

State of Colorado  
Oil and Gas Conservation Commission

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



FOR OGCC USE ONLY

RECEIVED  
2/20/2012

## SPILL/RELEASE REPORT

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

Spill report taken by:

FACILITY ID:

## OPERATOR INFORMATION

Name of Operator: <u>Petroleum Development Corporation</u>	OGCC Operator No: <u>69175</u>	Phone Numbers
Address: <u>1775 Sherman Street, Suite 3000</u>		No: <u>(303) 860-5800</u>
City: <u>Denver</u>	State: <u>CO</u> Zip: <u>80203</u>	Fax: <u>(303) 860-5838</u>
Contact Person: <u>Brandon Bruns</u>	Email: <u>bbruns@petd.com</u>	

## DESCRIPTION OF SPILL OR RELEASE

Date of Incident: <u>12/9/2012</u>	Facility Name & No: <u>Olson 13, 14, 23, 24-29</u>	County: <u>Weld</u>
Type of Facility (well, tank battery, flow line, pit): <u>Tank Battery</u>	QtrQtr: <u>SESW</u>	Section: <u>29</u>
Well Name and Number: <u>Olson 13, 14, 23, 24-29</u>	Township: <u>4N</u>	Range: <u>67W</u>
API Number: <u>331189</u>	Meridian: <u>6th</u>	

Specify volume spilled and recovered (in bbls) for the following materials:

Oil spilled: Unk Oil recov'd: 0 Water spilled: 0 Water recov'd: 0 Other spilled: 0 Other recov'd 0

Ground Water impacted? ☐ Yes ☒ No Surface Water impacted? ☐ Yes ☒ No

Contained within berm? ☐ Yes ☒ No Area and vertical extent of spill: <900 ft<sup>2</sup> x ~19' bgs

Current land use: Oil and Gas Production Facility/Agriculture Weather conditions: Low 40s

Soil/geology description: Sands and silty sands

IF LESS THAN A MILE, report distance IN FEET to nearest ... Surface water: ~2,800' S Wetlands: NA Buildings: 215' SW

Livestock: NA Water wells: ~400' SW Depth to shallowest ground water: >21' bgs

Cause of spill (e.g. equipment failure, human error, etc.): Equipment failure Detailed description of the spill/release incident:

During re-fracking operations at the facility, subsurface impacts were discovered below the southern separator within the bermed containment area. A topographic map of the site is included as Figure 1.

## CORRECTIVE ACTION

Describe immediate response (how stopped, contained and recovered):

On December 9, 2011 PDC shut-in the wells feeding the tank battery and evacuated the transfer lines via a vacuum truck. The earthen berm was removed and approximately 100 cubic yards (cy) of impacted material was removed and transported to the Waste Management Facility in Ault, Colorado. The location and extent of the excavation is illustrated on Figure 2. Groundwater was not impacted at the facility.

Describe any emergency pits constructed: NA

How was the extent of contamination determined?

On December 9, 2011 six soil samples were collected within the excavation footprint at depths ranging between 9 and 10 feet below ground surface (bgs). Soil samples were collected from the northwest wall (SS01), the southwest wall (SS02), the north wall (SS04), the southeast wall (SS05), and the northeast wall (SS06). Additionally, one soil sample was collected approximately 10 feet bgs from the center of the excavation area (SS03). A photoionization detector (PID) was used during sample collection to determine volatile organic compound (VOC) impacts within the soil. On January 23, 2012, direct push drilling activities were conducted at the Site to further delineate the lateral and vertical extents of the impacts. Seven Geoprobe boring locations were completed at locations surrounding the excavation area to depths ranging from 20 to 22 feet bgs. PID readings were recorded from soil cores and utilized to delineate the area of impacts beyond the limits of the former excavation. Temporary wells were installed at two of the borehole locations (BH-03 and BH-06) for future in-situ remediation activities. Soil sample analytical and PID results from the excavation and Geoprobe borings are summarized in Table 1. The laboratory analytical reports are included as Attachment A. The extent of the excavation and soil and boring locations are illustrated on Figure 2.

Further remediation activities proposed (attach separate sheet if needed):

PDC is currently evaluating in-situ remediation strategies to address soil impacts and will summarize this in a subsequent Form 27.

