



RECEIVED
11/10/2010

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: **2607424**

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

Spill or Release Plug & Abandon Central Facility Closure Site/Facility Closure Other (describe): _____

GENERAL INFORMATION

OGCC Operator Number: 69175 Name of Operator: <u>Petroleum Development Corporation</u> Address: <u>1775 Sherman Street, Suite 3000</u> City: <u>Denver</u> State: <u>CO</u> Zip: <u>80203</u>		Contact Name and Telephone Name: <u>John Nussbaumer</u> No: <u>303-860-5800</u> Fax: <u>303-860-5838</u>	
API/Facility No: <u>05-045-14046</u> Facility Name: <u>Mesa # 1 pad</u> Well Name: <u>Puckett</u>		County: <u>Garfield County</u> Facility Number: _____ Well Number: <u>#21A-7D</u>	
Location (QtrQtr, Sec, Twp, Rng, Meridian): <u>NENW SEC 7 T7S R96W 6th Principal Meridian</u> Latitude: <u>39.45761</u> Longitude: <u>-108.15217</u>			

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Produced water and Condensate

Site Conditions: Is location within a sensitive area (according to Rule 901e)? Y N If yes, attach evaluation. Groundwater < 20 feet bgs.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Oil/gas development, open range

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Clay loam underlain by shale bedrock

Potential receptors (water wells within 1/4 mi, surface waters, etc.): An unnamed creek is located 387ft east of the site, no water wells are located within a 1/4 mile radius of the site.

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

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	<u>25' north to south x 26' east to west</u>	<u>Observations of soil staining and laboratory analysis</u>
<input type="checkbox"/> Vegetation	_____	_____
<input type="checkbox"/> Groundwater	_____	_____
<input type="checkbox"/> Surface water	_____	_____

REMEDIATION WORKPLAN

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

Form 19 submitted on 8/29/2008. Form 27 submitted on 10/3/2008.

Describe how source is to be removed:

A produced water tank overflowed causing approximately 16 barrels (bbls) of produced water and 3 bbls of condensate to spill into the steel secondary containment. A site location map and site map are presented as Figures 1 and 2, respectively. Once the produced water tank and secondary containment were removed, soils beneath the tank were excavated. Approximately 169 cubic yards of petroleum hydrocarbon impacted soil was removed from the excavation. Excavation soil samples were collected and submitted for laboratory analysis of total petroleum hydrocarbons (TPH) by U.S. Environmental Protection Agency (EPA) method 8015 full carbon chain. Laboratory results indicate that TPH concentrations (C6-C36) at the extents of the excavation are below the Colorado Oil and Gas Conservation Commission (COGCC) 1,000 milligram per kilogram (mg/kg) sensitive area allowable level. Soil analytical results are presented in Table 1.

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

At the time of the incident, condensate and produced water within the steel secondary containment was recovered with a vacuum truck and transported offsite. Approximately 169 cubic yards of petroleum hydrocarbon impacted soil was excavated and is currently being land farmed within a lined, secondary containment berm onsite until the stockpile is below the COGCC 1,000 (mg/kg) sensitive area allowable level.



REMEDIATION WORKPLAN (CONT.)

Tracking Number: Name of Operator: Petroleum Development Corporation OGCC Operator No: 69175 Received Date: Well Name & No: Puckett 14D-24D Facility Name & No.: Mesa 19 Pad

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.

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 from the frac tank release was backfilled with native fill material. The secondary containment has been backfilled with new ballast material. Once the stockpile is below the COGCC 1,000 mg/kg sensitive area allowable level, soils and ballast material will be reused onsite. The site was restored to pre-release grade and PDC's production facility remains at the site.

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? [X] Y [] N If yes, describe: Soil sample B01@ surf was collected from the surface of the frac tank release and submitted for TPH analysis by EPA Method 8015B. Analytical results indicated TPH concentrations exceeded the COGCC sensitive area allowable level of 1,000 mg/kg. Impacted soils were excavated to a depth of approximately two feet bgs and soil sample B01@ 2' was collected from the base of the excavation. TPH concentrations at the extent of the excavation were below the COGCC sensitive area allowable level of 1,000 mg/kg. A site map depicting the excavation and soil sample locations is provided in Figure 2. Groundwater was not encountered in the excavation. Soil samples were not collected from the production tank release since all impacted material was contained within the lined, secondary containment. Approximately 18 cubic yards of petroleum hydrocarbon impacted soil and ballast material are currently being landfarmed within a lined, secondary containment onsite. The stockpile will be resampled during Summer 2009.

