

State of Colorado  
Oil and Gas Conservation Commission

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



FOR OGCC USE ONLY

## 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.

OGCC Employee:

☐ Spill ☐ Complaint  
☐ Inspection ☐ NOAV

Tracking No:

## CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

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

## GENERAL INFORMATION

<b>OGCC Operator Number:</b> 47120		<b>Contact Name and Telephone</b>	
<b>Name of Operator:</b> Kerr-McGee Oil and Gas Onshore, LP		<b>Name:</b> Phillip Hamlin	
<b>Address:</b> 1099 18th Street, Suite 1800		<b>No:</b> 970-336-3500	
<b>City:</b> Denver <b>State:</b> CO <b>Zip:</b> 80202		<b>Fax:</b> 970-336-3656	
<b>API/Facility No:</b> 329576	<b>County:</b> Weld		
<b>Facility Name:</b> Warren	<b>Facility Number:</b> 63N67W29NESE		
<b>Well Name:</b> Warren	<b>Well Number:</b> 29-9L		
<b>Location (QtrQtr, Sec, Twp, Rng, Meridian):</b> NESE S29 T3N R67W		<b>Latitude:</b> 40.195527	<b>Longitude:</b> -104.906045

## TECHNICAL CONDITIONS

<b>Type of Waste Causing Impact (crude oil, condensate, produced water, etc.):</b> <u>Crude Oil and Produced Water</u>	
<b>Site Conditions:</b> Is location within a sensitive area (according to Rule 901e)? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N If yes, attach evaluation.	
<b>Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.):</b> <u>Crop Land</u>	
<b>Soil type, if not previously identified on Form 2A or Federal Surface Use Plan:</b> <u>Coarse sand, gravel/river rock</u>	
<b>Potential receptors (water wells within 1/4 mi, surface waters, etc.):</b> <u>The nearest surface water is located approximately 105' west of the site.</u>	
<u>The nearest water well is located approximately 742' south of the release area.</u>	
<b>Description of Impact (if previously provided, refer to that form or document):</b>	
<b>Impacted Media (check):</b>	<b>Extent of Impact:</b>
<input checked="" type="checkbox"/> Soils	15' (E-W) x 15' (N-S) x 19' bgs
<input type="checkbox"/> Vegetation	
<input checked="" type="checkbox"/> Groundwater	See attached data
<input type="checkbox"/> Surface water	
<b>How Determined:</b>	
<u>Excavation, soil sampling, and laboratory analysis</u>	
<u>Groundwater sampling and laboratory analysis</u>	

## REMEDIALATION WORKPLAN

<b>Describe initial action taken (if previously provided, refer to that form or document):</b> <p>On July 15, 2014, historical hydrocarbon impacts were discovered during replacement of the produced water sump at the Warren 63N67W29NESE production facility. The volume of released material is unknown. The well was shut in, associated underground infrastructure removed, and excavation activities commenced. Groundwater was not encountered in the excavation. An Initial Form 19 was submitted to the COGCC on July 18, 2014 (COGCC Document No. 400646026), and a Supplemental Form 19 was submitted on July 25, 2014 (COGCC Document No. 400649221). The COGCC has issued Spill Tracking Number 438253 for this release.</p>
<b>Describe how source is to be removed:</b> <p>On July 15, 2014, excavation activities commenced and approximately 290 cubic yards of impacted material were excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Excavation activities were guided in the field using a photoionization detector (PID) to measure volatile organic compound (VOC) concentrations in soil. Soil samples were collected from the sidewalls and base of the final extent of the excavation area at approximately 10 and 19 feet below ground surface (bgs), respectively. Soil samples were submitted to eAnalytics Laboratory in Loveland, Colorado for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA Method 8260, TPH - diesel range organics and oil range organics (DRO and ORO) by USEPA Method 8015. Laboratory results indicated that constituent concentrations in the soil samples collected from the final lateral extent of the excavation area were below applicable COGCC Table 910-1 standards. Benzene and TPH concentrations in the base sample (B01@19) were above the applicable COGCC Table 910-1 standards. Additional excavation was not completed due to unstable soils, and groundwater was not encountered in the excavation area. The excavation was subsequently backfilled and re-contoured to match pre-existing conditions; impacted soil was left in place to be addressed by future in-situ remediation. Soil analytical results are summarized in Table 1. Soil sample locations are illustrated on Figure 1 and laboratory analytical reports are included as Attachment A.</p>
<b>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.:</b> <p>Impacted soil was excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado. Impacted soil left in place at the base of the excavation will be treated using in-situ remediation technologies. Groundwater monitoring and remediation measures are described on the following page.</p>



State of Colorado  
Oil and Gas Conservation Commission

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



Tracking Number: \_\_\_\_\_  
Name of Operator: \_\_\_\_\_  
OGCC Operator No: \_\_\_\_\_  
Received Date: \_\_\_\_\_  
Well Name & No: \_\_\_\_\_  
Facility Name & No.: \_\_\_\_\_

REMEDIATION WORKPLAN (CONT.)

OGCC Employee: \_\_\_\_\_

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

On March 27, 2015, three temporary groundwater monitoring/remediation wells (BH01-BH03) were installed at the site to assess the extent of potential groundwater impacts. Groundwater samples are collected on a quarterly basis from the temporary monitoring wells and analyzed for BTEX by USEPA Method 8260; the most recent samples were collected on October 14, 2015. Temporary monitoring/remediation well locations and groundwater analytical results are illustrated on Figure 2, and a groundwater contour map, based on data collected on July 28, 2015, is presented on Figure 3. Groundwater analytical results are summarized in Table 2 and the groundwater laboratory analytical reports and well completion diagrams are included as Attachments A and B, respectively. Additional temporary monitoring wells may be installed in order to establish downgradient points of compliance. Quarterly groundwater monitoring at the temporary monitoring locations will be conducted until BTEX concentrations remain below COGCC groundwater standards for four consecutive quarters.

