

June 15, 2015

Great Western Operating Company, LLC  
1801 Broadway, Suite 500  
Denver, Colorado 80202

Attention: Scot Donato, EH&S/Regulatory Manager

Subject: Limited Subsurface Investigation  
Mershon Production Battery Site  
Weld County, Colorado  
Project Number E14447.EC

Dear Mr. Donato,

As requested, A. G. Wassenaar, Inc. (AGW) conducted a limited subsurface investigation at the Mershon Production Battery Site in Weld County, Colorado. The site contains six oil and gas wellheads, seven condensate storage tanks, and one produced water storage tank. The tanks are positioned within two earthen containment berms. This letter summarizes the project activities and analytical results.

## SCOPE OF WORK

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This project was completed in accordance with the scope of work discussed with and approved by Great Western Operating Company, LLC (GWOC).

The purpose of the investigation was to further evaluate the extent of previously identified petroleum impacts in ground water at the site. The chemicals of concern for this project include benzene, toluene, ethylbenzene, and total xylenes (BTEX).

The investigation included the following general tasks:

- Health and Safety Plan Development
- Utility Locating and Potholing
- Permanent ground water monitoring well installation
- Ground Water Sampling
- Laboratory Analysis and Data Interpretation
- Report Preparation

## BACKGROUND AND PREVIOUS ENVIRONMENTAL ACTIVITIES

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AGW was present at the site on September 18, 2014, following the identification of visibly impacted soils beneath a produced water vessel which was being removed. AGW collected three soil samples for field evaluation and laboratory analysis from beneath the location of the former produced water vessel and from test pits east of the produced water vessel. The soil samples were submitted for laboratory analysis

of gasoline range organics (GRO) and diesel range organics (DRO). 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. The results of the September 18, 2014 soil sampling activities are depicted on Figure 1 in Attachment B.

GWOC notified the COGCC, as well as the surface owner and Weld County, of the release on September 26, 2014. On September 29, 2014, GWOC submitted a Form 19 Spill/Release Report. A supplemental Spill/Release Report was submitted on October 3, 2014, and a Form 27 Site Investigation and Remediation Workplan was submitted on October 7, 2014. COGCC approved the Form 27 on October 14, 2014, and work at this site will proceed under Remediation Project No. 8677. Copies of all COGCC forms and notifications are included in Attachment A.

In October 2014, approximately 200 cubic yards of soil exhibiting staining and odors were removed on various dates and disposed of at Waste Management's North Weld Landfill located in Ault, Colorado. The maximum depth of the excavation was approximately 14 feet deep. Ground water was encountered approximately 12-13 feet below ground surface (bgs). Following excavation, AGW collected four soil samples on October 3, 2014 from the excavation cavity walls. Due to the presence of ground water at the base of the excavation cavity, a soil sample was not collected from the base. AGW did collect one "grab" ground water sample, designated GW-Pit, from ground water which infiltrated the base of the excavation. Results from the October 3, 2014 soil and ground water sampling results are depicted on Figure 1 in Attachment B.

On October 20, 2014, approximately 150 cubic yards of additional soil were removed from the excavation. AGW collected a confirmation soil sample from the eastern wall of the expanded excavation and directed the excavation of additional test pits on the east and west sides of the DCP pipeline west of the excavation. "Grab" ground water samples, designated W-1 and W-2, were collected from two test pits south of the existing excavation. The October 20, 2014 soil and ground water sampling results are depicted on Figure 1 in Attachment B. To enhance remediation, approximately 250 pounds of an activated carbon and oxygen releasing remediation compound called COGAC (manufactured by Remington Technologies of Loveland, Colorado) were placed at the base of the excavation cavity prior to backfilling in October 2014.

## **METHODS AND RESULTS**

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### ***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.

### ***Utility Clearances***

In accordance with Colorado law, AGW and the project drilling contractor contacted the Utility Notification Center of Colorado (UNCC) and associated utility companies to locate public subsurface utilities in the proposed boring areas prior to borehole advancement. Based on the utility locates, no subsurface utility conflicts were identified at the borehole locations.

### ***Potholing Methods***

Prior to advancement of two of the boreholes, MW-1 and MW-3, Dakota Drilling, Inc. (Dakota) of Denver, Colorado conducted hydro-excavation to a depth of 5 feet to ensure that no utilities were present in these locations. No conflicting pipelines or other buried utility lines were present within these two borehole locations.

### ***Drilling and Soil Sampling Methods***

On April 9, 2015, Dakota utilized a CME-55 truck-mounted drill rig to advance a total of four boreholes and assist with soil sample collection. The boreholes were designated MW-1 through MW-4.

To evaluate the previously identified impacted ground water in the former excavation, MW-1 was positioned as close as possible to the produced water tank, directly south of the earthen berm at the site. Based on regional topography and nearby surface water features, the estimated direction of ground water flow in the area is toward the south. Based on this information, borehole MW-2 was positioned southeast of the produced water tank and the earthen berm, borehole MW-3 was advanced southwest of the produced water tank and the earthen berm, and borehole MW-4 was advanced south of the produced water tank and the earthen berm. Figure 2 in Attachment B depicts the borehole locations.

To drill the boreholes, Dakota utilized 4-inch outside diameter solid-stem augers. During drilling, an AGW field geologist collected soil samples for field evaluation at approximate 5 foot intervals. The soil samples were collected from auger cuttings.

To control potential cross-contamination, Dakota used clean, decontaminated augers for each of the four boreholes. In addition, AGW cleaned the water level measuring tape prior to drilling and between uses with an Alconox® detergent and municipal water solution, followed by a municipal water rinse. The AGW field geologist also wore disposable nitrile gloves during sampling to help control potential cross-contamination.

Each borehole was advanced to a depth of 20 feet bgs to intersect the ground water table.

### ***Soil Field Screening Methods***

A portion of each borehole 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.

### ***Soil Observations and Screening Results***

Soils encountered during this project generally consisted of brown and gray silty sands from the surface to the base of each borehole. There were no suspect odors or staining observed in any of the soil samples. During this project, slightly elevated PID readings were detected in soils from the borehole for MW-1. Additional soil details and specific PID results are presented on the soil boring logs in Attachment C.

### ***Monitoring Well Installation Methods***

To allow for collection of ground water samples, Dakota constructed monitoring wells in each of the boreholes using 2-inch diameter, schedule 40 polyvinylchloride (PVC) piping. Each permanent well included a 10-foot section of machine slotted screen pipe (0.010-inch slots) with a bottom cap at the base of the borehole. Above each screened section, PVC riser pipe extended to approximately three feet above the ground surface. Commercial washed quartz sand (10/20) was then used to fill the space around each screened section to act as a filter pack. To control potential surface water infiltration, hydrated bentonite chips were used to fill the void around each riser pipe (above the screen and filter pack) to within approximately 12 inches of the top of the casing. Each permanent monitoring well pipe top was also sealed with a waterproof cap. To protect each monitoring well from potential surface damage, Dakota also installed steel protective covers set in concrete around each well. Well construction details are presented on the boring logs in Attachment C.