Final disposition of E&P waste (land treated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.): Condensate and produced water was recovered utilizing a vacuum truck and transported offsite. Approximately 18 cubic yards of petroleum hydrocarbon impacted soil and ballast material is currently being landfarmed onsite within a lined, secondary containment. The soil stockpile will remain onsite until it has been demonstrated that the TPH concentrations are below the COGCC 1,000 (mg/kg) sensitive area allowable level.

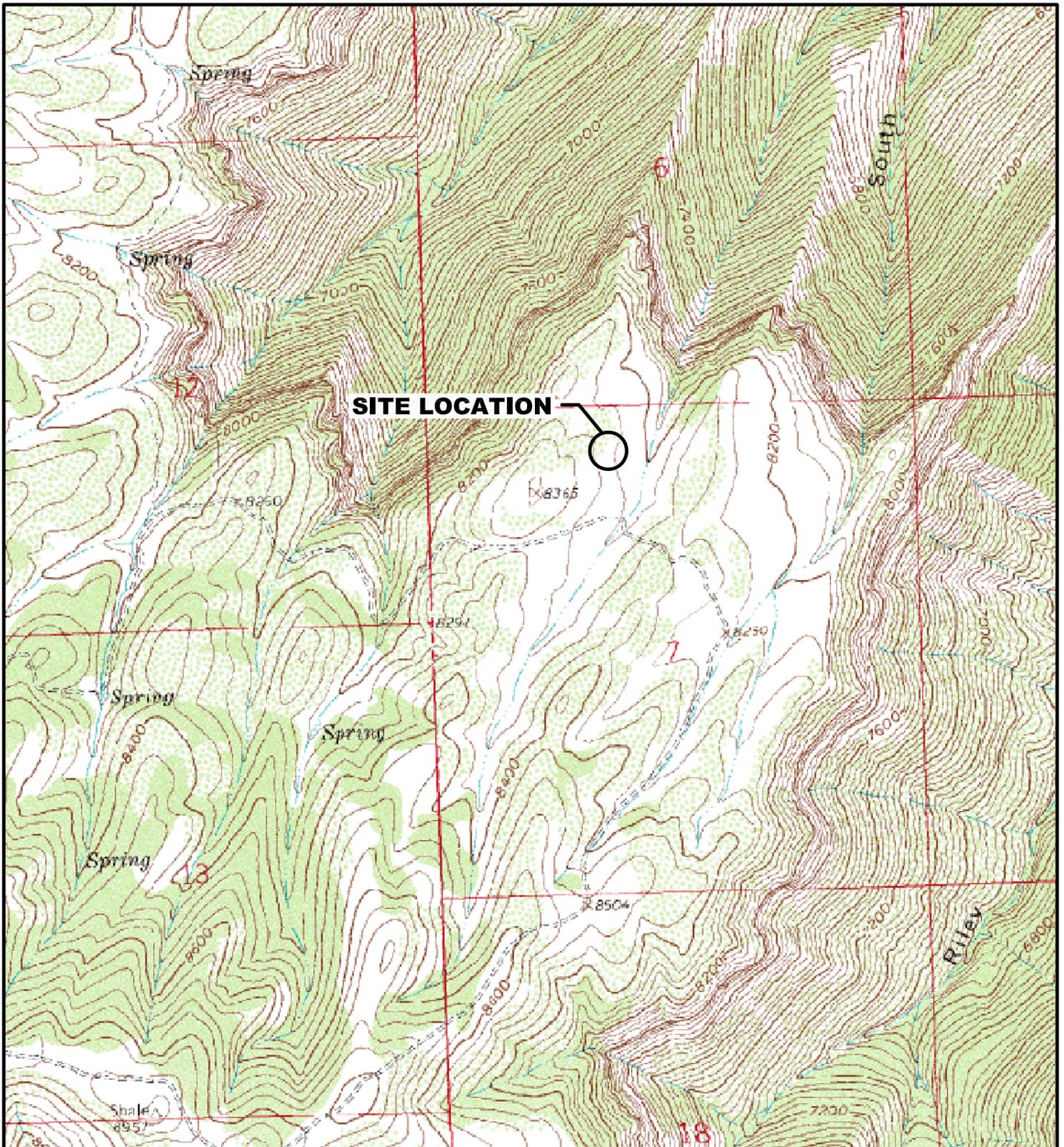
IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 9/29/08 Date Site Investigation Completed: 10/13/08 Remediation Plan Submitted: 1/21/09 Remediation Start Date: 9/29/08 Anticipated Completion Date: 6/1/09 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: M. Scott Ghan, LT Environmental, as agent for PDC