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 excavation has been backfilled with clean soil and graded to match the adjacent topography. Kerr-McGee's tank battery remains at the site. Reclamation activities at the site will be compliant with COGCC regulations.

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:

Impacted soil was left at the base of the excavation and will be addressed in-place. Temporary monitoring/remediation wells have been installed to assess groundwater impacts. Soil and groundwater analytical results are summarized in Tables 1 and 2, respectively. The analytical laboratory reports are included as Attachment A.

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

Impacted soil was transported to the Front Range Regional Landfill in Erie, Colorado for disposal. Impacted groundwater was transported to a licensed injection facility for disposal.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 7/15/2014	Date Site Investigation Completed: TBD	Remediation Plan Submitted: _____
Remediation Start Date: 7/15/2014	Anticipated Completion Date: 4/15/2017	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: Phillip Hamlin

Signed: [Signature] Title: Senior HSE Representative Date: 12/6/15

OGCC Approved: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

## FIGURES



DATE:	October 29, 2015
DESIGNED BY:	R. Bruner
DRAWN BY:	R. Bruner



**Kerr-McGee Oil and Gas Onshore, LP**  
**WARREN 63N67W29NESE**  
NESE, Section 29, Township 3 North, Range 67 West  
Weld County, Colorado

Sample Location  
Map

FIGURE  
1





DATE:	October 29, 2015
DESIGNED BY:	R. Bruner
DRAWN BY:	R. Bruner



**Kerr-McGee Oil and Gas Onshore, LP**  
**WARREN 63N67W29NESE**  
NESE, Section 29, Township 3 North, Range 67 West  
Weld County, Colorado

Groundwater Sample Results  
Map (10/14/2015)

FIGURE  
2





DATE:	October 29, 2015
DESIGNED BY:	R. Bruner
DRAWN BY:	R. Bruner



Kerr-McGee Oil and Gas Onshore, LP  
WARREN 63N67W29NESE  
NESE, Section 29, Township 3 North, Range 67 West  
Weld County, Colorado

Groundwater Elevation Contour  
Map (07/28/2015)

FIGURE  
3

**ANALYTICAL  
TABLES**

**TABLE 1**  
**WARREN 63N67W29NESE**  
**SOIL SAMPLE RESULTS SUMMARY TABLE**  
**KERR-McGEE OIL AND GAS ONSHORE LP**

Sample ID	Date	Depth (ft. bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	TVPH-GRO (mg/kg)	TEPH-DRO (mg/kg)	TEPH-ORO (mg/kg)
<b>COGCC standards for soil (mg/kg) <sup>(1)</sup></b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500</b>		
W01 @ 10	07/15/14	10	<0.01	<0.01	<0.01	<0.01	<50	<50	<50
E01 @ 10	07/15/14	10	<0.01	<0.01	<0.01	<0.01	<50	<50	<50
N01 @ 10	07/15/14	10	<0.01	<0.01	<0.01	<0.01	<50	<50	<50
S01 @ 10	07/15/14	10	<0.01	<0.01	<0.01	<0.01	<50	<50	<50
B01 @ 19	07/15/14	19	<b>0.948</b>	13.4	5.19	49.5	<b>2465</b>	<b>604</b>	58.2

**Notes:**

1. Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.

COGCC = Colorado Oil and Gas Conservation Commission

(<) = Analytical result is less than the indicated laboratory reporting limit

TVPH - GRO = Total volatile petroleum hydrocarbons - gasoline range organics

TEPH - DRO = Total extractable petroleum hydrocarbons - diesel range organics

TEPH - ORO = Total extractable petroleum hydrocarbons - oil range organics

mg/kg = Milligrams per kilogram

ft. bgs = Feet below ground surface

**BOLD** = Analytical result is in exceedance of COGCC Table 910-1 soil standards



**TABLE 2**  
**WARREN 63N67W29NESE**  
**GROUNDWATER RESULTS SUMMARY TABLE**  
**KERR-McGEE OIL AND GAS ONSHORE LP**

Sample ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth To Water (ft. bgs)
<b>COGCC Standards for groundwater (µg/L) <sup>(1)</sup></b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>	
BH01	04/03/15	NS	NS	NS	NS	DRY
BH01	07/28/15	<b>18.3</b>	1	<1.0	80.8	20.75
BH01	10/14/15	NS	NS	NS	NS	DRY
BH02	04/03/15	NS	NS	NS	NS	DRY
BH02	07/28/15	<b>66.1</b>	7.4	32.4	235	20.80
BH02	10/14/15	6.4	<2.0	8.9	9.0	25.81
BH03	04/03/15	NS	NS	NS	NS	DRY
BH03	07/28/15	<1.0	<1.0	<1.0	<1.0	22.98
BH03	10/14/15	NS	NS	NS	NS	DRY

**Notes:**

1. Standards for groundwater are taken from 2 CCR 404-1, Table 910-1, effective February 1, 2014.

COGCC = Colorado Oil and Gas Conservation Commission

(<) = Analytical result is less than the indicated laboratory reporting limit

µg/L = Micrograms per liter

ft. bgs = Feet below ground surface

NS = Not Sampled

**BOLD** = Analytical result is in exceedance of COGCC Table 910-1 groundwater standards

**ATTACHMENT A  
LABORATORY  
ANALYTICAL REPORTS**



# Test Report



July 16, 2014

Client: Tasman Geosciences / Anadarko

Project: Warren 29-9L & 29-16L

Lab ID: 1780

Date Samples Received: 7/15/2014

Number of Samples: 5

Sample Condition: Samples arrived intact and in appropriate sample containers

Sample Temperature: Within acceptable range of 2-6° C, or as specified in EPA Method

The quality control procedures associated with the requested analyses were satisfactorily passed before the samples were run.

Thank you for allowing eAnalytics Laboratory to provide laboratory services for you.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Dieken".