### ***Surveying Methods***

To determine the relative ground surface and monitoring well casing elevations at the site, and to allow ground water flow direction and gradient calculations, AGW conducted an elevation survey of the subject area on April 9, 2015. The surveying was completed using standard methods with a tripod-mounted level and fiberglass measuring rod. A site-specific benchmark elevation of 100.00 feet was used for reference at the top of the well pipe at MW-1. The elevation survey results are considered accurate to 1/100th of a foot. As part of the surveying activities, AGW also recorded lateral distance measurements between monitoring wells using a GPS.

### ***Well Development and Ground Water Measurements***

Following monitoring well installation, the monitoring wells were developed to remove excess silt and sand sediment, maximize inflow of ground water into the wells, and to allow for representative sample collection. Monitoring well development was accomplished by agitating the ground water column in each well using a new dedicated plastic bailer attached to nylon cord. Following the removal of approximately three well volumes from each monitoring well, the extracted water was relatively clear.

During this project, AGW utilized a clean electronic water level indicator tape to measure the depth to ground water at all four monitoring wells. The water level indicator tape was cleaned prior to, and between each use, with a solution of Alconox® detergent and tap water, followed by a tap water rinse.

### ***Ground Water Elevation Measurements***

Following monitoring well development, ground water in the monitoring wells was allowed to stabilize before ground water measurements were collected on April 20, 2015 for ground water elevation calculations and gradient determination. Ground water depths ranged from approximately 10.48 to 11.97 feet bgs. Table 1 summarizes the ground water depth measurements and elevations.

**Table 1: Ground Water Measurements  
Mershon Production Site  
April 20, 2015**

Well Number	Ground Surface Elevation (ft.)*	Top of Casing (T.O.C.) Elevation (ft.)	Depth to Ground Water (T.O.C.) (ft.)	Ground Water Elevation (ft.)
MW-1	97.29	100.00	14.69	85.31
MW-2	96.08	98.73	13.45	85.28
MW-3	96.27	98.99	13.71	85.28
MW-4	96.27	98.97	13.75	85.22

\* Elevations are in feet, based on a site datum of 100.00 feet. Benchmark is the top of well pipe casing MW-1

To evaluate the ground water measurements, AGW compared the measured data with surveyed elevations. Based on the results, ground water flow across the site is generally towards the south with a gradient of approximately 0.0085 feet per foot. Figure 2 in Attachment B illustrates the ground water elevations and estimated flow directions.

#### ***Ground Water Sampling Methods***

Following monitoring well installation, AGW collected ground water samples from each of the four wells for analytical testing on April 9, 2015. Prior to collecting the samples, AGW measured the depth to ground water at each location.

To collect the samples, AGW utilized a new dedicated plastic bailer attached to nylon cord at each borehole. Each sample was transferred into three acid-preserved glass vials supplied by the laboratory for BTEX analysis. The filled sample containers were immediately sealed, labeled, and placed into a cooler with ice (a preservative). On the day of sample collection, AGW delivered the samples to Origins for analytical testing. During this project, AGW followed chain-of-custody procedures in general accordance with EPA guidelines. Origins analyzed all four ground water samples for BTEX using EPA Method 8260C.

#### ***Ground Water Analytical Results***

Table 2, below, summarizes the ground water analytical results. A copy of the laboratory report is included in Attachment D. The results are also illustrated on Figure 3 in Attachment B.

**Table 2: Ground Water Analytical Results  
Mershon Production Site  
April 9, 2015**

Sample Number	Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-1	0.118	0.0046	0.0139	0.0532
MW-2	ND	ND	ND	ND
MW-3	ND	ND	ND	ND

Sample Number	Benzene	Toluene	Ethylbenzene	Total Xylenes
MW-4	ND	ND	ND	ND
COGCC Table 910-1 Concentrations (mg/L)	0.005	1.0	0.70	10.0

All concentrations are in mg/L = Milligrams per liter, parts per million

ND = Not detected above laboratory detection limits

Analytes in **bold** exceed their respective COGCC Table 910-1 concentration

To evaluate the ground water analytical results, AGW consulted the Table 910-1 Concentration Levels provided within COGCC 900 Series Rules for Exploration and Production Waste Management. Based on the results, BTEX compounds were detected in sample MW-1. Benzene was detected at 0.118 mg/L, which is greater than its COGCC Table 910-1 concentration of 0.005 mg/L. All other analytes were present at concentrations less than their respective COGCC Table 910-1 concentrations. BTEX compounds were not detected in any of the other samples at concentrations greater than the laboratory detection limits.

## DISCUSSION

On April 9, 2015, AGW conducted a limited subsurface investigation at the Mershon Production Site, in the vicinity of a release associated with a produced water tank. The investigation was conducted to further define the extent of contaminated ground water that had been previously identified in the excavation following the release.

To allow for collection of ground water for field evaluation and analytical testing, four permanent ground water wells were installed south, southeast, and southwest of the release location and former excavation.

Ground water samples were collected from each of the four monitoring wells on the day of installation, and analyzed for BTEX. Based on the ground water analytical results, BTEX compounds were not detected in any of the samples at concentrations greater than COGCC Table 910-1 regulatory concentrations, with the exception of benzene in the monitoring well nearest to the release, MW-1.

## CONCLUSIONS

Impacted soils were removed in the vicinity of the former produced water vessel, except for inaccessible soils directly adjacent to underground gas lines, based on soil analytical results from samples collected in September and October 2014. To enhance remediation, approximately 250 pounds of COGAC were placed at the base of the excavation cavity prior to backfilling in October 2014. Impacted soils that could not be accessed should bioremediate in-situ given the limited volume remaining and the removal of other potential sources.

Based on ground water data from the monitoring wells installed at this site, impacted ground water is limited to the immediate vicinity of the operational produced water tank. Colorado Division of Water Resources well records indicate that there are no domestic water wells within ½ mile downgradient of the site. Additionally, based on the use of adjacent property in all directions (agricultural and industrial), it is

the opinion of AGW that the limited ground water impact does not present a significant threat to human health or the environment, and that monitored natural attenuation is the best remediation alternative for this site.

The monitoring wells at the site will be sampled for four consecutive quarters to monitor natural attenuation of impacted ground water.