Signed: [Signature] Title: Senior Environmental Scientist Date: 2/9/09

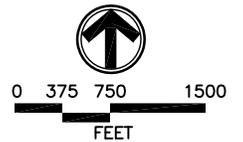
OGCC Approved: [Signature] Title: EPS Date: 3/17/11



SITE LOCATION

LEGEND

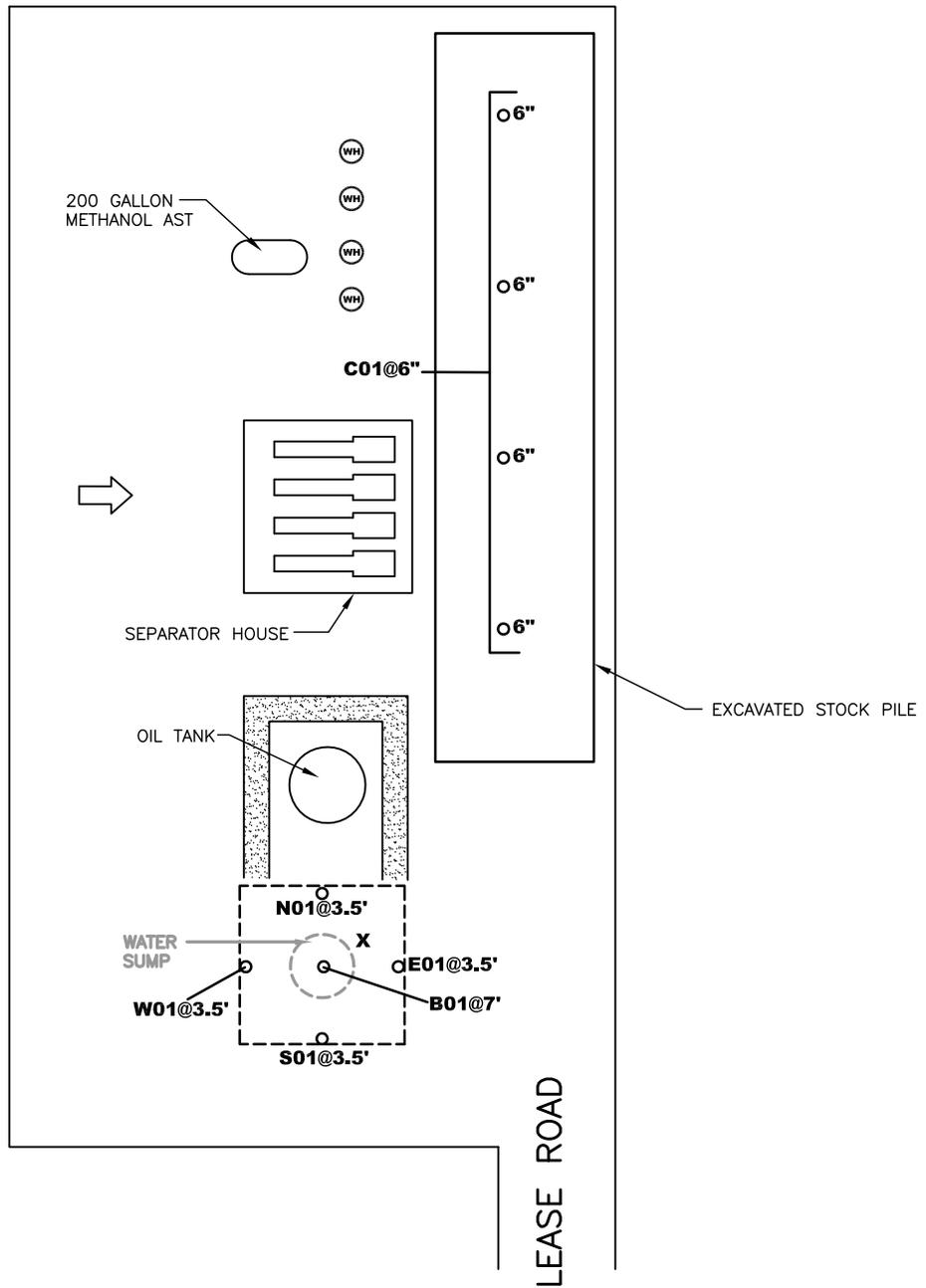
○ SITE LOCATION



SOURCE: TOPOZONE.COM
USGS 7.5' QUADRANGLE
(NAD27)