Christopher Dieken  
Quality Assurance Manager

A handwritten signature in black ink, appearing to read "Todd Rhea".

Todd Rhea  
Laboratory Manager

**eAnalytics Laboratory**

1767 Rocky Mountain Avenue Loveland CO 80538

## Chain of Custody

**e**ANALYTICS  
LABORATORY

Chain of Custody Form

# eANALYTICS LABORATORY

1767 Rocky Mountain Avenue Loveland CO 80538

Phone: (970) 667-6975

Fax: (970) 669-0941

www.eAnalyticsLab.com

**CLIENT INFORMATION**

(\*New Clients please fill out completely)

Company: Tasman Geosciences / Anadarko  
Project: Warren 29-9L & 29H6L  
Project Manager: Paul Schneider / Phil Hamlin  
Sampler: Christine Wasko  
Phone/Email: 720-409-8791 / cwasko@tasman-geo.com  
Address: 6899 Pecos Street, Unit C  
Denver, CO 80221

**ANALYSIS INFORMATION**

(Select analysis by checking box on corresponding sample line)

Other Analysis

Lab ID	Sample Name	Sampling Date/Time	Number of Containers	Matrix (S) Soil (W) Water (V) Vapor (O) Other	BTEX (EPA 8260)	BTEX/GRO (EPA 8260)	DRO/GRO (EPA 8015)	TPH-GRO/DRO/GRO (EPA 8260/8015)	SAR (US Dept of Ag Method 20B)	EC (US Dept of Ag Method 3)	pH (EPA 9045D)	Other Analysis
1	N01C10,	7/15/14 930 AM	1	S		X	X					
2	E01C10,	935 AM										
3	N01C10,	940 AM										
4	E01C10,	K2R										
5	B01C19,	1330 PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										
		AM / PM										

Comments:

**Turnaround Time (Business Days)**

TAT begins when sample is received by eANALYTICS

☐ Normal (5-10 Days)  
☐ 3 Day (1.25x)  
☐ 1 Day (2x)  
☐ Same Day (3x)  
☐ Next Bus. Morning (APC Pricing)

If Rush analysis requires an extra charge.  
possible please inform eANALYTICS in advance  
for rush analysis.

**For eANALYTICS Use**

Samples Received Intact

Received Within Temperature Range (2-6°C)

Sample Preservative

None

☒ Yes No  
☒ Yes No  
Acid  
Other

**Record of Custody**

Relinquished by:

Company:

Received by:

Company:

Relinquished by:

Company:

Received by:

Company:

Date

Date

Time

Date

Time

Date

Time

7/15/14 1200 AM PM

7/15/14 1200 AM PM

WO # 88584726  
1780

**eANALYTICS: Environmental testing made Easy**

Page of

## eAnalytics Laboratory

1767 Rocky Mountain Avenue Loveland CO 80538

The results contained within this report relate only to the items analyzed



# eANALYTICS

## LABORATORY

Client: Tasman Geosciences / Anadarko Lab ID: 1780

Project: Warren 29-9L & 29-16L

Analysis: Volatile Organics Method: EPA8260  
TPH EPA8260/8015

Sample Name	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPH GRO C6-C10	TPH DRO C10-C28	TPH ORO C28-C36	Date Sampled	Date Analyzed	Lab ID	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
W01 @ 10	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	< 50	07/15/14	07/15/14	1780	1
E01 @ 10'	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	< 50	07/15/14	07/15/14	1780	2
N01 @ 10'	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	< 50	07/15/14	07/15/14	1780	3
S01 @ 10'	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	< 50	07/15/14	07/15/14	1780	4
B01 @ 19'	<b>0.948</b>	<b>13.4</b>	<b>5.19</b>	<b>49.5</b>	<b>2465</b>	<b>604</b>	<b>58.2</b>	07/15/14	07/15/14	1780	5

**eAnalytics Laboratory**

1767 Rocky Mountain Avenue Loveland CO 80538

**e**ANALYTICS  
LABORATORY

Client: Tasman Geosciences / Anadarko

Lab ID: 1780

Project: Warren 29-9L &amp; 29-16L

Method: EPA8260

Sample Name	Dibromo- fluoromethane % Recovery	1,2 Dichloro- ethane-D4 % Recovery	Toluene-D8 % Recovery	Bromo- fluorobenzene % Recovery	Date Sampled	Date Analyzed	Lab ID
W01 @ 10	104	92	87	91	07/15/14	07/15/14	1780 1
E01 @ 10'	100	101	95	87	07/15/14	07/15/14	1780 2
N01 @ 10'	107	105	87	93	07/15/14	07/15/14	1780 3
S01 @ 10'	104	101	97	89	07/15/14	07/15/14	1780 4
B01 @ 19'	108	91	101	109	07/15/14	07/15/14	1780 5

**eAnalytics Laboratory**

1767 Rocky Mountain Avenue Loveland CO 80538



# eANALYTICS

## LABORATORY

Client: Tasman Geosciences / Anadarko

Lab ID: 1780

Project: Warren 29-9L &amp; 29-16L

Analysis: Volatile Organics  
TPHMethod: EPA8260  
EPA8260/8015

Sample Name								Date Analyzed	Lab ID	
	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPH GRO C6-C10	TPH DRO C10-C28	TPH ORO C28-C36			
	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec	% Rec			
Laboratory Control Sample	96	101	93	96	89	101	100	07/15/14	LCS	1780 1
(70-130%)										
Method Blank	< 0.01	< 0.01	< 0.01	< 0.01	< 50	< 50	< 50	07/15/14	MB	1780 1
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			

**eAnalytics Laboratory**

1767 Rocky Mountain Avenue Loveland CO 80538



August 03, 2015

Tasman Geosciences

Bob Cornez

6899 Pecos Street, Unit C

Denver

CO 80211

Project Name - KMG - Warren 29-9L, 29-16L

Project Number - [none]

Attached are your analytical results for KMG - Warren 29-9L, 29-16L received by Origins Laboratory, Inc. July 28, 2015. This project is associated with Origins project number X507382-01.