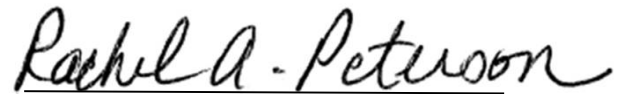
## **LIMITATIONS**

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This report summarizes AGW's findings associated with a limited subsurface investigation at the Mershon Production Site in Weld County, Colorado. Although AGW completes thorough studies, no warranty is made of its accuracy, completeness, and timeliness based on information obtained from third party sources. Findings are a reflection of, and within, the scope-of-work and limitations of the work performed.

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.

A handwritten signature in black ink that reads "Rachel A. Peterson". The signature is fluid and cursive, with the first name "Rachel" and last name "Peterson" clearly legible.

Rachel A. Peterson, P.G.  
Project Manager

RAP/dd

Attachments

## **ATTACHMENT A**

### **COGCC FORMS 19 AND 27**





# 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:

400695452

Date Received:

09/28/2014

Spill report taken by:

ALLISON, RICK

Spill/Release Point ID:

439123

## 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: GREAT WESTERN OPERATING COMPANY LLC	Operator No: 10110	<b>Phone Numbers</b> Phone: (303) 398-0537 Mobile: (303) 398-0537 Email: sdonato@gwogco.com
Address: 1801 BROADWAY #500		
City: DENVER	State: CO Zip: 80202	
Contact Person: Scot Donato		

### INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 400695452

Initial Report Date: 09/25/2014 Date of Discovery: 09/25/2014 Spill Type: Historical Release

#### Spill/Release Point Location:

Location of Spill/Release: QTRQTR SWSE SEC 26 TWP 6N RNG 67W MERIDIAN 6

Latitude: 40.452920 Longitude: -104.857360

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

#### Reference Location:

Facility Type: PARTIALLY-BURIED VESSEL ☒ Facility/Location ID No 333241

☐ 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? No

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? No

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

Estimated Oil Spill Volume(bbl): 0

Estimated Condensate Spill Volume(bbl): 0

Estimated Flow Back Fluid Spill Volume(bbl): 0

Estimated Produced Water Spill Volume(bbl): Unknown

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

Estimated Drilling Fluid Spill Volume(bbl): 0

Specify: historical release: unknown quantity of produced water released

#### Land Use:

Current Land Use: OTHER Other(Specify): vacant and industrial

Weather Condition: clear, sunny

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):

A fiberglass produced water vessel was being removed and potential impacts were observed in soils beneath the removed vessel. Limited excavation and stockpiling of visibly impacted were conducted.

List Agencies and Other Parties Notified:

### OTHER NOTIFICATIONS

<u>Date</u>	<u>Agency/Party</u>	<u>Contact</u>	<u>Phone</u>	<u>Response</u>
9/25/2014	Weld County	Tom Parko	970-353-6100	N/A
9/25/2014	Surface Owner	Broe Group	-	
			-	

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: 09/28/2014 Email: petersonr@agwassenaar.com

### Attachment Check List

<u>Att Doc Num</u>	<u>Name</u>
2614945	EMAIL 24 HOUR NOTIFICATION
400695452	SPILL/RELEASE REPORT(INITIAL)
400695856	TOPOGRAPHIC MAP
400697277	FORM 19 SUBMITTED

Total Attach: 4 Files

### General Comments

<u>User Group</u>	<u>Comment</u>	<u>Comment Date</u>
Environmental	Operator's 24 notification is attached.	9/29/2014 8:49:33 AM

Total: 1 comment(s)

## Rachel Peterson

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**From:** Scot Donato <sdonato@gwogco.com>  
**Sent:** Friday, September 26, 2014 11:26 AM  
**To:** rick.allison@state.co.us; rrudisill@weldgov.com; jmcDonald@weldgov.com;  
tparko@co.weld.co.us  
**Cc:** Rachel Peterson, PG (petersonr@agwassenaar.com)  
**Subject:** Release notification

This email serves as notification of a release at Great Western Operating Company's Mershon facility, COGCC location 333241. The release volume is unknown.

A produced water vessel was being removed and potential impacts were observed in soils beneath the removed vessel on September 18, 2014. Laboratory analytical results received on September 25, 2014 confirmed the release. The site is located in Weld County, in the SWSE Section 26, Township 6N, Range 67W, 6<sup>th</sup> p.m.

Broe group-surface owner has also been notified.



**Scot A. Donato**  
EH&S/Regulatory Manager  
**Great Western Operating Company, LLC**  
1801 Broadway, Suite 500  
Denver, CO 80202  
Office: 303-398-0302  
Fax: 866-742-1784  
sdonato@gwogco.com

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# 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:

400701233

Date Received:

10/03/2014

Spill report taken by:

ALLISON, RICK

Spill/Release Point ID:

439123

## 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>GREAT WESTERN OPERATING COMPANY LLC</u>	Operator No: <u>10110</u>	<b>Phone Numbers</b>
Address: <u>1801 BROADWAY #500</u>		Phone: <u>(303) 398-0537</u>
City: <u>DENVER</u>	State: <u>CO</u>	Mobile: <u>(303) 398-0537</u>
Zip: <u>80202</u>		Email: <u>sdonato@gwogco.com</u>
Contact Person: <u>Scot Donato</u>		

### INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 400695452

Initial Report Date: 09/25/2014 Date of Discovery: 09/25/2014 Spill Type: Historical Release

#### Spill/Release Point Location:

Location of Spill/Release: QTRQTR SWSE SEC 26 TWP 6N RNG 67W MERIDIAN 6Latitude: 40.452920 Longitude: -104.857360Municipality (if within municipal boundaries): Windsor County: WELD

#### Reference Location:

Facility Type: PARTIALLY-BURIED VESSEL ☒ Facility/Location ID No 333241☐ 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? No

*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? No

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

Estimated Oil Spill Volume(bbl): 0Estimated Condensate Spill Volume(bbl): 0Estimated Flow Back Fluid Spill Volume(bbl): 0Estimated Produced Water Spill Volume(bbl): UnknownEstimated Other E&P Waste Spill Volume(bbl): 0Estimated Drilling Fluid Spill Volume(bbl): 0Specify: historical release: unknown quantity of produced water released

#### Land Use:

Current Land Use: OTHER Other(Specify): vacant and industrialWeather Condition: clear, sunnySurface 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):

A fiberglass produced water vessel was being removed and potential impacts were observed in soils beneath the removed vessel. Limited excavation and stockpiling of visibly impacted were conducted.