Describe measures taken to prevent problem from reoccurring:

PDC replaced dump and flow lines at the facility and will continue with annual pressure testing.

## OTHER NOTIFICATIONS

List the parties and agencies notified (County, BLM, EPA, DOT, Local Emergency Planning Coordinator or other).

Date	Agency	Contact	Phone	Response

Spill/Release Tracking No: 2222956

**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.

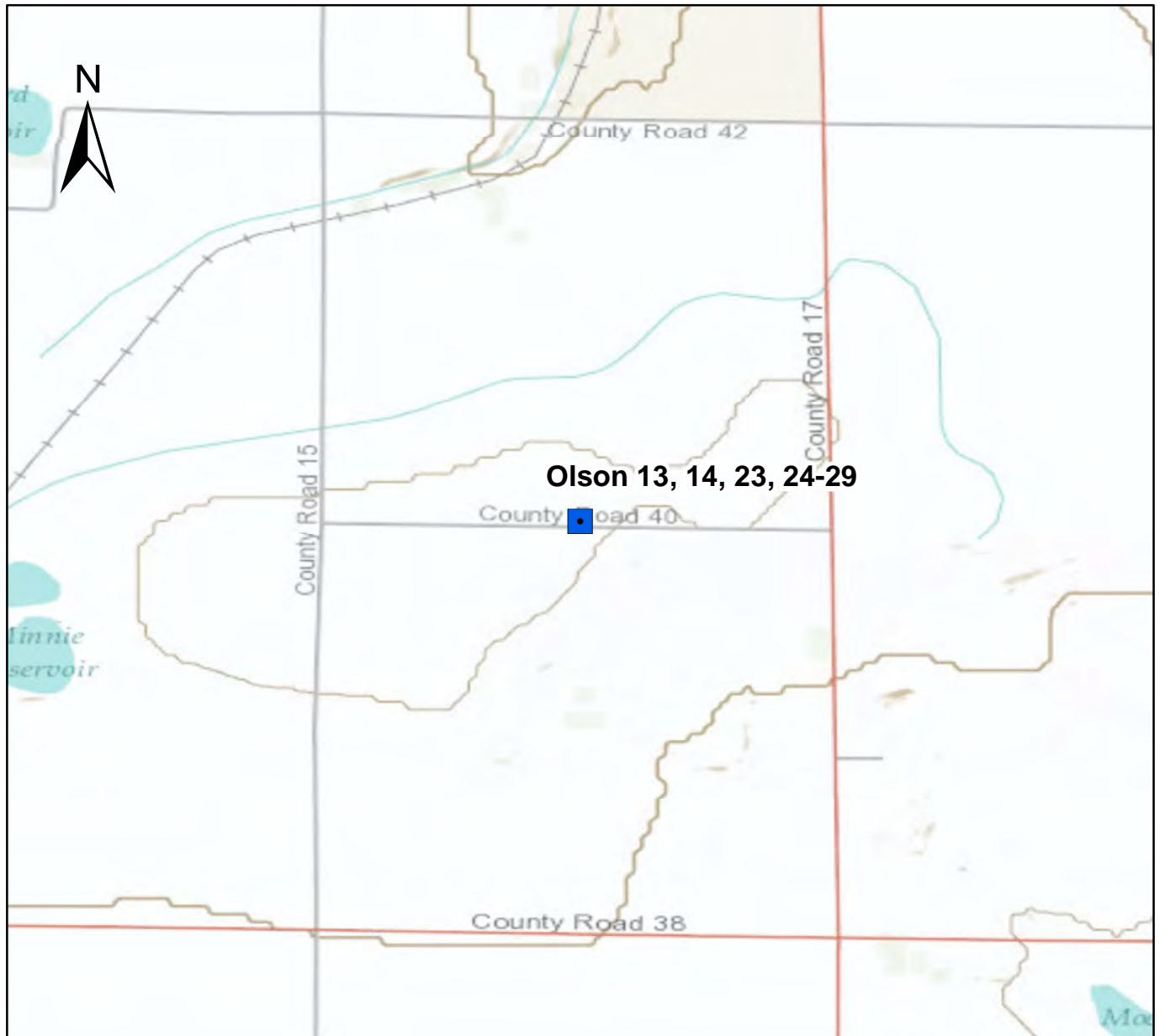
mg/kg= Milligrams per kilogram.