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

Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Bob Cornez

Project Number: [none]

Project: KMG - Warren 29-9L, 29-16L

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	X507382-01	Water	July 28, 2015 14:20	07/28/2015 16:38
BH02	X507382-02	Water	July 28, 2015 14:28	07/28/2015 16:38
BH03	X507382-03	Water	July 28, 2015 14:35	07/28/2015 16:38

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.*

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

ORIGINS

XS07382

page 1 of 1

Client: **Tasman (APC)**  
Address:   
Telephone Number:   
Email Address: **Bob.Cornez@tasmangeo.com**

Project Manager: **Bob Cornez**  
Project Name: **Warren 29-9L, 29-16L**  
Project Number:   
Samples Collected by: **Matt P.**

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Soil	Groundwater	Air Sample #	Other	Analysis	Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other						
BH01	7/28/15	1420	3	X				X				BTEX B260	1
BH02		1428	3	X				X					2
BH03		1435	3	X				X					3
													4
													5
													6
													7
													8
													9
													10

Relinquished By: *[Signature]* Date: 7/28/15 Time: 1615  
Relinquished By: *[Signature]* Date: 7/28/15 Time: 1638

Received By: *[Signature]* Date: 7/28/15 Time: 1638  
Received By: *[Signature]* Date: 7/28/15 Time: 1638

Turnaround Time: Same Day ☐ 24 Hr ☐ 48 Hr ☐ 72 Hr ☐ Standard ☒ 5.9

Origins Laboratory, Inc.

*Jeff 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.



Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

Origins Laboratory

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

## Sample Receipt Checklist

Origins Work Order: XS07382

Client: Tasman

Client Project ID: KMG-warren

Checklist Completed by: Jeff Smith

Shipped Via: HD

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 7/29/15

Airbill #: N/A

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

Cooler Number/Temperature: 1 5.9 °C 1 °C 1 °C (Describe) °C

Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C <sup>(1)</sup> ?	X			
Is there ice present (document if blue ice is used)	X			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		X		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		X		
Were all samples received intact <sup>(1)</sup> ?	X			
Was adequate sample volume provided <sup>(1)</sup> ?	X			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?		X		
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	X			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	X			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	X			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	X			
For volatiles in water — is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		X		
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)	X			
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) Jeff Smith

Date/Time Reviewed 7/29/15

Origins Laboratory, Inc.

*Jeff 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.

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

BH01

7/28/2015 2:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X507382-01 (Water)**

**BTEX by EPA 8260C**

Benzene	18.3	1.0	ug/L	1	5G29009	07/29/2015	07/30/2015
Toluene	1.0	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	80.8	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	115 %	84-121			"	"	"
Surrogate: Toluene-d8	98.5 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	92.8 %	84-114			"	"	"

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.

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

BH02

7/28/2015 2:28:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X507382-02 (Water)**

**BTEX by EPA 8260C**

Benzene	66.1	1.0	ug/L	1	5G29009	07/29/2015	07/30/2015
Toluene	7.4	1.0	"	"	"	"	"
Ethylbenzene	32.4	1.0	"	"	"	"	"
Xylenes, total	235	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	118 %	84-121			"	"	"
Surrogate: Toluene-d8	101 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	90.0 %	84-114			"	"	"

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

BH03

7/28/2015 2:35:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X507382-03 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5G29009	07/29/2015	07/30/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	119 %	84-121			"	"	"
Surrogate: Toluene-d8	100 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	92.6 %	84-114			"	"	"

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.



Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

**Blank (5G29009-BLK1)**

Prepared: 07/29/2015 Analyzed: 07/30/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5	110		87.3-113			
Surrogate: Toluene-d8	63		"	62.5	101		90.9-108			
Surrogate: 4-Bromofluorobenzene	58		"	62.5	92.9		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.*

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

**Blank (5G29009-BLK2)**

Prepared: 07/29/2015 Analyzed: 07/30/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5	111		87.3-113			
Surrogate: Toluene-d8	63		"	62.5	100		90.9-108			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	97.6		88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

**LCS (5G29009-BS1)**

Prepared: 07/29/2015 Analyzed: 07/30/2015

Benzene	52.2	1.0	ug/L	50.0		104	75-126			
Toluene	50.2	1.0	"	50.0		100	78.7-126			
Ethylbenzene	52.6	1.0	"	50.0		105	80-130			
m,p-Xylene	105	2.0	"	100		105	77.2-133			
o-Xylene	50.7	1.0	"	50.0		101	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	67		"	62.5		108	87.3-113			
Surrogate: Toluene-d8	62		"	62.5		98.6	90.9-108			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		94.9	88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

**LCS (5G29009-BS2)**

Prepared: 07/29/2015 Analyzed: 07/30/2015

Benzene	48.9	1.0	ug/L	50.0		97.7	75-126			
Toluene	45.8	1.0	"	50.0		91.6	78.7-126			
Ethylbenzene	46.9	1.0	"	50.0		93.9	80-130			
m,p-Xylene	93.4	2.0	"	100		93.4	77.2-133			
o-Xylene	47.4	1.0	"	50.0		94.8	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5		105	87.3-113			
Surrogate: Toluene-d8	62		"	62.5		99.6	90.9-108			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.1	88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

Matrix Spike (5G29009-MS1)		Source: X507382-01			Prepared: 07/29/2015 Analyzed: 07/30/2015					
Benzene	88.8	1.0	ug/L	50.0	18.3	141	74-130			QM-07
Toluene	58.5	1.0	"	50.0	1.0	115	73-131			
Ethylbenzene	58.6	1.0	"	50.0	ND	117	76-132			
m,p-Xylene	194	2.0	"	100	56.3	137	69-139			
o-Xylene	90.7	1.0	"	50.0	24.6	132	74-131			QM-07
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5		110	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		101	90.9-108			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		93.9	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.*