List Agencies and Other Parties Notified:

### OTHER NOTIFICATIONS

Date	Agency/Party	Contact	Phone	Response
9/25/2014	Weld County	Tom Parko	970-353-6100	N/A
9/25/2014	Surface Owner	Broe Group	-	
			-	

### SPILL/RELEASE DETAIL REPORTS

#1	Supplemental Report Date: 10/03/2014			
<b>FLUIDS</b>	BBL's SPILLED	BBL's RECOVERED	Unknown	
OIL	0	0	<input type="checkbox"/>	
CONDENSATE	0	0	<input type="checkbox"/>	
PRODUCED WATER			<input checked="" 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: Historical release: unknown quantity of produced water released				
Was spill/release completely contained within berms or secondary containment? <u>NO</u> Was an Emergency Pit constructed? <u>NO</u>				
<i>Secondary containment, including walls &amp; floor regardless of construction material, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.</i>				
<b>A Form 15 Pit Report shall be submitted within 30 calendar days after the construction of an emergency pit</b>				
Impacted Media (Check all that apply) <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Groundwater <input type="checkbox"/> Surface Water <input type="checkbox"/> Dry Drainage Feature				
Surface Area Impacted: Length of Impact (feet):		Width of Impact (feet):		
Depth of Impact (feet BGS):		Depth of Impact (inches BGS):		
How was extent determined?				
Extent will be determined during further excavation and sampling.				
Soil/Geology Description:				
Poorly sorted clays, silts, and coarse sands.				
Depth to Groundwater (feet BGS) 14		Number Water Wells within 1/2 mile radius: 18		
If less than 1 mile, distance in feet to nearest	Water Well	None <input checked="" type="checkbox"/>	Surface Water	None <input checked="" type="checkbox"/>
	Wetlands	None <input checked="" 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:				

A produced water vessel was being removed and potential impacts were observed in soils beneath the removed vessel on September 18, 2014. Laboratory analytical results received on September 25, 2014 confirmed the release. Additional soil excavation and sampling was conducted on October 3, 2014 to further determine the extent of impact. Additional laboratory results will be submitted to COGCC when available.

## CORRECTIVE ACTIONS

#1	Supplemental Report Date: 10/03/2014
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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)

A produced water vessel was being removed and potential impacts were observed in soils beneath the removed vessel on September 18, 2014. The incident was a result of a historical release of unknown origins.

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

Volume of Soil Excavated (cubic yards): 200

Disposition of Excavated Soil (attach documentation) ☒ Offsite Disposal ☐ Onsite Treatment  
☐ Other (specify) \_\_\_\_\_

Volume of Impacted Ground Water Removed (bbls): \_\_\_\_\_

Volume of Impacted Surface Water Removed (bbls): \_\_\_\_\_

## 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: \_\_\_\_\_

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: 10/03/2014 Email: petersonr@agwassenaar.com

## Attachment Check List

Att Doc Num	Name
400701233	FORM 19 SUBMITTED
400701249	TOPOGRAPHIC MAP

Total Attach: 2 Files

## General Comments

User Group	Comment	Comment Date

Total: 0 comment(s)

State of Colorado  
**Oil and Gas Conservation Commission**

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



FOR OGCC USE ONLY  
Received 10/7/2014

Project No. 8677

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

☒ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☒ Other (describe): site improvements

OGCC Employee:

☒ Spill Complaint  
Inspection NOAV

Tracking No: 400695452

OGCC Operator Number: 10110

Name of Operator: Great Western Operating Company, LLC

Address: 1801 Broadway, Suite 500

City: Denver State: CO Zip: 80202

Contact Name and Telephone:

Scot Donato, EH&S/Regulatory Manager

No: 303-398-0537

Fax: 866-742-1784

API Number:

County: Weld

Facility Name: Mershon

Facility Number: 333241

Well Name:

Well Number:

Location: (QtrQtr, Sec, Twp, Rng, Meridian): SWSE 26 6N 67W 6 Latitude: 40.45292 Longitude: -104.85736

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): produced water

**Site Conditions:** Is location within a sensitive area (according to Rule 901e)? ☐ Y ☐ N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): vacant, industrial

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Nunn Clay Loam, 0 to 1 percent slopes

Potential receptors (water wells within 1/4 mi, surface waters, etc.): None, see Form 19 submitted 09/28/2014

**Description of Impact** (if previously provided, refer to that form or document):

Impacted Media (check):

Extent of Impact:

How Determined:



Soils

To be determined during further excavation and sampling



Vegetation



Groundwater



Surface Water

**REMEDIALATION WORKPLAN**

**Describe initial action taken** (if previously provided, refer to that form or document):

Limited excavation and stockpiling of visibly impacted soils on September 18, 2014. Collected initial soil samples for laboratory analysis. September 25, 2014 lab results confirmed release. Approximately 250 cubic yards of additional impacted soils were excavated and sent for disposal at Waste Management's North Weld County facility on October 3, 2014.

**Describe how source is to be removed:**

Initial soil excavation based on staining, odors, and final laboratory analytical results has been completed at location of former produced water vessel.

**Describe how remediation of existing impacts is to be accomplished**, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

Source removal will be conducted through impacted soil removal. Confirmation soil samples will be collected and analyzed for GRO/DRO/pH/EC. Removed soils will be disposed of properly at an approved offsite disposal facility.



Tracking Number:	4006954542
Name of Operator:	Great Western Operating Co.
OGCC Operator No:	10110
Received Date:	10/7/2014
Well Name & No:	
Facility Name & No:	Mershon

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

The vertical extent of soil impact will be determined during soil excavation activities in order to ensure that impacted soils are not in contact with ground water. If ground water is not encountered during further excavation, ground water investigation and remediation will not be conducted. If ground water is encountered during excavation activities, a grab ground water sample will be collected.

**Describe reclamation plan.** Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The site will be reclaimed in accordance with the 1000 series rules.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☒ Y ☐ N If yes, describe:

Further definition of site impacts will be completed during additional site investigation activities.

**Final disposition of E&P waste** (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

Impacted soils will be disposed of at a licensed disposal facility.

### IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 09/18/14	Date Site Investigation Completed: _____	Date Remediation Plan Submitted: _____
Remediation Start Date: 10/03/14	Anticipated Completion Date: _____	Actual Completion Date: _____

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

Print Name: Scot A. Donato Signed: Scot A. Donato  
Title: EH&S/Regulatory Manager Date: 10/07/14

OGCC Approved: \_\_\_\_\_ Title: Northeast EPS Date: 10/14/2014

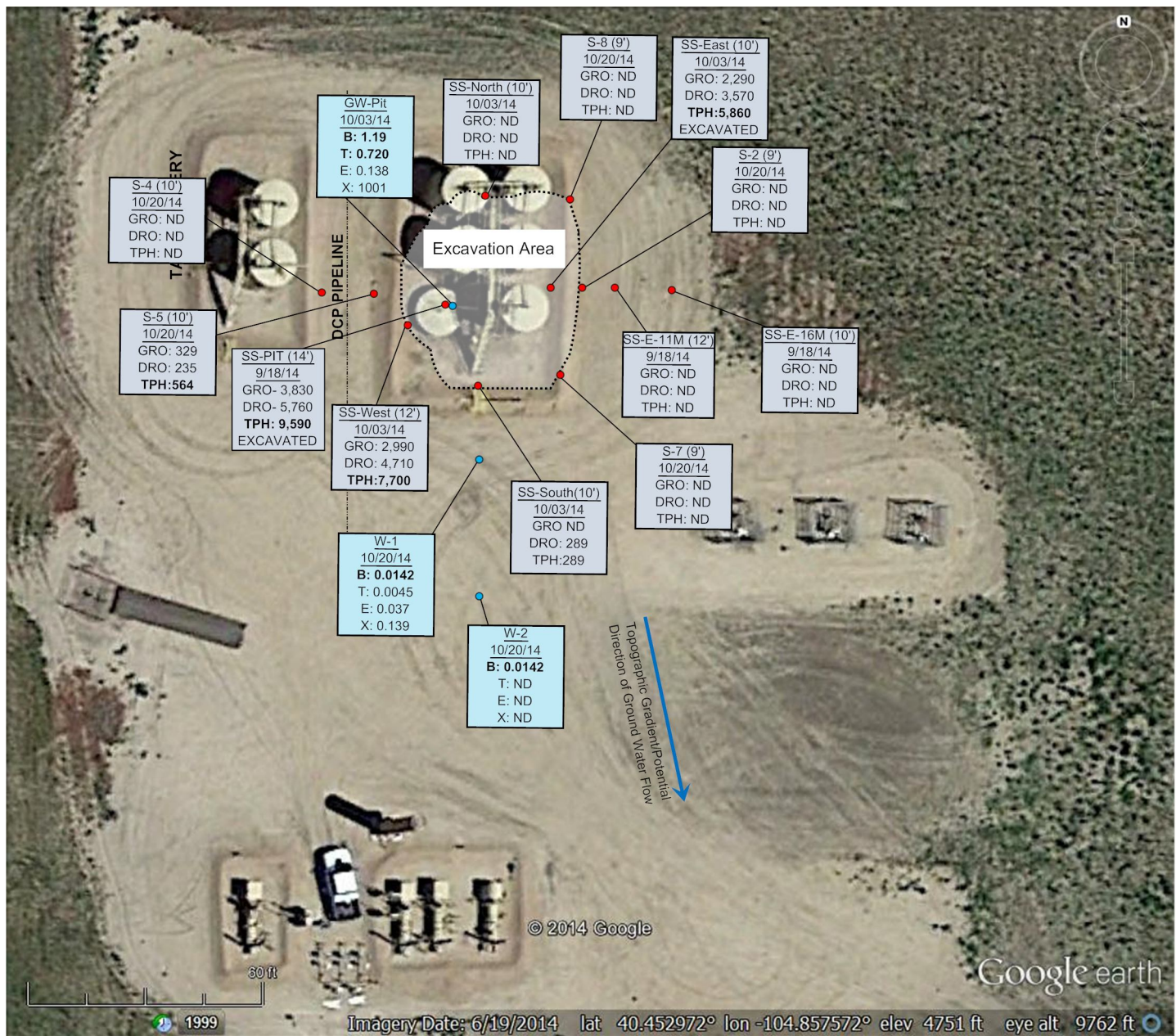
Condition of Approval: Conduct the additional site investigation within 45 days of approval of this Form 27. Submit a summary of site assessment results and any proposed remedial actions within 90 days of approval of this Form 27.



## **ATTACHMENT B**

### **DIAGRAMS**





### LEGEND

- Soil Sample Name (depth in feet)  
date of collection
- Ground Water Sample  
date of collection

GRO: Gasoline Range Organics  
DRO: Diesel Range Organics  
TPH: Total Petroleum Hydrocarbons (GRO + DRO)  
B: Benzene, T: Toluene, E: Ethylbenzene, X: Total Xylenes  
ND: Not detected above laboratory detection limits

pH and Specific Conductivity Results are not depicted; all pH and EC results were less than COGCC Table 910-1 concentrations  
Soil concentrations are in milligrams per kilogram (mg/kg)  
Ground water concentrations are in milligrams per liter (mg/L)  
Concentrations in **BOLD** exceed applicable COGCC Table 910-1 concentrations

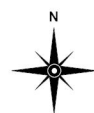
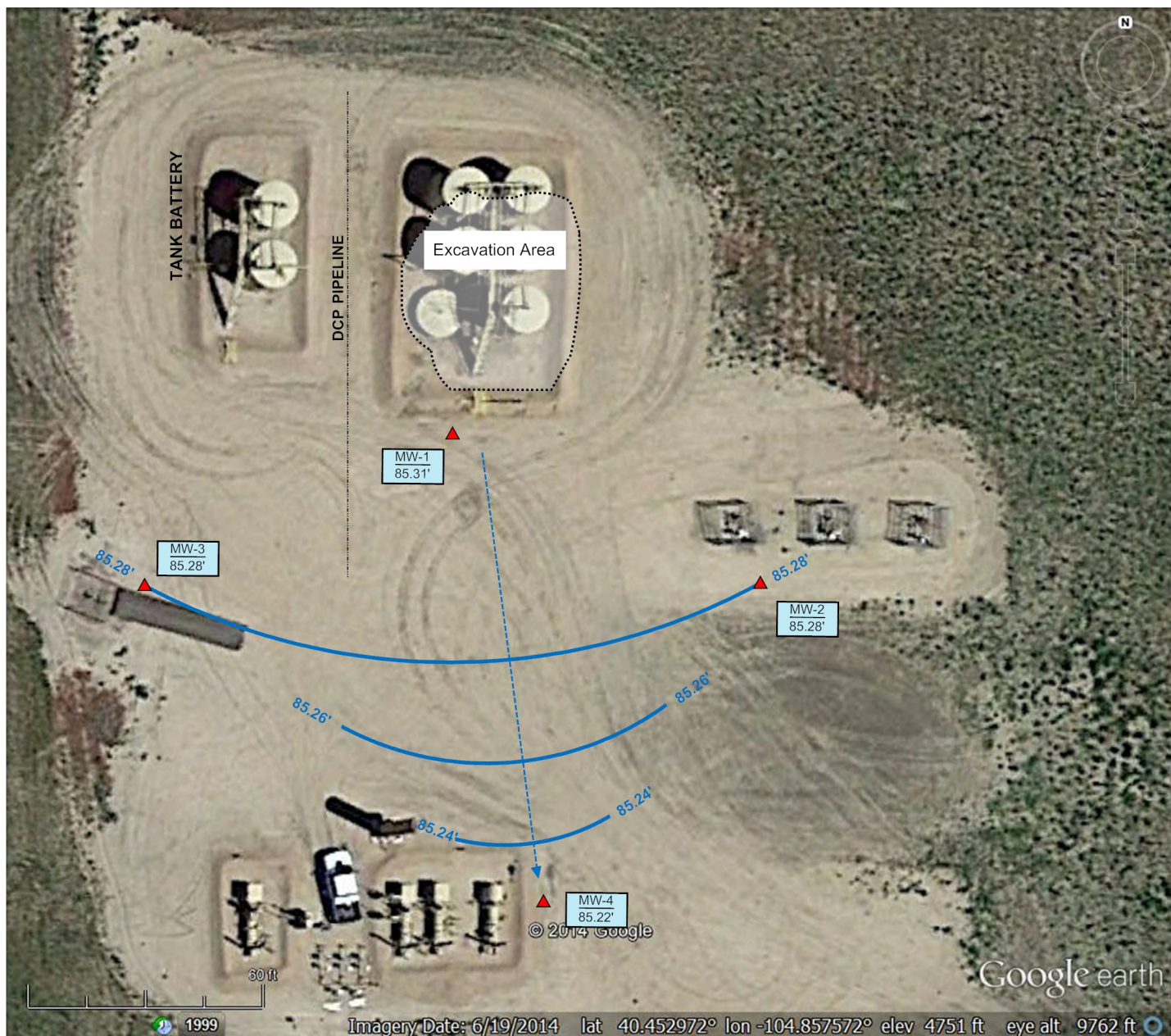


