

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

#6943

RECEIVED  
3/30/2012

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

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

☒ Spill ☐ Complaint☐ Inspection ☐ NOAV

Tracking No: 2222956

## GENERAL INFORMATION

<b>OGCC Operator Number:</b> 69175		<b>Contact Name and Telephone</b>	
<b>Name of Operator:</b> Petroleum Development Corporation		<b>Name:</b> Brandon Bruns	
<b>Address:</b> 1775 Sherman Street, Suite 3000		<b>No:</b> (303) 860-5800	
<b>City:</b> Denver <b>State:</b> CO <b>Zip:</b> 80203		<b>Fax:</b> (303) 860-5838	
<b>API/Facility No:</b> 05-123-20281		<b>County:</b> Weld	
<b>Facility Name:</b> Olson 13, 14, 23, 24-29		<b>Facility Number:</b> 05-123-20281	
<b>Well Name:</b> Olson 13, 14, 23, 24-29		<b>Well Number:</b> Olson 13, 14, 23, 24-29	
<b>Location (QtrQtr, Sec, Twp, Rng, Meridian):</b> SESW 29 T4N R67W 6th PM		<b>Latitude:</b> 40.277043 <b>Longitude:</b> -104.913977	

## TECHNICAL CONDITIONS

<b>Type of Waste Causing Impact (crude oil, condensate, produced water, etc.):</b> <u>Condensate</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>Livestock grazing, residential, and cultivated.</u>		
<b>Soil type, if not previously identified on Form 2A or Federal Surface Use Plan:</b> <u>Silt/Sand</u>		
<b>Potential receptors (water wells within 1/4 mi, surface waters, etc.):</b> <u>Surface water area is located approximately 450' to the west of the Tank Battery, a roadside ditch ~50' to the south, and residential buildings are located ~130' west; depth to groundwater is estimated to be &gt;30 ft bgs.</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>	<b>How Determined:</b>
<input checked="" type="checkbox"/> Soils	<u>Form 19 submitted on February 20, 2012</u>	<u>Excavation, geoprobing, and soil sampling</u>
<input type="checkbox"/> Vegetation	_____	_____
<input type="checkbox"/> Groundwater	_____	_____
<input type="checkbox"/> Surface water	_____	_____

## REMEDIAL WORKPLAN

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

A Form 19 was submitted on February 20, 2012, COGCC assigned spill tracking #2222956 to the incident. An aerial map of the site is included on Figure 1.

Describe how source is to be removed:

The source area was previously excavated and impacted material was transported and disposed of as described in the Form 19 submitted on February 20, 2012.

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.:

PDC plans to inject a chemical oxidant (chemox) to address residual hydrocarbon impacts within the subsurface at the Site. The chemox will be injected through two temporary monitoring well locations (BH-03 and BH-06) that were installed during geoprobing activities (illustrated on Figure 2), as well as two additional geoprobe injection points that will be installed during injection activities. Additionally, PDC plans to install one temporary horizontal boring beneath the separator secondary containment to be utilized for chemox injection activities. PDC will subsequently conduct geoprobing and soil sampling activities near the monitoring well locations to determine if injection activities successfully remediated residual hydrocarbon impacts at the Site. Should confirmation soil samples indicate that concentrations are below the COGCC Table 910-1 limits for hydrocarbon impacts, an NFA letter will be submitted and the temporary monitoring locations will be abandoned. However, should the soil samples indicate that hydrocarbon impacts continue to exceed the Table 910-1 limits, PDC will evaluate further remedial alternatives.

State of Colorado  
Oil and Gas Conservation Commission

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



Tracking Number: 2222956  
Name of Operator: Petroleum Development Corporation  
OGCC Operator No: 69175  
Received Date:  
Well Name & No: Olson 13, 14, 23, 24-29  
Facility Name & No.: Olson 13, 14, 23, 24-29

REMEDIAL WORKPLAN (CONT.)

OGCC Employee

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):  
Groundwater was not encountered during excavation or geoprobing activities.

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 area where the excavation is located is used as an equipment access area to the tank battery location as well as the bermed separator secondary containment and consists of road base. The excavation has been backfilled and compacted with clean material and the ground surface was contoured to match pre-existing conditions.