Jen Pellegrini For Noelle Doyle Mathis, President

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

Matrix Spike (5G29009-MS2)		Source: X507382-02			Prepared: 07/29/2015 Analyzed: 07/30/2015					
Benzene	61.8	1.0	ug/L	50.0	66.1	NR	74-130			QM-07
Toluene	53.5	1.0	"	50.0	7.4	92.2	73-131			
Ethylbenzene	60.0	1.0	"	50.0	32.4	55.2	76-132			QM-07
m,p-Xylene	163	2.0	"	100	179	NR	69-139			QM-07
o-Xylene	68.8	1.0	"	50.0	56.6	24.3	74-131			QM-07
Surrogate: 1,2-Dichloroethane-d4	71		"	62.5		114	87.3-113			
Surrogate: Toluene-d8	66		"	62.5		105	90.9-108			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		94.1	88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

Matrix Spike Dup (5G29009-MSD1)		Source: X507382-01			Prepared: 07/29/2015 Analyzed: 07/30/2015					
Benzene	83.3	1.0	ug/L	50.0	18.3	130	74-130	6.36	20	
Toluene	60.0	1.0	"	50.0	1.0	118	73-131	2.55	20	
Ethylbenzene	60.0	1.0	"	50.0	ND	120	76-132	2.35	20	
m,p-Xylene	185	2.0	"	100	56.3	129	69-139	4.66	20	
o-Xylene	87.1	1.0	"	50.0	24.6	125	74-131	4.03	20	
Surrogate: 1,2-Dichloroethane-d4	70		"	62.5		112	87.3-113			
Surrogate: Toluene-d8	61		"	62.5		98.1	90.9-108			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.7	88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Bob Cornez  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5G29009 - EPA 5030B (Water)**

Matrix Spike Dup (5G29009-MSD2)		Source: X507382-02			Prepared: 07/29/2015 Analyzed: 07/30/2015					
Benzene	76.6	1.0	ug/L	50.0	66.1	20.9	74-130	21.3	20	QM-07
Toluene	56.0	1.0	"	50.0	7.4	97.4	73-131	4.71	20	
Ethylbenzene	66.0	1.0	"	50.0	32.4	67.3	76-132	9.59	20	QM-07
m,p-Xylene	196	2.0	"	100	179	17.1	69-139	18.1	20	QM-07
o-Xylene	78.5	1.0	"	50.0	56.6	43.7	74-131	13.2	20	QM-07
Surrogate: 1,2-Dichloroethane-d4	70		"	62.5		111	87.3-113			
Surrogate: Toluene-d8	62		"	62.5		99.6	90.9-108			
Surrogate: 4-Bromofluorobenzene	57		"	62.5		91.6	88.6-111			

Origins Laboratory, Inc.



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Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Bob Cornez

Project Number: [none]

Project: KMG - Warren 29-9L, 29-16L

---

### Notes and Definitions

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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

---

Jen Pellegrini For Noelle Doyle Mathis, President



October 21, 2015

Tasman Geosciences

Christine Wasko

6899 Pecos Street, Unit C

Denver

CO 80211

Project Name - KMG - Warren 29-9L, 29-16L

Project Number - [none]

Attached are your analytical results for KMG - Warren 29-9L, 29-16L received by Origins Laboratory, Inc. October 14, 2015. This project is associated with Origins project number X510169-01.

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

Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Christine Wasko

Project Number: [none]

Project: KMG - Warren 29-9L, 29-16L

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH02	X510169-01	Water	October 14, 2015 10:02	10/14/2015 15:00

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.*

Jen Pellegrini For Noelle Doyle Mathis, President

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

www.originslaboratory.com

page 1 of 1

**ORIGINS** LABORATORY, INC

Client: ARC Midstream - Tasman

Project Manager: Christine Wasko

Address:

Project Name: ARC Warren 29-9L, 29-16L

Project Number:

Telephone Number: 735-554-7592

Samples Collected By: Kevin Wasko

Email Address:

ARC Invoice: Phil Hemlin

XS10169

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative					Matrix			Analysis	Sample Instructions
				Unpreserved	HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summer #	Other		
BH02	10/14/15	10:02	2	X				X				SILCO BTEX	1
													2
													3
													4
													5
													6
													7
													8
													9
													10

Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Turnaround Time:
Kevin Wasko	10/14/15	1:50	[Signature]	10/14/15	1:50	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"/> 24 Hr

Data Results Needed

1 725 Eik 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.

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

Origins Laboratory

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

## Sample Receipt Checklist

Origins Work Order: XS10169

Client: Tasman

Client Project ID: KMG - Warren

Checklist Completed by: Jeff Smith

Shipped Via: 41D  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 01/15/15

Airbill #: N/A

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

Cooler Number/Temperature: 1 126.6 °C 1 °C 1 °C 1 °C

Thermometer ID: TOUS

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"/>		<u>sampled same day</u>
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? If yes, contact client and note in narrative.		<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"/>			<u>HCL</u>
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.

Jeff Smith  
Reviewed by (Project Manager)

10/5/15  
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.



Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

BH02

10/14/2015 10:02:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X510169-01 (Water)**

**BTEX by EPA 8260C**

Benzene	6.4	2.0	ug/L	2	5J16006	10/16/2015	10/17/2015
Toluene	ND	2.0	"	"	"	"	"
Ethylbenzene	8.9	2.0	"	"	"	"	"
Xylenes, total	9.0	2.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	87.9 %	84-121			"	"	"
Surrogate: Toluene-d8	100 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	96.1 %	84-114			"	"	"

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.

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5J16006 - EPA 5030B (Water)**

**Blank (5J16006-BLK1)**

Prepared: 10/16/2015 Analyzed: 10/16/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	56		"	62.5	89.1	84-121				
Surrogate: Toluene-d8	62		"	62.5	98.4	85-115				
Surrogate: 4-Bromofluorobenzene	60		"	62.5	96.7	84-114				

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.