FIGURE 1
SITE LOCATION MAP
MESA #1
NENW 7, T7S, R96W
GARFIELD COUNTY, CO
PETROLEUM DEVELOPMENT CORPORATION





LEGEND

- WELL HEAD
- C01@6"** SOIL SAMPLE LOCATION
- BERM
- X** RELEASE LOCATION
- EXTENT OF EXCAVATION
- ESTIMATED GROUNDWATER FLOW DIRECTION

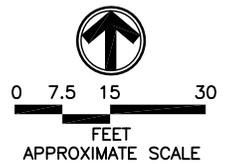


FIGURE 2
SITE MAP
MESA #1
NENW 7, T7S, R96W
GARFIELD COUNTY, CO
PETROLEUM DEVELOPMENT CORPORATION



TABLE 1
SOIL SAMPLE ANALYTICAL DATA
MESA # 1
PETROLEUM DEVELOPMENT CORPORATION

SAMPLE ID	DATE	DEPTH	TPH (mg/kg)
N01@3.5'	8/26/2008	3.5'	<50.0
E01@3.5'	8/26/2008	3.5'	<50.0
W01@3.5'	8/26/2008	3.5'	<50.0
S01@3.5'	8/26/2008	3.5'	<50.0
B01@7'	8/26/2008	7'	67.6
C01@6"	10/31/2008	6"	115.1

< - Less than stated laboratory reporting limit

TPH - Total Petroleum Hydrocarbons

mg/kg - Milligrams per kilogram

bgs - Below ground surface





4640 Pecos Street | Unit C | Denver, Colorado 80211
303.433.1322 Phone 303.265.9645 Fax

August 29, 2008

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

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

Attached are the analytical results for Mesa #1 Spill received by Origins Laboratory, Inc. 8/27/2008 3:05:00PM. Please let us know if you have any questions, or if we can help with anything at all.

A handwritten signature in black ink, appearing to read "Noelle E Doyle".

Laboratory Manager
Noelle E Doyle

The analytical results in the following report were analyzed under the guidelines of EPA Methods specified in SW-846. The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. This laboratory report is intended solely for the above addressee and it is only to be used and or reproduced in its entirety.

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

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

CROSS REFERENCE REPORT

Laboratory ID	Sample ID	Matrix	Sampled	Date Received
NO1 @ 3.5'	X808086-01	Soil	8/26/2008 3:30:00PM	08/27/2008 15:05
EO1 @ 3.5'	X808086-02	Soil	8/26/2008 3:35:00PM	08/27/2008 15:05
WO1 @ 3.5'	X808086-03	Soil	8/26/2008 3:40:00PM	08/27/2008 15:05
SO1 @ 3.5'	X808086-04	Soil	8/26/2008 3:45:00PM	08/27/2008 15:05
BO1 @ 7'	X808086-05	Soil	8/26/2008 3:50:00PM	08/27/2008 15:05

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

NO1 @ 3.5'
X808086-01 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8H28003	08/28/2008	08/28/2008
Diesel (C10-C28)	ND	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager

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LT Environmental, Inc.
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Scott Ghan
 Project Number: PDCW0822
 Project: Mesa #1 Spill

EO1 @ 3.5'
X808086-02 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8H28003	08/28/2008	08/28/2008
Diesel (C10-C28)	ND	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"

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LT Environmental, Inc.
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Arvada CO 80003

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

WO1 @ 3.5'
X808086-03 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8H28003	08/28/2008	08/28/2008
Diesel (C10-C28)	ND	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"

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Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

SO1 @ 3.5'
X808086-04 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8H28003	08/28/2008	08/28/2008
Diesel (C10-C28)	ND	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"
TPH - Carbon Chain Total	ND	50.0	"	"	"	"	"

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Arvada CO 80003

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

BO1 @ 7'
X808086-05 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8H28003	08/28/2008	08/29/2008
Diesel (C10-C28)	67.6	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200	"	"	"	"	"
TPH - Carbon Chain Total	67.6	50.0	"	"	"	"	"

Origins Laboratory, Inc.