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.



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



## Figure 1

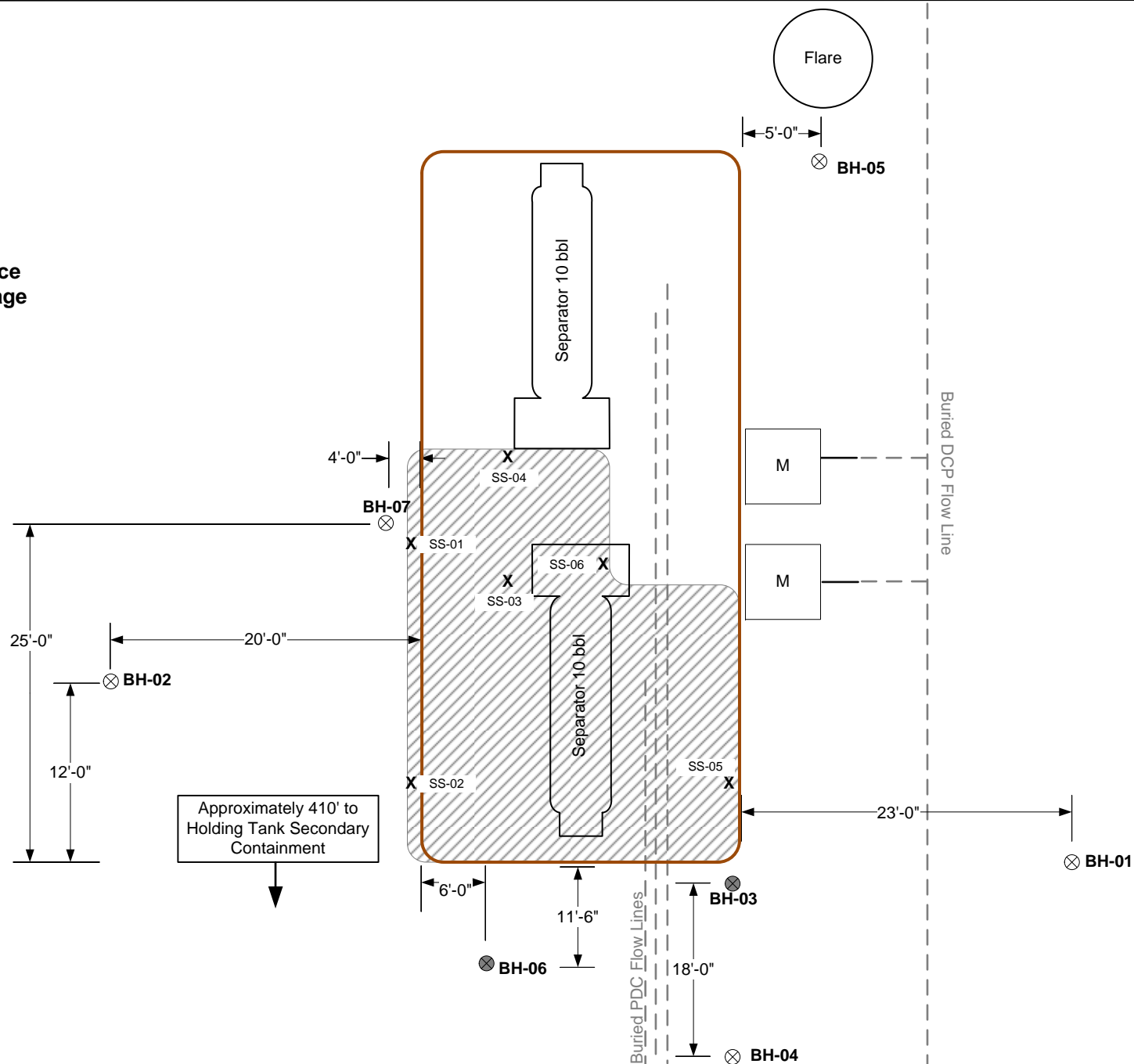
Site Location Map  
Olson 13 14, 23, 24-29  
SESW S29 T4N R67W  
Weld County, Colorado

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

# 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,



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

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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