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5J16006 - EPA 5030B (Water)**

**LCS (5J16006-BS1)**

Prepared: 10/16/2015 Analyzed: 10/16/2015

Benzene	56.2	1.0	ug/L	50.0	112	75-126
Toluene	54.0	1.0	"	50.0	108	78.7-126
Ethylbenzene	53.2	1.0	"	50.0	106	80-130
m,p-Xylene	106	2.0	"	100	106	77.2-133
o-Xylene	55.2	1.0	"	50.0	110	77.9-126
Surrogate: 1,2-Dichloroethane-d4	51		"	62.5	81.3	84-121
Surrogate: Toluene-d8	63		"	62.5	101	85-115
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.2	84-114

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.*

Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5J16006 - EPA 5030B (Water)**

Matrix Spike (5J16006-MS1)		Source: X510168-01			Prepared: 10/16/2015 Analyzed: 10/16/2015					
Benzene	61.1	1.0	ug/L	50.0	ND	122	74-130			
Toluene	58.7	1.0	"	50.0	ND	117	73-131			
Ethylbenzene	58.9	1.0	"	50.0	ND	118	76-132			
m,p-Xylene	117	2.0	"	100	ND	117	69-139			
o-Xylene	56.4	1.0	"	50.0	ND	113	74-131			
Surrogate: 1,2-Dichloroethane-d4	57		"	62.5		91.9	84-121			
Surrogate: Toluene-d8	62		"	62.5		99.4	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.7	84-114			

Origins Laboratory, Inc.



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Tasman Geosciences  
6899 Pecos Street, Unit C  
Denver CO 80211

Christine Wasko  
Project Number: [none]  
Project: KMG - Warren 29-9L, 29-16L

**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 5J16006 - EPA 5030B (Water)**

Matrix Spike Dup (5J16006-MSD1)		Source: X510168-01			Prepared: 10/16/2015 Analyzed: 10/16/2015					
Benzene	57.1	1.0	ug/L	50.0	ND	114	74-130	6.77	20	
Toluene	54.4	1.0	"	50.0	ND	109	73-131	7.48	20	
Ethylbenzene	54.8	1.0	"	50.0	ND	110	76-132	7.34	20	
m,p-Xylene	109	2.0	"	100	ND	109	69-139	7.16	20	
o-Xylene	53.1	1.0	"	50.0	ND	106	74-131	5.94	20	
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		92.2	84-121			
Surrogate: Toluene-d8	62		"	62.5		98.4	85-115			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.8	84-114			

Origins Laboratory, Inc.



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Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Christine Wasko

Project Number: [none]

Project: KMG - Warren 29-9L, 29-16L

### 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.

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

**ATTACHMENT B  
SOIL BORING &  
WELL COMPLETION  
LOGS**



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Kerr-McGee Oil and Gas Onshore, LP

LOGGED BY: Jason Spector

PROJECT MANAGER: Robert Cornez

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Direct Push

DRILL BIT SIZE (INCHES): 2 3/8"

DATE STARTED - COMPLETED: 3/27/2015

TOTAL WELL DEPTH (FT. BGS): 27

DEPTH TO WATER (FT. BGS): Dry (10/14/15)