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:

The extent of the hydrocarbon impacts has been delineated and no further subsurface investigation is required at the site. Laboratory analytical results from soil samples that were collected during excavation and geoprobing activities indicate that moderate hydrocarbon impacts exist outside the extents of the previous excavation. The laboratory analytical results are provided in Table 1 and the temporary monitoring well locations are illustrated on Figure 2.

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

Waste was disposed of at the Waste Management Facility in Ault, CO.

IMPLEMENTATION SCHEDULE

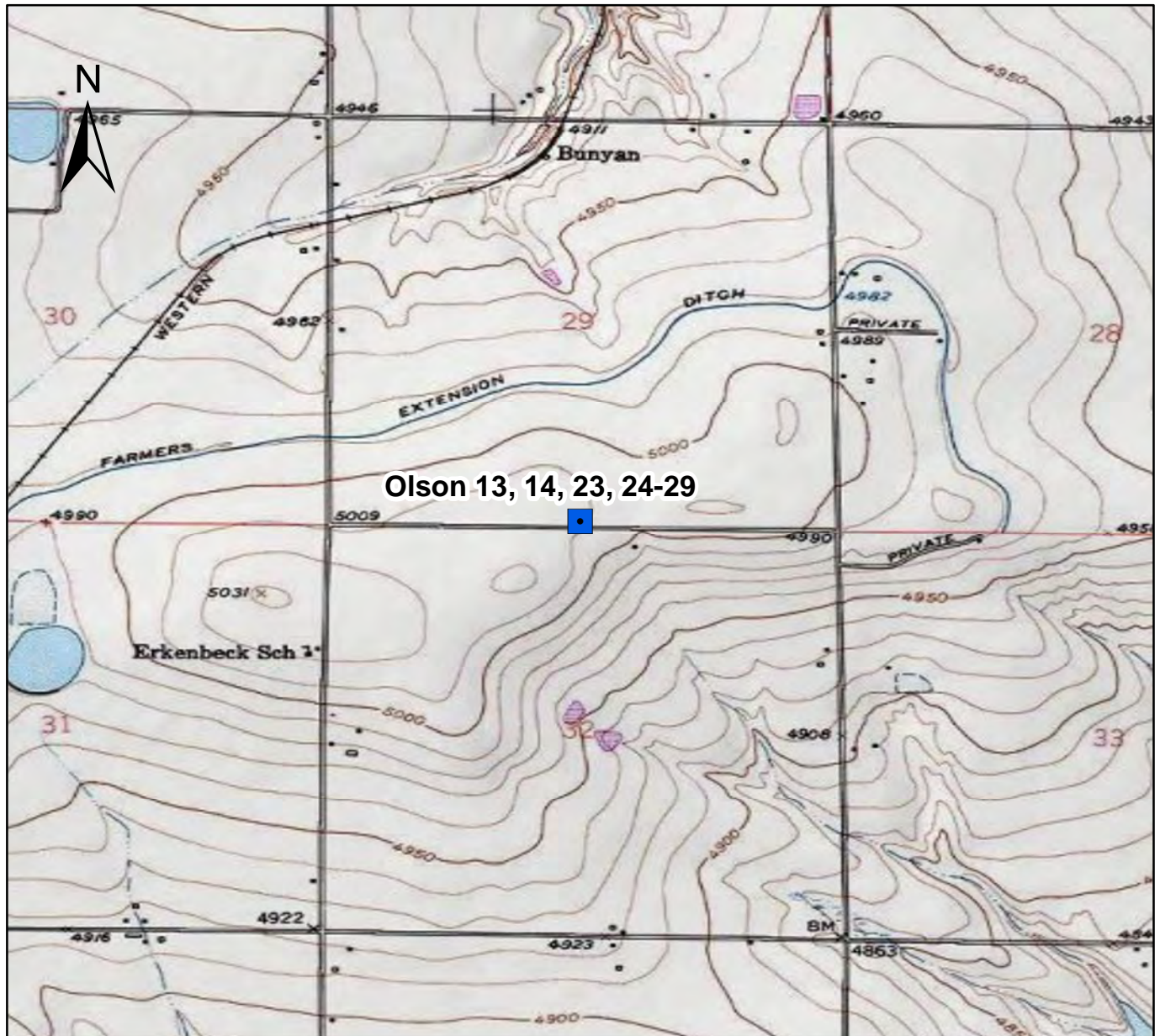
Date Site Investigation Began: 12/9/2012	Date Site Investigation Completed: 1/23/12	Remediation Plan Submitted:
Remediation Start Date: 12/9/2012	Anticipated Completion Date: NA	Actual Completion Date:

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

Print Name: Brandon Bruns

Signed: Brandon Bruns Title: EHS Professional Date: 3/30/12

OGCC Approved: Carolyn Bruns For Title: John Axelsson Date: 04/12/2012  
EPS NE Region



0 750 1,500 3,000 4,500  
Feet



## Figure 1

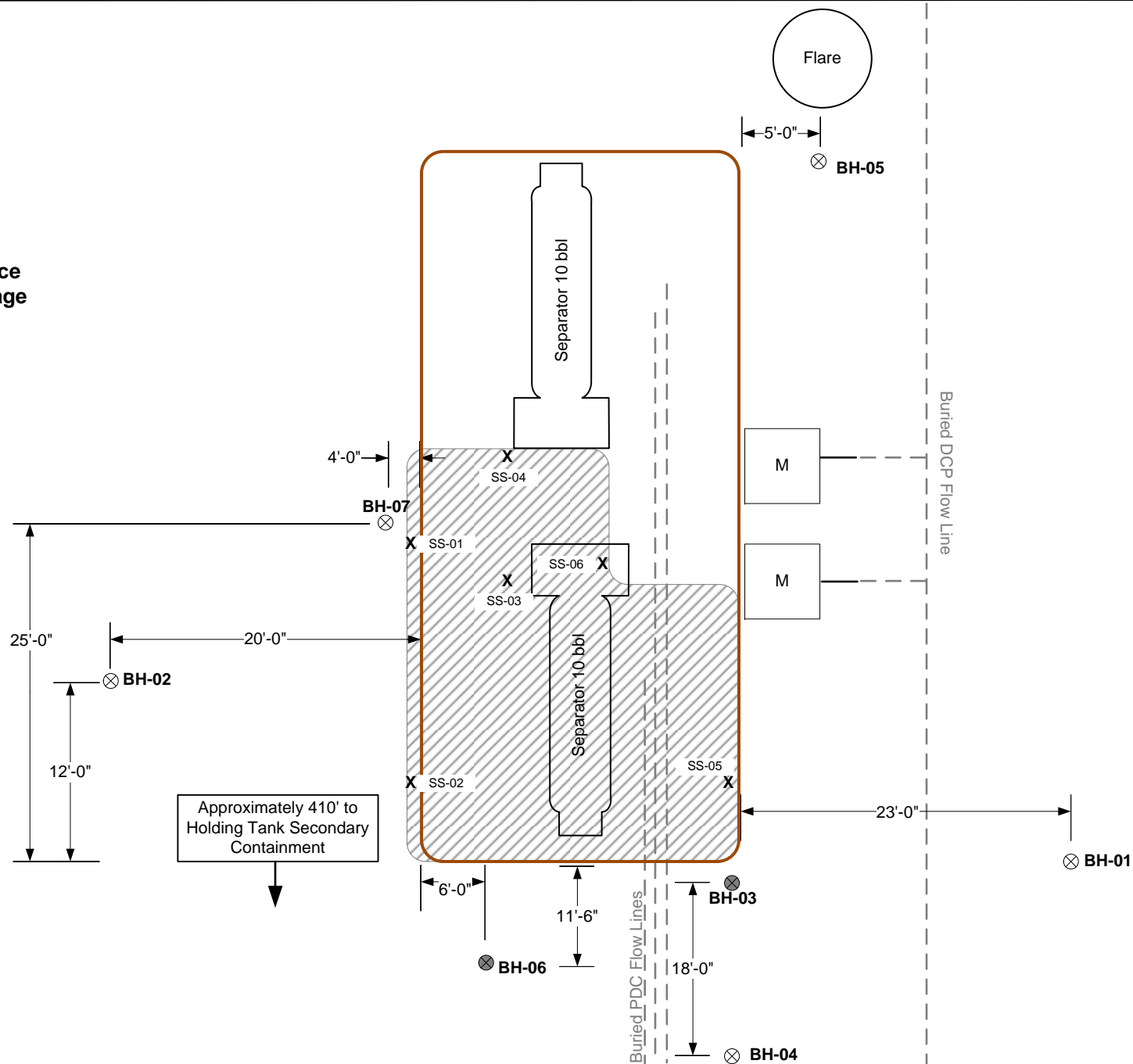
Site Location Map  
Olson 13 14, 23, 24-29  
SESW S29 T4N R67W  
Weld County, Colorado

