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 401052095

Initial Report Date: 05/23/2016 Date of Discovery: 05/20/2016 Spill Type: Recent Spill

Spill/Release Point Location:

Location of Spill/Release: QTRQTR SENW SEC 19 TWP 7N RNG 65W MERIDIAN 6

Latitude: 40.561680 Longitude: -104.706960

Municipality (if within municipal boundaries): _____ County: WELD

Reference Location:

Facility Type: TANK BATTERY Facility/Location ID No 439215
 No Existing Facility or Location ID No.
 Well API No. (Only if the reference facility is well) 05- -

Fluid(s) Spilled/Released (please answer Yes/No):

Was one (1) barrel or more spilled outside of berms or secondary containment? Yes

Secondary containment, including walls & floor regardless of construction material, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.

Were Five (5) barrels or more spilled? Yes

Estimated Total Spill Volume: use same ranges as others for values

Estimated Oil Spill Volume(bbl): >=5 and <100 Estimated Condensate Spill Volume(bbl): 0

Estimated Flow Back Fluid Spill Volume(bbl): 0 Estimated Produced Water Spill Volume(bbl): 0

Estimated Other E&P Waste Spill Volume(bbl): 0 Estimated Drilling Fluid Spill Volume(bbl): 0

Specify: _____

Land Use:

Current Land Use: OTHER Other(Specify): well pad

Weather Condition: clear

Surface Owner: FEE Other(Specify): _____

Check if impacted or threatened by spill/Release (please answer Yes/No to all that apply):

Waters of the State Residence/Occupied Structure Livestock Public Byway Surface Water Supply Area
As defined in COGCC 100-Series Rules

Describe what is known about the spill/release event (what happened -- including how it was stopped, contained, and recovered):

Approximately 10-15 barrels of oil were released onto the ground surface while a workover rig was on the site. The spill was immediately contained and cleaned up. Further documentation of the cleanup will be provided.

List Agencies and Other Parties Notified:

OTHER NOTIFICATIONS

Date	Agency/Party	Contact	Phone	Response
5/20/2016	COGCC	Rick Allison	-	notified by email
5/20/2016	Weld County	Troy Swain	-	notified by email
5/23/2016	landowner	Darrell Waag	-	notified

CORRECTIVE ACTIONS

#1 Supplemental Report Date: 06/09/2016

Cause of Spill (Check all that apply) Human Error Equipment Failure Historical-Unknown
 Other (specify) _____

Describe Incident & Root Cause (include specific equipment and point of failure)

Spill occurred from an overflow tank on the workover rig; tank was overfilled during equalizing of tanks. Flow to the tank was immediately shut off and a vacuum truck was used to clean up all spilled oil. Additional soil from the location of the spill was excavated and hauled offsite for disposal.

Describe measures taken to prevent the problem(s) from reoccurring:

Effective immediately; secondary containment under all tanks used to store oil associated with workover rigs.

Volume of Soil Excavated (cubic yards): 18

Disposition of Excavated Soil (attach documentation) Offsite Disposal Onsite Treatment
 Other (specify) _____

Volume of Impacted Ground Water Removed (bbls): 0

Volume of Impacted Surface Water Removed (bbls): 0

REQUEST FOR CLOSURE

Spill/Release Reports should be closed when impacts have been remediated or when further investigation and corrective actions will take place under an approved Form 27.

Basis for Closure: Corrective Actions Completed (documentation attached)

Work proceeding under an approved Form 27

Form 27 Remediation Project No: _____

OPERATOR COMMENTS:

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: _____ Print Name: Rachel A. Peterson

Title: Project Manager Date: 06/09/2016 Email: petersonr@agwassenaar.com

COA Type**Description**

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Attachment Check List**Att Doc Num****Name**

401060732	SPILL/RELEASE REPORT(SUPPLEMENTAL)
401060750	OTHER
401066262	FORM 19 SUBMITTED

Total Attach: 3 Files

General Comments**User Group****Comment****Comment Date**

Environmental	<p>COGCC Environmental Staff removed the Request for Closure. Although pictures showing the pad after excavation were supplied, no confirmation soil samples documenting compliance with Table 910-1 Concentration Levels were submitted. Therefore, closure cannot be granted at this time.</p> <p>The Operator is directed to submit a new Form 19 Supplemental Report that includes a site diagram illustrating the release extent and laboratory analytical data showing compliance of the remaining soil with Table 910-1. The number and location of soil samples should be based on the size of the area impacted. Since this was a crude oil spill, confirmation soil samples must be analyzed for TPH-DRO, TPH-GRO and BTEX.</p> <p>Staff emailed the Operator on 6/21/2016.</p>	<p>6/21/2016 11:45:22 AM</p>
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Total: 1 comment(s)