Warren 63N67W29NESE

BORING / WELL ID: BH01

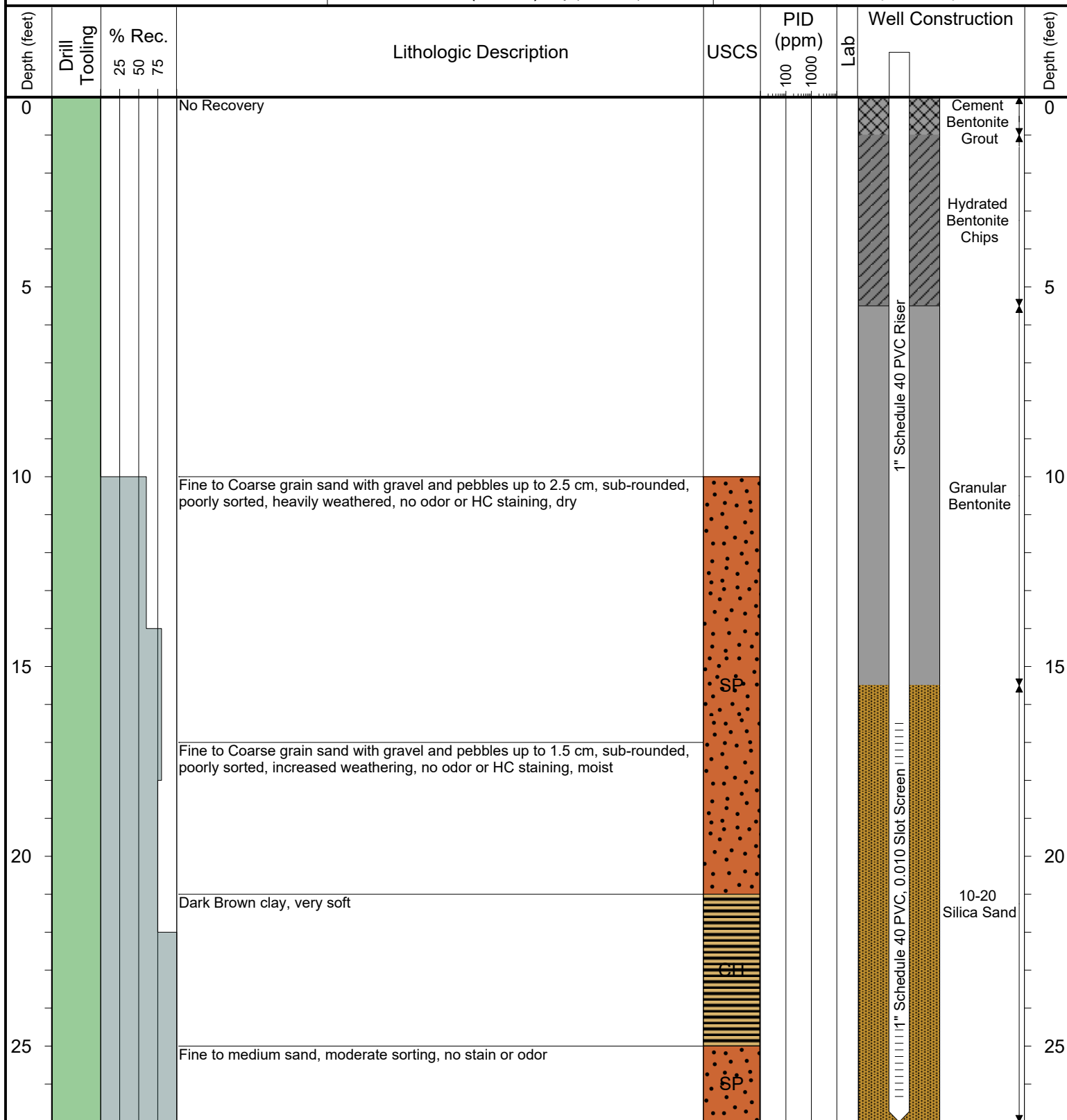
LOCATION: Weld County, Colorado

NORTHING (CO STATE PLANE): 40.189848

EASTING (CO STATE PLANE): -104.904937

CASING ELEVATION (FT. AMSL): 4802.94

GROUND ELEVATION (FT. AMSL): 4802.65



Drilling / Sample Method:

Macro-Core

Expendable Well Tip

Perforated Injection Tool

HydroPunch Groundwater Sampler

Laboratory Sample Types:

Geotechnical Lab

Analytical Chemistry Lab

Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Kerr-McGee Oil and Gas Onshore, LP

LOGGED BY: Jason Spector

PROJECT MANAGER: Robert Cornez

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Direct Push

DRILL BIT SIZE (INCHES): 2 3/8"