Drawn By: CAW  
Date: 02/20/2012





↑  
Surface  
Drainage



PROJECT  
NO:

DRAWN BY: BDH

DATE: 1/30/12

**Facility Diagram**  
PDC Energy – DJ Basin  
Olson 13, 14, 23, 24-29  
T4N R67W S29  
Weld County, CO



5690 Webster Avenue  
Arvada CO 80002

LEGEND

- Earthen Berm
- Bore Hole Location
- Bore Hole Location With Temporary Well Installed
- Approximate Extent of Excavation
- Excavation Soil Sample

Meter Shed

FIGURE 2

Not to Scale

**TABLE 1**  
**OLSON 13, 14, 23, 24-29**  
**SOIL ANALYTICAL RESULTS TABLE**

Sample ID	Date Sampled	Depth (Feet bgs)	PID Readings (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzne (mg/kg)	Total Xylenes (mg/kg)	Napthalene (mg/kg)	TPH <sup>(2)</sup> (mg/kg)
SS01	12/9/2011	9	230	0.013	0.031	0.015	0.75	0.02	132
SS02	12/9/2011	9	20	ND	ND	ND	ND	ND	ND
SS03	12/9/2011	10	1006	0.038	ND	0.4	1.58	0.16	<b>850</b>
SS04	12/9/2011	9	165	ND	ND	ND	ND	ND	ND
SS05	12/9/2011	9	1110	<b>9.3</b>	0.078	6.1	38	1.5	<b>2,710</b>
SS06	12/9/2011	9	1030	<b>0.5</b>	ND	1.9	12.7	0.36	<b>1,030</b>
BH03-19.5	1/23/2012	19.5	3048	ND	ND	ND	ND	ND	ND
BH06-17.5-18.5	1/23/2012	17.5-18.5	4300	0.024	0.59	0.3	7.3	0.89	<b>1,160</b>
COGCC standards for Soil (mg/kg) <sup>(1)</sup>				<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>23</b>	<b>500</b>

Notes:

1). Standards for Soil are taken from 2 CCR 404-1, Table 910-1, effective April 1, 2009.

2). TPH - Total volatile and extractable petroleum hydrocarbons. Value calculated by adding GRO and DRO concentrations.

GRO - Gasoline range organics.

DRO - Diesel range organics.

mg/kg= Milligrams per kilogram.

bgs - Below ground surface.

ppm - Parts per million

ND- Not Detected

**Bold** red values indicate an exceedance of the COGCC soil standards for the Site.

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

December 13, 2011

Brian Dodek  
LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada, CO 80003  
RE: PDC - Olson 13-23,29

Enclosed are the results of analyses for samples received by Summit Scientific on 12/09/11 17:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury For Ben Shrewsbury  
President / Laboratory Director



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01	R112063-01	Soil	12/09/11 13:25	12/09/11 17:15
SS02	R112063-02	Soil	12/09/11 13:30	12/09/11 17:15
SS03	R112063-03	Soil	12/09/11 13:35	12/09/11 17:15
SS04	R112063-04	Soil	12/09/11 13:40	12/09/11 17:15
SS05	R112063-05	Soil	12/09/11 13:45	12/09/11 17:15
SS06	R112063-06	Soil	12/09/11 13:50	12/09/11 17:15

Summit Scientific

*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.*



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090

Project Manager: Brian Dodek

**Reported:**

12/13/11 08:30

## Summit Scientific 8112063

741 Corporate Circle Suite I ♦ Golden, Colorado 80401  
303-277-9310 ♦ 303-277-9531 Fax

Client: LT Environmental, Inc. \_\_\_\_\_  
 Address: 4600 West 60th Avenue \_\_\_\_\_  
 City/State/Zip: Arvada, CO 80003 \_\_\_\_\_  
 Phone: (303) 433-0788 \_\_\_\_\_  
 Project Manager: Brian Dodek \_\_\_\_\_  
 E-Mail: bdodek@ltenv.com \_\_\_\_\_  
 Fax: (303) 433-1432 \_\_\_\_\_  
 Project Name: 0500 13-231.07 \_\_\_\_\_  
 Sample Name: 5 Dec \_\_\_\_\_  
 Project Number: 018811090 \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