Approximate Scale: 1" = 40'

**A.G. WASSENAAR** **INC.**  
GEOTECHNICAL • ENVIRONMENTAL  
CONSULTANTS

September and October 2014  
Soil and Ground Water Analytical Results  
Mershon Production Site, Weld County, Colorado  
September and October 2014  
AGW Project Number: E14447.EC  
Figure 1





Approximate Scale: 1" = 40'

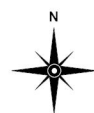
**A.G. WASSENAAR** **INC.**  
GEOTECHNICAL • ENVIRONMENTAL  
CONSULTANTS

### LEGEND

- ▲ Ground Water Monitoring Well Location  
Relative Ground Water Elevation in feet (')
- Direction of Ground Water Flow

April 2015  
Ground Water Elevations and Flow Direction  
Mershon Production Site, Weld County, Colorado  
AGW Project Number: E14447.EC  
Figure 2





Approximate Scale: 1" = 40'

### LEGEND

- ▲ Ground Water Monitoring Well Location  
Analytical Results

B: Benzene, T: Toluene, E: Ethylbenzene, X: Total Xylenes  
ND: Not detected above laboratory detection limits

Ground water concentrations are in milligrams per liter (mg/L)  
Concentrations in **BOLD** exceed applicable COGCC Table 910-1 concentrations

**A.G. WASSENAAR** | **INC.**  
GEOTECHNICAL • ENVIRONMENTAL  
CONSULTANTS

April 2015  
Ground Water Analytical Results  
Mershon Production Site, Weld County, Colorado  
AGW Project Number: E14447.EC  
Figure 3

**ATTACHMENT C**

**BOREHOLE LOGS**



**Inc.**

[www.agwassenaar.com](http://www.agwassenaar.com)

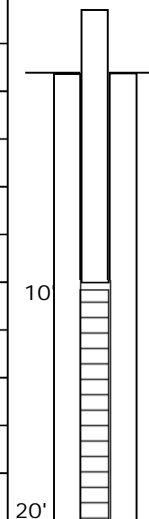
Auger Type: 4" Solid Stem Boring Number: MW-1

see Figures 2-3 in Attachment B

WL (after \_\_\_\_\_ hrs) \_\_\_\_\_

[illegible]

## Well Diagram



# A.G. Wassenaar

Geotechnical and Environmental Consultants

2180 South Ivanhoe Street, Suite 5  
Denver, Colorado 80222-5710

303-759-8373 Fax 303-759-4874

www.agwassenaar.com

**Inc.**

Geologist: \_\_\_R. Peterson\_\_\_ Drill Date: \_\_\_04/09/15\_\_\_  
Driller: \_\_\_Dan\_\_\_ Start Time: \_\_\_915 AM\_\_\_  
Helper: \_\_\_Jose\_\_\_ End Time: \_\_\_945 AM\_\_\_  
Auger Type: \_\_\_4" Solid Stem\_\_\_ Boring Number: \_\_\_MW-2\_\_\_

Location Diagram

see Figures 2-3 in Attachment B

## Water Level Observations

WL (while drilling) \_\_\_11'\_\_\_

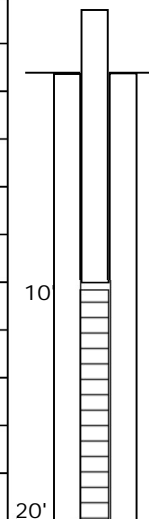
WL (while sampling) \_\_\_10.48'\_\_\_

WL (after \_\_\_ hrs) \_\_\_

Project Number \_\_\_E14447.E2\_\_\_

Project Number ____E14447.E2_____											
Sample No.	Depth or Elevation (feet)		Sampling Method	Split Spoon Blows				Length Recovered In Inches	PID Reading	Strata Change	Sample Description
	From	To		6"	6"	6"	6"				
				← 2 feet →							
1	0	5	AU						0		Brown silty clay, slightly moist
2	5	10	AU						0		Brown silty clay, slightly moist
3	10	15	AU						0		Light brown silty sand with clay, wet
											End of boring: 20'
											10' of screen, 10' riser pipe

Well Diagram



# A.G. Wassenaar

Geotechnical and Environmental Consultants

2180 South Ivanhoe Street, Suite 5  
Denver, Colorado 80222-5710

303-759-8373 Fax 303-759-4874

www.agwassenaar.com

**Inc.**

Geologist: \_\_\_R. Peterson\_\_\_ Drill Date: \_\_\_04/09/15\_\_\_  
Driller: \_\_\_Dan\_\_\_ Start Time: \_\_\_1015 AM\_\_\_  
Helper: \_\_\_Jose\_\_\_ End Time: \_\_\_1045 AM\_\_\_  
Auger Type: \_\_\_4" Solid Stem\_\_\_ Boring Number: \_\_\_MW-3\_\_\_