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LT Environmental, Inc.
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Scott Ghan
 Project Number: PDCW0822
 Project: Mesa #1 Spill

Extractable Petroleum Hydrocarbons by 8015M – Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8H28003 – EPA 5030B										
Blank (8H28003–BLK1)										
Prepared: 08/28/2008 Analyzed: 08/28/2008										
Gasoline (C6–C10)	ND	50.0	mg/kg							
Diesel (C10–C28)	ND	50.0	"							
Residual Range Organics (C28–C36)	ND	200	"							
TPH – Carbon Chain Total	ND	50.0	"							
LCS (8H28003–BS1)										
Prepared: 08/28/2008 Analyzed: 08/28/2008										
Gasoline (C6–C10)	ND	50.0	mg/kg				60–140			
Diesel (C10–C28)	148	50.0	"	200		74.1	60–140			
Matrix Spike (8H28003–MS1)										
Source: X808088–05 Prepared: 08/28/2008 Analyzed: 08/28/2008										
Gasoline (C6–C10)	ND	50.0	mg/kg		ND		70–130			
Diesel (C10–C28)	179	50.0	"	200	ND	89.6	60–140			
Matrix Spike Dup (8H28003–MSD1)										
Source: X808088–05 Prepared: 08/28/2008 Analyzed: 08/28/2008										
Gasoline (C6–C10)	ND	50.0	mg/kg		ND		70–130		20	
Diesel (C10–C28)	174	50.0	"	200	ND	87.1	60–140	2.89	25	

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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

Scott Ghan
Project Number: PDCW0822
Project: Mesa #1 Spill

Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager



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November 13, 2008

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

Scott Ghan
Project Number: PDCW0822
Project: PDC - Mesa #1 Spill

Attached are the analytical results for PDC - Mesa #1 Spill received by Origins Laboratory, Inc. 10/31/2008 4:00:00PM. Please let us know if you have any questions, or if we can help with anything at all.

A handwritten signature in black ink, appearing to read "Noelle E Doyle", written in a cursive style.

Laboratory Manager
Noelle E Doyle

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

Scott Ghan
Project Number: PDCW0822
Project: PDC - Mesa #1 Spill

CROSS REFERENCE REPORT

Laboratory ID	Sample ID	Matrix	Sampled	Date Received
CO1 @ 6"	X811007-01	Soil	10/31/2008 2:00:00PM	10/31/2008 16:00

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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Scott Ghan
Project Number: PDCW0822
Project: PDC - Mesa #1 Spill

CO1 @ 6"
X811007-01 (Soil)

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Notes
		Limit							

Origins Laboratory, Inc.

TPH-Carbon Chain by EPA Method 8015M

Gasoline (C6-C10)	ND	50.0	mg/kg	1	8K03004	11/03/2008	11/04/2008
Diesel (C10-C28)	115.1	50.0	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	200.0	"	"	"	"	"
TPH - Carbon Chain Total	115.1	50.0	"	"	"	"	"

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager



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

Scott Ghan
 Project Number: PDCW0822
 Project: PDC – Mesa #1 Spill

Extractable Petroleum Hydrocarbons by 8015M – Quality Control
Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8K03004 – Default Prep GC-Semi										
Blank (8K03004-BLK1)					Prepared: 11/03/2008 Analyzed: 11/03/2008					
Gasoline (C6-C10)	ND	50.0	mg/kg							
Diesel (C10-C28)	ND	50.0	"							
LCS (8K03004-BS1)					Prepared: 11/03/2008 Analyzed: 11/03/2008					
Gasoline (C6-C10)	ND	50.0	mg/kg				60-140			
Diesel (C10-C28)	151.8	50.0	"	200		75.9	60-140			
LCS Dup (8K03004-BSD1)					Prepared: 11/03/2008 Analyzed: 11/03/2008					
Gasoline (C6-C10)	ND	50.0	mg/kg				60-140		25	
Diesel (C10-C28)	157.9	50.0	"	200		78.9	60-140	3.91	25	

Origins Laboratory, Inc.

Noelle E Doyle, Laboratory Manager

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

Scott Ghan
Project Number: PDCW0822
Project: PDC – Mesa #1 Spill

Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

Origins Laboratory, Inc.

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Noelle E Doyle, Laboratory Manager