[illegible]

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS01**  
**R112063-01 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:25

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	120	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:25

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		99.9 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:25

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.020	0.0050	mg/kg	1	1121009	12/10/11	12/11/11	EPA 8260B	
Benzene	0.013	0.0050	"	"	"	"	"	"	
Toluene	0.031	0.0050	"	"	"	"	"	"	
Ethylbenzene	0.015	0.0050	"	"	"	"	"	"	
m,p-Xylene	0.47	0.010	"	"	"	"	"	"	
o-Xylene	0.28	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	12	0.50	"	"	"	"	"	"	

Date Sampled: 12/09/11 13:25

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		91.1 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		101 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		109 %	78.4-125		"	"	"	"	

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS02**  
**R112063-02 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		98.9 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.0050	mg/kg	1	1121009	12/10/11	12/11/11	EPA 8260B	
Benzene	ND	0.0050	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
m,p-Xylene	ND	0.010	"	"	"	"	"	"	
o-Xylene	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: 12/09/11 13:30

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		99.9 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		99.8 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.3 %	78.4-125		"	"	"	"	

Summit Scientific

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4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS03**  
**R112063-03 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:35

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	690	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:35

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		104 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:35

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.16	0.0050	mg/kg	1	1121009	12/10/11	12/11/11	EPA 8260B	
Benzene	0.038	0.0050	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	0.40	0.0050	"	"	"	"	"	"	
m,p-Xylene	0.78	0.010	"	"	"	"	"	"	
o-Xylene	0.80	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	160	5.0	"	10	"	"	"	"	

Date Sampled: 12/09/11 13:35

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		103 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		101 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		105 %	78.4-125		"	"	"	"	

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS04**  
**R112063-04 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		98.9 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.0050	mg/kg	1	1121009	12/10/11	12/11/11	EPA 8260B	
Benzene	ND	0.0050	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
m,p-Xylene	ND	0.010	"	"	"	"	"	"	
o-Xylene	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: 12/09/11 13:40

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		93.5 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		99.2 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.9 %	78.4-125		"	"	"	"	

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4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS05**  
**R112063-05 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	910	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		103 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	1.5	0.050	mg/kg	10	1121009	12/10/11	12/12/11	EPA 8260B	
Benzene	9.3	0.050	"	"	"	"	"	"	
Toluene	0.078	0.050	"	"	"	"	"	"	
Ethylbenzene	6.1	0.050	"	"	"	"	"	"	
m,p-Xylene	26	0.10	"	"	"	"	"	"	
o-Xylene	12	0.050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	1800	50	"	100	"	"	"	"	

Date Sampled: 12/09/11 13:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		87.4 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		100 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	78.4-125		"	"	"	"	

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**SS06**  
**R112063-06 (Soil)**

**Summit Scientific**

**Total Petroleum Hydrocarbons by 8015**

Date Sampled: 12/09/11 13:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	860	50	mg/kg	1	1121008	12/10/11	12/11/11	8015 DRO	

Date Sampled: 12/09/11 13:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		106 %	88.8-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: 12/09/11 13:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.36	0.0050	mg/kg	1	1121009	12/10/11	12/11/11	EPA 8260B	
Benzene	0.50	0.050	"	10	"	"	"	"	
Toluene	ND	0.0050	"	1	"	"	"	"	
Ethylbenzene	1.9	0.050	"	10	"	"	"	"	
m,p-Xylene	9.0	0.10	"	"	"	"	"	"	
o-Xylene	3.7	0.050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	170	5.0	"	"	"	"	"	"	

Date Sampled: 12/09/11 13:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		90.4 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		105 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		115 %	78.4-125		"	"	"	"	

Summit Scientific

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.





LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29  
Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**Total Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1121008 - EPA 3550A**

**Blank (1121008-BLK1)**

Prepared: 12/10/11 Analyzed: 12/11/11

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 12.2 " 12.5 97.8 88.8-124

**LCS (1121008-BS1)**

Prepared: 12/10/11 Analyzed: 12/11/11

C10-C28 (DRO) 569 50 mg/kg 501 114 81.4-129 9.26

**LCS Dup (1121008-BSD1)**

Prepared: 12/10/11 Analyzed: 12/11/11

C10-C28 (DRO) 569 50 mg/kg 501 114 81.4-129 0.0968 9.26

**Matrix Spike (1121008-MS1)**

Source: R112063-01

Prepared: 12/10/11 Analyzed: 12/11/11

C10-C28 (DRO) 580 50 mg/kg 501 125 90.9 77.8-133 8.48

**Matrix Spike Dup (1121008-MSD1)**

Source: R112063-01

Prepared: 12/10/11 Analyzed: 12/11/11

C10-C28 (DRO) 579 50 mg/kg 501 125 90.6 77.8-133 0.278 8.48

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29  
Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1121009 - EPA 5030 Soil MS**

**Blank (1121009-BLK1)**

Prepared: 12/10/11 Analyzed: 12/11/11

Naphthalene	ND	0.0050	mg/kg							
Benzene	ND	0.0050	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
m,p-Xylene	ND	0.010	"							
o-Xylene	ND	0.0050	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0386		"	0.0400		96.4	67.4-143			
Surrogate: Toluene-d8	0.0393		"	0.0400		98.2	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0381		"	0.0400		95.2	78.4-125			

**LCS (1121009-BS1)**

Prepared: 12/10/11 Analyzed: 12/11/11

Naphthalene	ND	0.0050	mg/kg				67.8-151		20	
Benzene	0.0864	0.0050	"	0.100		86.4	61-139	4.91	11.1	
Toluene	0.0896	0.0050	"	0.100		89.6	64-132	8.12	10.9	
Ethylbenzene	0.0931	0.0050	"	0.100		93.1	68.7-135	12.5	20	
m,p-Xylene	0.189	0.010	"	0.200		94.4	70.4-129	14.5	20	
o-Xylene	0.0932	0.0050	"	0.100		93.2	66.9-126	14.1	20	
Surrogate: 1,2-Dichloroethane-d4	0.0392		"	0.0400		97.9	67.4-143			
Surrogate: Toluene-d8	0.0399		"	0.0400		99.8	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0384		"	0.0400		96.1	78.4-125			

**LCS Dup (1121009-BSD1)**

Prepared: 12/10/11 Analyzed: 12/11/11

Naphthalene	ND	0.0050	mg/kg				67.8-151		20	
Benzene	0.0822	0.0050	"	0.100		82.2	61-139	4.91	11.1	
Toluene	0.0826	0.0050	"	0.100		82.6	64-132	8.12	10.9	
Ethylbenzene	0.106	0.0050	"	0.100		106	68.7-135	12.5	20	
m,p-Xylene	0.218	0.010	"	0.200		109	70.4-129	14.5	20	
o-Xylene	0.107	0.0050	"	0.100		107	66.9-126	14.1	20	
Surrogate: 1,2-Dichloroethane-d4	0.0416		"	0.0400		104	67.4-143			
Surrogate: Toluene-d8	0.0391		"	0.0400		97.6	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0442		"	0.0400		111	78.4-125			

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29  
Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 1121009 - EPA 5030 Soil MS**

**Matrix Spike (1121009-MS1)**

**Source: R112049-01**

Prepared: 12/10/11

Analyzed: 12/11/11

Naphthalene	ND	0.0050	mg/kg		0.00		26.4-144		20	
Benzene	0.0855	0.0050	"	0.100	0.00	85.5	42.9-137		17.9	
Toluene	0.0888	0.0050	"	0.100	0.00	88.8	42.6-130		11.9	
Ethylbenzene	0.0901	0.0050	"	0.100	0.00	90.1	39-133		20	
m,p-Xylene	0.185	0.010	"	0.200	0.00	92.3	34.7-134		20	
o-Xylene	0.0902	0.0050	"	0.100	0.00	90.2	41.3-126		20	
Surrogate: 1,2-Dichloroethane-d4	0.0412		"	0.0400		103	67.4-143			
Surrogate: Toluene-d8	0.0392		"	0.0400		98.1	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0386		"	0.0400		96.4	78.4-125			