Location Diagram

see Figures 2-3 in Attachment B

## Water Level Observations

WL (while drilling) \_\_\_11'\_\_\_

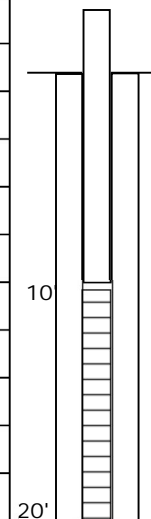
WL (while sampling) \_\_\_11.05'\_\_\_

WL (after \_\_\_ hrs) \_\_\_

Project Number \_\_\_E14447.E2\_\_\_

Project Number ____E14447.E2_____											
Sample No.	Depth or Elevation (feet)		Sampling Method	Split Spoon Blows				Length Recovered In Inches	PID Reading	Strata Change	Sample Description
	From	To		6"	6"	6"	6"				
				← 2 feet →							
1	0	5	AU						1.6		Brown/light brown silty sand, damp
2	5	10	AU						0.2		Brown/light brown silty sand, wet
3	10	15	AU						0.8		Brown/light brown silty sand, wet
											End of boring: 20'
											10' of screen, 10' riser pipe

Well Diagram





# A.G. Wassenaar

Geotechnical and Environmental Consultants

2180 South Ivanhoe Street, Suite 5  
Denver, Colorado 80222-5710

303-759-8373 Fax 303-759-4874

www.agwassenaar.com

**Inc.**

Geologist:    R. Peterson    Drill Date:    04/09/15     
Driller:    Dan    Start Time:    945 AM     
Helper:    Jose    End Time:    1015 AM     
Auger Type:    4" Solid Stem    Boring Number:    MW-4   

Location Diagram

see Figures 2-3 in Attachment B

## Water Level Observations

WL (while drilling)    11'   

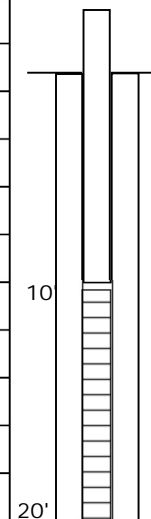
WL (while sampling)    10.61'   

WL (after        hrs)       

Project Number    E14447.E2   

Project Number E14447.E2											
Sample No.	Depth or Elevation (feet)		Sampling Method	Split Spoon Blows				Length Recovered In Inches	PID Reading	Strata Change	Sample Description
	From	To		6"	6"	6"	6"				
				← 2 feet →							
1	0	5	AU						0		Brown/gray sand and silty clay, slightly damp
2	5	10	AU						0		Brown/gray sand and silty clay, very damp
3	10	15	AU						0		Light brown silty sand, wet
											End of boring: 20'
											10' of screen, 10' riser pipe

Well Diagram



## **ATTACHMENT D**

### **LABORATORY ANALYTICAL REPORT**





April 16, 2015

A.G. Wassenaar

Rachel Peterson

2180 South Ivanhoe Street - Suite 5

Denver

CO 80222

**Project Name - Mershon**

**Project Number - E14447.EC**

Attached are your analytical results for Mershon received by Origins Laboratory, Inc. April 09, 2015. This project is associated with Origins project number X504133-01.

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: E14447.EC

Project: Mershon

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	X504133-01	Water	April 9, 2015 12:20	04/09/2015 13:44
MW-2	X504133-02	Water	April 9, 2015 12:15	04/09/2015 13:44
MW-3	X504133-03	Water	April 9, 2015 12:20	04/09/2015 13:44
MW-4	X504133-04	Water	April 9, 2015 12:15	04/09/2015 13:44

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: E14447.EC

Project: Mershon

www.originslaboratory.com

page 1 of 1

# ORIGINS

LABORATORY, INC

XS04133

Client: A.G. Wassenaar Inc.  
 Address: 2180 S. Ivanhoe St.  
Denver CO 80222  
 Telephone Number: 303-759-8373  
 Email Address: petersonr@agwassenaar.com

Project Manager: Rachel Peterson  
 Project Name: Mershon  
 Project Number: E14447.EC  
 Samples Collected By: Rachel Peterson

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix				Analysis		Sample Instructions	
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summa Canister #	Other				
MW-1	4/9/15	1220	3												1
MW-2		1215	3												2
MW-3		1220	3												3
MW-4		1215	3												4
															5
															6
															7
															8
															9
															10

Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Turnaround Time:
Rachel Peterson	4-9-15	1344	gmb	4-9-15	1344	Same Day <input type="checkbox"/> 24 Hr <input type="checkbox"/> 48 Hr <input type="checkbox"/> 72 Hr <input type="checkbox"/> Standard <input checked="" type="checkbox"/>

Date Results Needed

Just collected  
89°C

Temp Received:

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

Origins Laboratory, Inc.

*Jefe Pellegrini*

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: E14447.EC

Project: Mershon

Origins Laboratory

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

## Sample Receipt Checklist

Origins Work Order: **XS04133**

Client: **A.G. Wassenaar**

Client Project ID: **Mershon**

Checklist Completed by: **Jen Pellegrini**

Shipped Via: **HLD**  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: **4/9/15**

Airbill #: **N/A**

Matrix(s) Received: (Check all that apply): ☐ Soil/Solid ☒ Water ☐ Other: \_\_\_\_\_

Cooler Number/Temperature: **1** / **8.9** °C \_\_\_\_\_ / \_\_\_\_\_ °C \_\_\_\_\_ / \_\_\_\_\_ °C (Describe)

Thermometer ID: **1003**

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?		<input checked="" type="checkbox"/>		<b>sampled same day</b>
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 <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? <b>If yes, contact client and note in narrative.</b>		<input checked="" type="checkbox"/>		
Are samples preserved that require preservation and was it checked <sup>(1)</sup> ? (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 <sub>3</sub> , HCL, H <sub>2</sub> SO <sub>4</sub> / ( pH >10 for samples preserved with NaAsO <sub>2</sub> +NaOH, ZnAc+NaOH)	<input checked="" type="checkbox"/>			<b>HCL</b>
Additional Comments (if any):				

<sup>(1)</sup>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)

Date/Time Reviewed

Origins Laboratory, Inc.