DATE STARTED - COMPLETED: 3/27/2015

TOTAL WELL DEPTH (FT. BGS): 27

DEPTH TO WATER (FT. BGS): 25.72 (10/14/15) ▼

Warren 63N67W29NESE

BORING / WELL ID: BH02

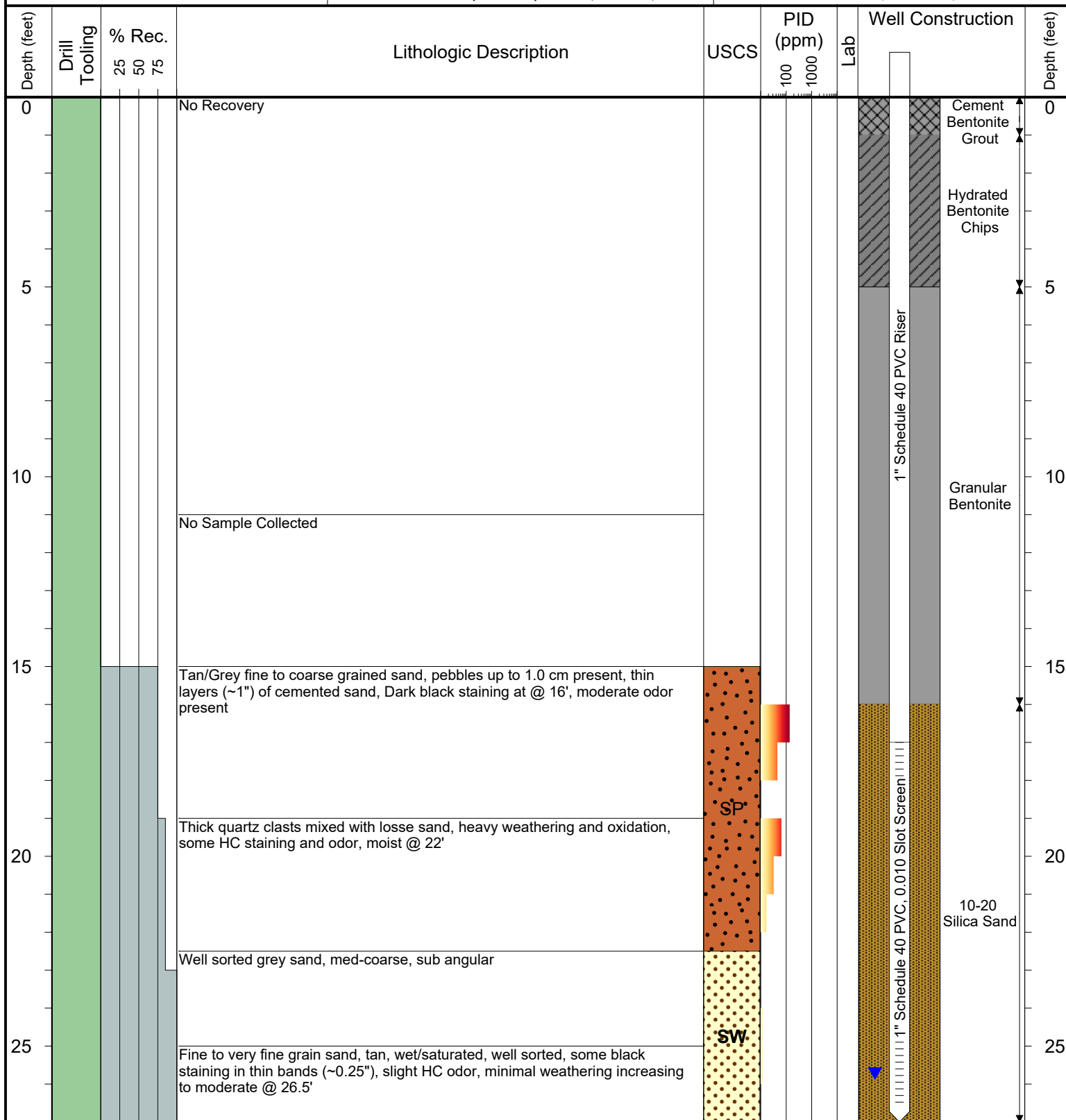
LOCATION: Weld County, Colorado

NORTHING (CO STATE PLANE): 40.189837

EASTING (CO STATE PLANE): -104.904851

CASING ELEVATION (FT. AMSL): 4802.69

GROUND ELEVATION (FT. AMSL): 4802.23



**Drilling / Sample Method:**

Macro-Core

Expendable Well Tip

Perforated Injection Tool

HydroPunch Groundwater Sampler

**Laboratory Sample Types:**

Geotechnical Lab

Analytical Chemistry Lab

Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Kerr-McGee Oil and Gas Onshore, LP

LOGGED BY: Jason Spector

PROJECT MANAGER: Robert Cornez

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Direct Push

DRILL BIT SIZE (INCHES): 2 3/8"

DATE STARTED - COMPLETED: 3/27/2015

TOTAL WELL DEPTH (FT. BGS): 28

DEPTH TO WATER (FT. BGS): Dry (10/14/15) ▼

Warren 63N67W29NESE

BORING / WELL ID: BH03

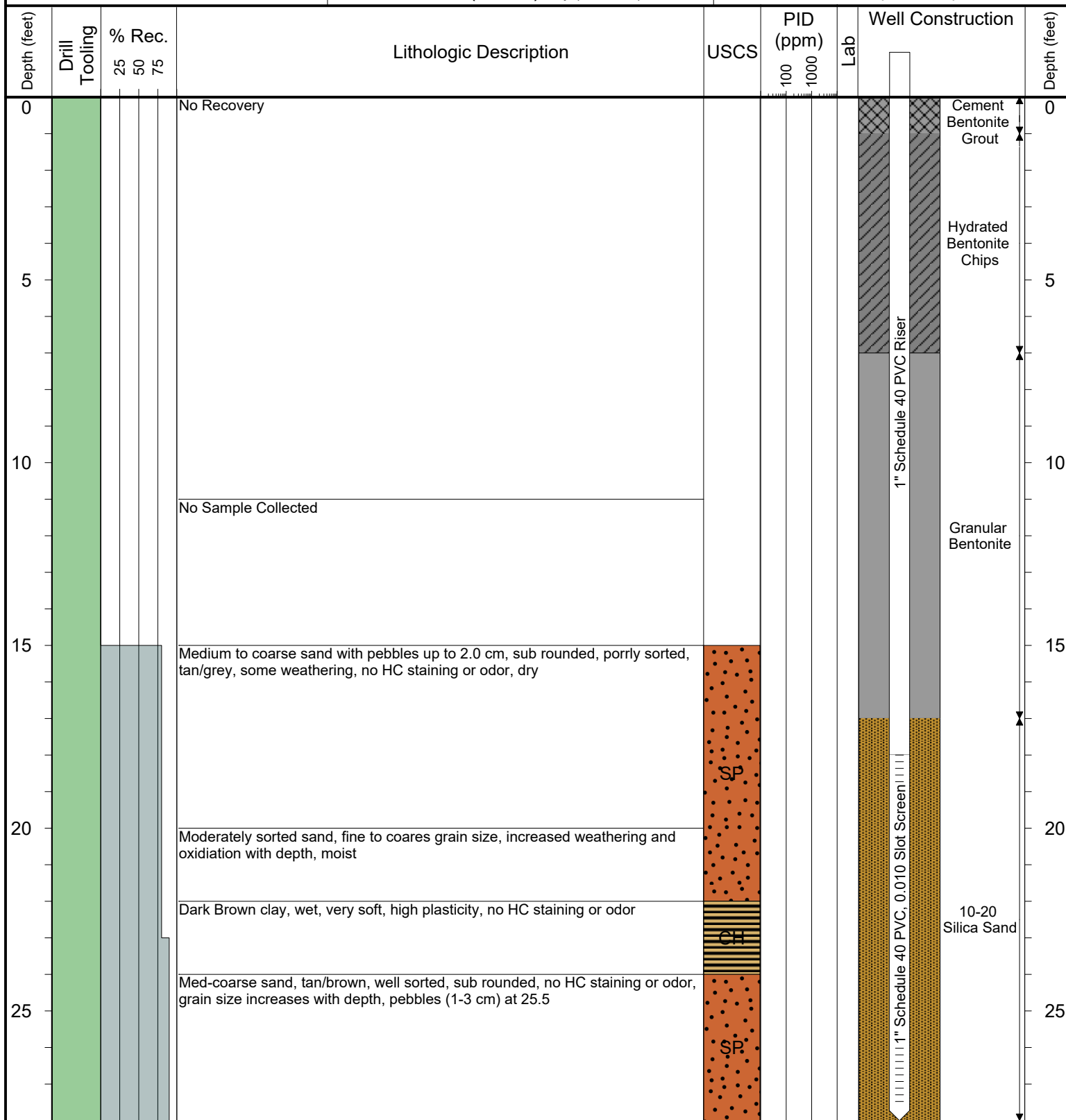
LOCATION: Weld County, Colorado

NORTHING (CO STATE PLANE): 40.189802

EASTING (CO STATE PLANE): -104.904977

CASING ELEVATION (FT. AMSL): 4803.07

GROUND ELEVATION (FT. AMSL): 4802.82



Drilling / Sample Method:

Macro-Core

Expendable Well Tip

Perforated Injection Tool

HydroPunch Groundwater Sampler

Laboratory Sample Types:

Geotechnical Lab

Analytical Chemistry Lab

Geotechnical & Analytical Chemistry Lab