**Matrix Spike Dup (1121009-MSD1)**

**Source: R112049-01**

Prepared: 12/10/11

Analyzed: 12/11/11

Naphthalene	ND	0.0050	mg/kg		0.00		26.4-144		20	
Benzene	0.0890	0.0050	"	0.100	0.00	89.0	42.9-137	3.95	17.9	
Toluene	0.0913	0.0050	"	0.100	0.00	91.3	42.6-130	2.77	11.9	
Ethylbenzene	0.0927	0.0050	"	0.100	0.00	92.7	39-133	2.89	20	
m,p-Xylene	0.190	0.010	"	0.200	0.00	95.1	34.7-134	3.01	20	
o-Xylene	0.0920	0.0050	"	0.100	0.00	92.0	41.3-126	1.97	20	
Surrogate: 1,2-Dichloroethane-d4	0.0420		"	0.0400		105	67.4-143			
Surrogate: Toluene-d8	0.0400		"	0.0400		100	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0382		"	0.0400		95.5	78.4-125			

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: PDC - Olson 13-23,29

Project Number: 0188-11090  
Project Manager: Brian Dodek

**Reported:**  
12/13/11 08:30

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

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Summit Scientific

A handwritten signature in black ink, appearing to be 'MSM'.

*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.*

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

January 25, 2012

Brian Humphrey  
Tasman Geosciences  
5690 Webster Street  
Arvada, CO 80002

RE: PDC - Olson 13,14,23,24-29

Enclosed are the results of analyses for samples received by Summit Scientific on 01/23/12 17:55. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Paul Shrewsbury For Ben Shrewsbury  
President / Laboratory Director



Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH03-19.5	R201147-01	Soil	01/23/12 10:35	01/23/12 17:55
BH06-17.5-18.5	R201147-02	Soil	01/23/12 12:30	01/23/12 17:55

Summit Scientific

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Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

**BH03-19.5**  
**R201147-01 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **01/23/12 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	2012303	01/23/12	01/23/12	8015 Full Carbon Chain	

Date Sampled: **01/23/12 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		94.2 %	80-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **01/23/12 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.0050	mg/kg	1	2012302	01/23/12	01/25/12	EPA 8260B	
Benzene	ND	0.0050	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
m,p-Xylene	ND	0.010	"	"	"	"	"	"	
o-Xylene	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **01/23/12 10:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		73.1 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		91.8 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		81.8 %	78.4-125		"	"	"	"	

Summit Scientific

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Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

**BH06-17.5-18.5**  
**R201147-02 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **01/23/12 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	890	50	mg/kg	1	2012303	01/23/12	01/23/12	8015 Full Carbon Chain	

Date Sampled: **01/23/12 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		101 %	80-124		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **01/23/12 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.89	0.050	mg/kg	10	2012302	01/23/12	01/25/12	EPA 8260B	
Benzene	0.024	0.0050	"	1	"	"	"	"	
Toluene	0.59	0.050	"	10	"	"	"	"	
Ethylbenzene	0.30	0.0050	"	1	"	"	"	"	
m,p-Xylene	5.1	0.10	"	10	"	"	"	"	
o-Xylene	2.2	0.050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	270	5.0	"	"	"	"	"	"	

Date Sampled: **01/23/12 12:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		90.5 %	67.4-143		"	"	"	"	
Surrogate: Toluene-d8		113 %	77.3-114		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.3 %	78.4-125		"	"	"	"	

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Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

## Volatile Organic Compounds by EPA Method 8260B - Quality Control

### Summit Scientific

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

#### Batch 2012302 - EPA 5030 Soil MS

##### Blank (2012302-BLK1)

Prepared: 01/23/12 Analyzed: 01/25/12

Naphthalene	ND	0.0050	mg/kg							
Benzene	ND	0.0050	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
m,p-Xylene	ND	0.010	"							
o-Xylene	ND	0.0050	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0368		"	0.0397	92.8	67.4-143				
Surrogate: Toluene-d8	0.0397		"	0.0400	99.2	77.3-114				
Surrogate: 4-Bromofluorobenzene	0.0415		"	0.0400	104	78.4-125				