*Jen Pellegrini*

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: E14447.EC

Project: Mershon

**MW-1**

**4/9/2015 12:20:00PM**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

**Origins Laboratory, Inc.**

**X504133-01 (Water)**

**BTEX by EPA 8260C**

Benzene	118	1.0	ug/L	1	5D15005	04/15/2015	04/16/2015
Toluene	4.6	1.0	"	"	"	"	"
Ethylbenzene	13.9	1.0	"	"	"	"	"
Xylenes, total	53.2	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4

104 % 87.3-113

"

"

"

Surrogate: Toluene-d8

103 % 90.9-108

"

"

"

Surrogate: 4-Bromofluorobenzene

92.6 % 88.6-111

"

"

"

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: E14447.EC

Project: Mershon

**MW-2**

**4/9/2015 12:15:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	--------------------	-------	----------	-------	----------	----------	-------

**Origins Laboratory, Inc.**  
**X504133-02 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5D15005	04/15/2015	04/16/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	103 %	87.3-113			"	"	"
Surrogate: Toluene-d8	102 %	90.9-108			"	"	"
Surrogate: 4-Bromofluorobenzene	92.2 %	88.6-111			"	"	"

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: E14447.EC

Project: Mershon

**MW-3**

**4/9/2015 12:20:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	--------------------	-------	----------	-------	----------	----------	-------

**Origins Laboratory, Inc.**  
**X504133-03 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5D15005	04/15/2015	04/16/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	103 %	87.3-113			"	"	"
Surrogate: Toluene-d8	102 %	90.9-108			"	"	"
Surrogate: 4-Bromofluorobenzene	92.5 %	88.6-111			"	"	"

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: E14447.EC

Project: Mershon

**MW-4**

**4/9/2015 12:15:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	--------------------	-------	----------	-------	----------	----------	-------

**Origins Laboratory, Inc.**  
**X504133-04 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5D15005	04/15/2015	04/16/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	103 %	87.3-113			"	"	"
Surrogate: Toluene-d8	100 %	90.9-108			"	"	"
Surrogate: 4-Bromofluorobenzene	91.5 %	88.6-111			"	"	"

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: E14447.EC

Project: Mershon

## 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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

#### Batch 5D15005 - EPA 5030B (Water)

#### Blank (5D15005-BLK1)

Prepared: 04/15/2015 Analyzed: 04/15/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5	102		87.3-113			
Surrogate: Toluene-d8	64		"	62.5	102		90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5	91.5		88.6-111			

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: E14447.EC

Project: Mershon

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch 5D15005 - EPA 5030B (Water)**

**Blank (5D15005-BLK2)**

Prepared: 04/15/2015 Analyzed: 04/15/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	65		"	62.5	104		87.3-113			
Surrogate: Toluene-d8	63		"	62.5	101		90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5	90.9		88.6-111			

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A.G. Wassenaar

2180 South Ivanhoe Street - Suite 5

Denver CO 80222

Rachel Peterson

Project Number: E14447.EC

Project: Mershon

**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 5D15005 - EPA 5030B (Water)**

**LCS (5D15005-BS1)**

Prepared: 04/15/2015 Analyzed: 04/15/2015

Benzene	42.6	1.0	ug/L	50.0		85.1	75-126			
Toluene	44.2	1.0	"	50.0		88.4	78.7-126			
Ethylbenzene	45.3	1.0	"	50.0		90.6	80-130			
m,p-Xylene	90.3	2.0	"	100		90.3	77.2-133			
o-Xylene	46.7	1.0	"	50.0		93.5	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	61		"	62.5		97.1	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		101	90.9-108			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		93.8	88.6-111			

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**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5D15005 - EPA 5030B (Water)**

**LCS (5D15005-BS2)**

Prepared: 04/15/2015 Analyzed: 04/15/2015

Benzene	52.4	1.0	ug/L	50.0		105	75-126			
Toluene	56.1	1.0	"	50.0		112	78.7-126			
Ethylbenzene	58.8	1.0	"	50.0		118	80-130			
m,p-Xylene	116	2.0	"	100		116	77.2-133			
o-Xylene	57.2	1.0	"	50.0		114	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		96.1	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		101	90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5		91.9	88.6-111			

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**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5D15005 - EPA 5030B (Water)**

Matrix Spike (5D15005-MS1)		Source: X504129-01			Prepared: 04/15/2015 Analyzed: 04/15/2015					
Benzene	49.6	1.0	ug/L	50.0	ND	99.1	74-130			
Toluene	52.1	1.0	"	50.0	ND	104	73-131			
Ethylbenzene	55.2	1.0	"	50.0	ND	110	76-132			
m,p-Xylene	108	2.0	"	100	ND	108	69-139			
o-Xylene	52.5	1.0	"	50.0	ND	105	74-131			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		95.2	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		101	90.9-108			
Surrogate: 4-Bromofluorobenzene	58		"	62.5		93.4	88.6-111			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5D15005 - EPA 5030B (Water)**

Matrix Spike (5D15005-MS2)		Source: X504129-02			Prepared: 04/15/2015 Analyzed: 04/16/2015					
Benzene	39.8	1.0	ug/L	50.0	ND	79.6	74-130			
Toluene	41.5	1.0	"	50.0	ND	82.9	73-131			
Ethylbenzene	42.3	1.0	"	50.0	ND	84.6	76-132			
m,p-Xylene	84.6	2.0	"	100	ND	84.6	69-139			
o-Xylene	42.1	1.0	"	50.0	ND	84.2	74-131			
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		96.2	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		101	90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5		92.0	88.6-111			

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## Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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#### Batch 5D15005 - EPA 5030B (Water)

Matrix Spike Dup (5D15005-MSD1)		Source: X504129-01			Prepared: 04/15/2015 Analyzed: 04/15/2015					
Benzene	48.1	1.0	ug/L	50.0	ND	96.2	74-130	2.93	20	
Toluene	49.4	1.0	"	50.0	ND	98.7	73-131	5.34	20	
Ethylbenzene	50.7	1.0	"	50.0	ND	101	76-132	8.40	20	
m,p-Xylene	102	2.0	"	100	ND	102	69-139	5.88	20	
o-Xylene	51.4	1.0	"	50.0	ND	103	74-131	2.14	20	
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		95.0	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		100	90.9-108			
Surrogate: 4-Bromofluorobenzene	58		"	62.5		93.3	88.6-111			

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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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**Batch 5D15005 - EPA 5030B (Water)**

Matrix Spike Dup (5D15005-MSD2)		Source: X504129-02			Prepared: 04/15/2015 Analyzed: 04/15/2015					
Benzene	44.5	1.0	ug/L	50.0	ND	89.0	74-130	11.2	20	
Toluene	47.5	1.0	"	50.0	ND	94.9	73-131	13.5	20	
Ethylbenzene	49.8	1.0	"	50.0	ND	99.5	76-132	16.1	20	
m,p-Xylene	98.9	2.0	"	100	ND	98.9	69-139	15.6	20	
o-Xylene	48.9	1.0	"	50.0	ND	97.8	74-131	14.9	20	
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		96.6	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		102	90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5		91.9	88.6-111			

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### Notes and Definitions

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