ATTACHMENT B

DIAGRAMS





□ - Approximate Area of Spill



Approximate Scale: 1" = 290'

A.G. WASSENAAR | **INC.**

GEOTECHNICAL • ENVIRONMENTAL
CONSULTANTS

Waag Middle, Weld County, Colorado
AGW Project Number: 162486.EC
Figure 1



- July 2016 Excavation Boundaries



- Soil Sample Location

B: Benzene

T: Toluene

E: Ethylbenzene

X: Total Xylenes

GRO: Gasoline-Range Organics

DRO: Diesel-Range Organics

ORO: Oil-Range Organics

ND: Not detected above laboratory detection limits



Approximate Scale: 1" = 37.5'

A.G. WASSENAAR | **INC.**

GEOTECHNICAL • ENVIRONMENTAL
CONSULTANTS

Waag Middle, Weld County, Colorado

AGW Project Number: 162486.EC

Figure 2

ATTACHMENT C

LABORATORY ANALYTICAL REPORTS



July 18, 2016

A.G. Wassenaar

Rachel Peterson

2180 South Ivanhoe Street - Suite 5

Denver

CO 80222

Project Name - 162486

Project Number - 162486

Attached are your analytical results for 162486 received by Origins Laboratory, Inc. July 13, 2016. This project is associated with Origins project number X607166-01.

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: 162486
Project: 162486

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
486-1	X607166-01	Soil	July 13, 2016 15:37	07/13/2016 17:20
486-2	X607166-02	Soil	July 13, 2016 15:41	07/13/2016 17:20

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: 162486
 Project: 162486

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

Sample Receipt Checklist

Origins Work Order: XU07166 Client: A.G. Wassenaar
 Client Project ID: 162486
 Checklist Completed by: J.P. Smith Shipped Via: HD
 Date/time completed: 7/14/16 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: NA
 Matrix(s) Received: (Check all that apply): Soil/Solid Water Other: _____
 Cooler Number/Temperature: 1 / 4.8 °C _____ / _____ °C _____ / _____ °C (Describe)
 Thermometer ID: TC05

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.

J.P. Smith Reviewed by (Project Manager) 7/14/16 Date/Time Reviewed

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

Rachel Peterson
 Project Number: 162486
 Project: 162486

486-1

7/13/2016 3:37:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X607166-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B6G1402	07/14/2016	07/14/2016	U
Residual Range Organics (C28-C40)	ND	200	"	"	"	"	"	U

Surrogate: o-Terphenyl 87.3 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B6G1401	07/14/2016	07/14/2016	U
Benzene	ND	0.002	"	"	"	"	"	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 107 % 70-130 " " "

Surrogate: Toluene-d8 97.3 % 70-130 " " "

Surrogate: 4-Bromofluorobenzene 105 % 70-130 " " "

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Rachel Peterson
 Project Number: 162486
 Project: 162486

486-2

7/13/2016 3:41:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X607166-02 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	ND	50.0	mg/kg	1	B6G1402	07/14/2016	07/14/2016	U
Residual Range Organics (C28-C40)	ND	200	"	"	"	"	"	U

Surrogate: o-Terphenyl 71.1 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	0.200	mg/kg	1	B6G1401	07/14/2016	07/14/2016	U
Benzene	ND	0.002	"	"	"	"	"	U
Toluene	ND	0.002	"	"	"	"	"	U
Ethylbenzene	ND	0.002	"	"	"	"	"	U
Xylenes, total	ND	0.002	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 104 % 70-130 " " "
Surrogate: Toluene-d8 97.7 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 101 % 70-130 " " "

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Rachel Peterson
 Project Number: 162486
 Project: 162486

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 B6G1401 - EPA 5030 (soil)

Blank (B6G1401-BLK1)