##### LCS (2012302-BS1)

Prepared: 01/23/12 Analyzed: 01/25/12

Naphthalene	ND	0.0050	mg/kg			67.8-151		20		
Benzene	0.0889	0.0050	"	0.100	88.9	61-139		11.1		
Toluene	0.0965	0.0050	"	0.100	96.5	64-132		10.9		
Ethylbenzene	0.107	0.0050	"	0.100	107	68.7-135		20		
m,p-Xylene	0.250	0.010	"	0.200	125	70.4-129		20		
o-Xylene	0.107	0.0050	"	0.100	107	66.9-126		20		
Surrogate: 1,2-Dichloroethane-d4	0.0477		"	0.0397	120	67.4-143				
Surrogate: Toluene-d8	0.0410		"	0.0400	103	77.3-114				
Surrogate: 4-Bromofluorobenzene	0.0408		"	0.0400	102	78.4-125				

##### LCS Dup (2012302-BSD1)

Prepared: 01/23/12 Analyzed: 01/25/12

Naphthalene	ND	0.0050	mg/kg			67.8-151		20		
Benzene	0.0817	0.0050	"	0.100	81.7	61-139	8.44	11.1		
Toluene	0.0929	0.0050	"	0.100	92.9	64-132	3.86	10.9		
Ethylbenzene	0.103	0.0050	"	0.100	103	68.7-135	4.32	20		
m,p-Xylene	0.238	0.010	"	0.200	119	70.4-129	4.93	20		
o-Xylene	0.104	0.0050	"	0.100	104	66.9-126	2.99	20		
Surrogate: 1,2-Dichloroethane-d4	0.0455		"	0.0397	115	67.4-143				
Surrogate: Toluene-d8	0.0415		"	0.0400	104	77.3-114				
Surrogate: 4-Bromofluorobenzene	0.0408		"	0.0400	102	78.4-125				

Summit Scientific

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Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

Analyte	Reporting			Spike	Source		%REC		RPD	
	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes

**Batch 2012302 - EPA 5030 Soil MS**

**Matrix Spike (2012302-MS1)**

**Source: R201126-01**

Prepared: 01/23/12 Analyzed: 01/25/12

Naphthalene	ND	0.0050	mg/kg		0.00		26.4-144		20	
Benzene	0.0760	0.0050	"	0.100	0.00	76.0	42.9-137		17.9	
Toluene	0.0768	0.0050	"	0.100	0.00	76.8	42.6-130		11.9	
Ethylbenzene	0.0684	0.0050	"	0.100	0.00	68.4	39-133		20	
m,p-Xylene	0.139	0.010	"	0.200	0.00	69.3	34.7-134		20	
o-Xylene	0.0733	0.0050	"	0.100	0.00	73.3	41.3-126		20	
Surrogate: 1,2-Dichloroethane-d4	0.0393		"	0.0397		99.1	67.4-143			
Surrogate: Toluene-d8	0.0410		"	0.0400		102	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0414		"	0.0400		103	78.4-125			

**Matrix Spike Dup (2012302-MSD1)**

**Source: R201126-01**

Prepared: 01/23/12 Analyzed: 01/25/12

Naphthalene	ND	0.0050	mg/kg		0.00		26.4-144		20	
Benzene	0.0728	0.0050	"	0.100	0.00	72.8	42.9-137	4.23	17.9	
Toluene	0.0772	0.0050	"	0.100	0.00	77.2	42.6-130	0.507	11.9	
Ethylbenzene	0.0740	0.0050	"	0.100	0.00	74.0	39-133	7.88	20	
m,p-Xylene	0.158	0.010	"	0.200	0.00	78.9	34.7-134	13.0	20	
o-Xylene	0.0792	0.0050	"	0.100	0.00	79.2	41.3-126	7.67	20	
Surrogate: 1,2-Dichloroethane-d4	0.0341		"	0.0397		85.9	67.4-143			
Surrogate: Toluene-d8	0.0398		"	0.0400		99.4	77.3-114			
Surrogate: 4-Bromofluorobenzene	0.0360		"	0.0400		90.1	78.4-125			

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Tasman Geosciences  
5690 Webster Street  
Arvada CO, 80002

Project: PDC - Olson 13,14,23,24-29

Project Number: [none]  
Project Manager: Brian Humphrey

**Reported:**  
01/25/12 15:57

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

---

Summit Scientific

A handwritten signature in black ink, appearing to be 'MSM'.

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