## Summit Scientific 8112063

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

Page 1 of 1

Client: LT Environmental, Inc.,

Address: 4600 West 60th Avenue

City/State/Zip: Arvada, CO 80003

Phone: (303) 433-9788

Sampler Name: 57

**Project Manager:** Brian Dodek

E-Mail: [bdodek@tenv.com](mailto:bdodek@tenv.com)

Project Name: A/c 12-22-29

Project Number: 0881090

[illegible]

[www.s2scientific.com](http://www.s2scientific.com)

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		"	"	"	"	

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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

**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		"	"	"	"	

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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

**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		"	"	"	"	

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

**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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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

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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

**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

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4600 West 60th Avenue  
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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		11.1	
Toluene	0.0896	0.0050	"	0.100		89.6	64-132		10.9	
Ethylbenzene	0.0931	0.0050	"	0.100		93.1	68.7-135		20	
m,p-Xylene	0.189	0.010	"	0.200		94.4	70.4-129		20	
o-Xylene	0.0932	0.0050	"	0.100		93.2	66.9-126		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

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

**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'.

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# 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

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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

Summit Scientific  
R201147

S2

741 Corporate Circle Suite 1 • Golden, Colorado 80401  
303-277-9310 • 303-277-9531 Fax

Page 1 of 1

Client: Tasman Geosciences  
Address: 5690 Webster Street  
City/State/Zip: Arvada, CO 80002  
Phone: (720) 988-2024  
Fax:  
Project Manager: BRIAN HUMPHREY  
E-Mail: bhumphrey@tasman-arco.com  
Project Name: PDC - Olson 13,14,23,24-29  
Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix	Analyze For:	Special Instructions
				HCl	HNO <sub>3</sub>	None	Other (Specify)			
BH03-19.5	1/23/12	10:55	2					Soil		
BH04-12.5/18.5	1/23/12	12:30	2					Groundwater		
BH05-14.5	1/23/12	14:00	2					Other (Specify)	8260 GNBTEX	
BH06-20	1/23/12	14:05	2					Other (Specify)	8015 DRO	
BH07-15.4	1/23/12	17:00	2					Other (Specify)		
BH08-19.4	1/23/12	17:00	2					Other (Specify)		
BH09-19.4	1/23/12	17:05	2					Other (Specify)		

Relinquished by:	Date/Time:	Received by:	Date/Time:	Turn Around Time (Check)	Notes:
Brian Humphrey	1/23/12 17:45	[Signature]	1/23/12 17:45	<input checked="" type="checkbox"/> Same Day <input type="checkbox"/> 24 Hours <input type="checkbox"/> 48 Hours <input checked="" type="checkbox"/> 72 Hours Standard	
Relinquished by:	Date/Time:	Received by:	Date/Time:	Sample Integrity:	<input checked="" type="checkbox"/> Temperature Upon Receipt: <input type="checkbox"/> Impact: YES <input checked="" type="checkbox"/> NO
Relinquished by:	Date/Time:	Received in Lab by:	Date/Time:		

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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: o-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

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  
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
<b>C10-C28 (DRO)</b>	<b>890</b>	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
<i>Surrogate: o-Terphenyl</i>		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
<b>Naphthalene</b>	<b>0.89</b>	0.050	mg/kg	10	2012302	01/23/12	01/25/12	EPA 8260B	
<b>Benzene</b>	<b>0.024</b>	0.0050	"	1	"	"	"	"	
<b>Toluene</b>	<b>0.59</b>	0.050	"	10	"	"	"	"	
<b>Ethylbenzene</b>	<b>0.30</b>	0.0050	"	1	"	"	"	"	
<b>m,p-Xylene</b>	<b>5.1</b>	0.10	"	10	"	"	"	"	
<b>o-Xylene</b>	<b>2.2</b>	0.050	"	"	"	"	"	"	
<b>Gasoline Range Hydrocarbons</b>	<b>270</b>	5.0	"	"	"	"	"	"	

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

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		90.5 %	67.4-143		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		113 %	77.3-114		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		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	8.44	11.1	
Toluene	0.0965	0.0050	"	0.100		96.5	64-132	3.86	10.9	
Ethylbenzene	0.107	0.0050	"	0.100		107	68.7-135	4.32	20	
m,p-Xylene	0.250	0.010	"	0.200		125	70.4-129	4.93	20	
o-Xylene	0.107	0.0050	"	0.100		107	66.9-126	2.99	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			

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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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