Prepared: 07/14/2016 Analyzed: 07/14/2016

Gasoline Range Hydrocarbons	ND	0.200	mg/kg							U
Benzene	ND	0.002	"							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	61		ug/kg	62.5		97.3	70-130			
Surrogate: Toluene-d8	60		"	62.5		96.2	70-130			
Surrogate: 4-Bromofluorobenzene	66		"	62.5		105	70-130			

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Rachel Peterson
 Project Number: 162486
 Project: 162486

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 B6G1401 - EPA 5030 (soil)

LCS (B6G1401-BS1)

Prepared: 07/14/2016 Analyzed: 07/14/2016

Benzene	0.105	0.002	mg/kg	0.100		105	77.1-124			
Toluene	0.099	0.002	"	0.100		98.9	74.5-128			
Ethylbenzene	0.100	0.002	"	0.100		99.7	66.4-127			
m,p-Xylene	0.200	0.004	"	0.200		100	76.6-124			
o-Xylene	0.103	0.002	"	0.100		103	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	61		ug/kg	62.5		97.0	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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Rachel Peterson
 Project Number: 162486
 Project: 162486

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 B6G1401 - EPA 5030 (soil)

Matrix Spike (B6G1401-MS1)	Source: X607166-01			Prepared: 07/14/2016 Analyzed: 07/14/2016						
Benzene	0.107	0.002	mg/kg	0.100	ND	107	71.8-126			
Toluene	0.100	0.002	"	0.100	ND	99.6	65.1-130			
Ethylbenzene	0.094	0.002	"	0.100	ND	94.4	62.2-130			
m,p-Xylene	0.194	0.004	"	0.200	ND	96.8	46.5-137			
o-Xylene	0.096	0.002	"	0.100	ND	95.9	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	65		ug/kg	62.5		104	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	70-130			

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Rachel Peterson
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 Project: 162486

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 B6G1401 - EPA 5030 (soil)

Matrix Spike Dup (B6G1401-MSD1)	Source: X607166-01			Prepared: 07/14/2016 Analyzed: 07/14/2016						
Benzene	0.105	0.002	mg/kg	0.100	ND	105	71.8-126	1.57	11.3	
Toluene	0.100	0.002	"	0.100	ND	100	65.1-130	0.860	15.4	
Ethylbenzene	0.097	0.002	"	0.100	ND	96.8	62.2-130	2.53	19.6	
m,p-Xylene	0.196	0.004	"	0.200	ND	97.8	46.5-137	0.976	19.2	
o-Xylene	0.099	0.002	"	0.100	ND	98.6	54.2-134	2.73	17.9	
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		105	70-130			
Surrogate: Toluene-d8	65		"	62.5		104	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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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 B6G1402 - EPA 3580

Blank (B6G1402-BLK1)

Prepared: 07/14/2016 Analyzed: 07/14/2016

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	39		"	50.0		77.8	59-131			

LCS (B6G1402-BS1)

Prepared: 07/14/2016 Analyzed: 07/14/2016

Diesel (C10-C28)	924	50.0	mg/kg	1000		92.4	64-121			
Residual Range Organics (C28-C40)	889	200	"	1000		88.9	58-124			
Surrogate: o-Terphenyl	42		"	50.0		84.6	59-131			

Matrix Spike (B6G1402-MS1)

Source: X607166-01

Prepared: 07/14/2016 Analyzed: 07/14/2016

Diesel (C10-C28)	970	50.0	mg/kg	1000	16.5	95.4	53-125			
Residual Range Organics (C28-C40)	971	200	"	1000	ND	97.1	47-133			
Surrogate: o-Terphenyl	48		"	50.0		96.6	59-131			

Matrix Spike Dup (B6G1402-MSD1)

Source: X607166-01

Prepared: 07/14/2016 Analyzed: 07/14/2016

Diesel (C10-C28)	952	50.0	mg/kg	1000	16.5	93.6	53-125	1.89	20	
Residual Range Organics (C28-C40)	931	200	"	1000	ND	93.1	47-133	4.23	20	
Surrogate: o-Terphenyl	50		"	50.0		100	59-131			

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Rachel Peterson
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Project: 162486

Notes and Definitions

U Sample is Non-Detect.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

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Jen Pellegrini For Noelle Doyle Mathis, President