

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.

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:

GENERAL INFORMATION

OGCC Operator Number: 69175		Contact Name and Telephone	
Name of Operator: PDC Energy, Inc.		Name: Karen Olson	
Address: 1775 Sherman Street, Suite 3000		No: (303) 860-5800	
City: Denver State: CO Zip: 80203		Fax: (303) 860-5838	
API/Facility No: 05-123-20065		County: Weld	
Facility Name: State 14, 24-8		Facility Number: 331043	
Well Name: State 14, 24-8		Well Number: State 14, 24-8	
Location (QtrQtr, Sec, Twp, Rng, Meridian): SESW S8 T5N R63W		Latitude: 40.40829 Longitude: -104.464200	

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.):	Produced Water
Site Conditions: Is location within a sensitive area (according to Rule 901e)?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N If yes, attach evaluation. ** Please see 'Potential Receptors' section below.
Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.):	Rangeland
Soil type, if not previously identified on Form 2A or Federal Surface Use Plan:	Valent sand, 3 to 9 percent slopes
Potential receptors (water wells within 1/4 mi, surface waters, etc.):	The nearest livestock is located approximately 25 feet from the site.
There are no residences, surface water, or water wells located within a mile radius of the site. Depth to shallow groundwater is estimated at approximately 80 feet bgs.	
Description of Impact (if previously provided, refer to that form or document):	
Impacted Media (check):	Extent of Impact:
<input checked="" type="checkbox"/> Soils	Refer to the attached Figure 2 and Table 1
<input type="checkbox"/> Vegetation	
<input type="checkbox"/> Groundwater	
<input type="checkbox"/> Surface water	
How Determined:	
Excavation and soil sampling	

REMEDIATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):
On September 16, 2015, a historic release was discovered below the produced water vessel during facility decommissioning activities. Excavation activities were summarized in an Initial Form 19 submitted on September 17, 2015 (Document # 400901373) and in a Supplemental Form 19 submitted on September 25, 2015 (Document # 400905161). A topographic map of the site is included as Figure 1.
Describe how source is to be removed:
Between September 16 and September 17, 2015, excavation activities were completed below the former produced water vessel. Approximately 80 cubic yards of impacted material were removed and transported to the Waste Management Facility in Ault, Colorado for disposal under PDC waste manifests. Three soil samples (SS01 - SS03) were collected from the base of the two excavation areas at approximately 17 feet and 22 feet below ground surface (bgs). Soil samples were submitted to Summit Scientific Laboratories in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene, and total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA Method 8260B, and TPH - diesel range organics (DRO) by USEPA Method 8015. Analytical results indicated constituent concentrations were in exceedance of COGCC Table 910-1 standards in two soil sample location (SS01 and SS02). Consequently, eleven (11) test pits were advanced around the excavation area delineate the lateral and vertical extent of remaining hydrocarbon impacts on site. Soil encountered in the test pits was field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Two soil samples were collected from the test pit (TP05) which exhibited the highest PID readings at approximately 14 feet and 21 feet bgs. Soil samples were submitted for laboratory analysis and analytical results indicated benzene and TPH concentrations were in exceedance of COGCC Table 910-1 standards in the soil sample collected at 14 feet bgs. Constituent concentrations were below regulatory standards in the soil sample collected at 21 feet bgs. One additional test pit (TP04) exhibited elevated PID readings between 16 feet and 20 feet bgs, however no samples were collected as the extent of remaining impacts was previously defined by laboratory samples and field screening activities. Soil samples were not collected for laboratory analysis from the remaining test pit locations. The excavation extent, test pit locations, and soil sample locations are illustrated on Figure 2. Soil analytical data is summarized in Table 1 and the laboratory analytical reports are included as Attachment A.
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.:
Analytical data collected during excavation activities indicated the vertical and lateral extent of remaining soil impacts were successfully delineated in the test pit locations. However, the vertical extent of remaining hydrocarbon impacts below the southern excavation area was not determined as soil sample SS02 exhibited benzene concentrations in exceedance of regulatory standards. Consequently, the projected remaining area of hydrocarbon impact has been established within the boundaries of the test pits (TP01 and TP06 -TP11) located at the perimeter of the facility footprint.
Based on this data, multiple remediation options were evaluated and soil mixing and chemical treatment were selected to address remaining petroleum hydrocarbon impacts on site. Impacted material will be excavated within the projected area of impact, as described above, to the vertical extent of remaining soil impacts, as determined by field screening activities and laboratory analytical data. The excavation area will be benched and sloped in accordance with OSHA 29 CFR 1926 Subpart P Appendix B. Material will be removed from the excavation area and chemically treated ex-situ using hydrogen peroxide. Treated material will be stock piled on-site for subsequent confirmation sampling. Soil samples will be collected for every 100 cubic yards of treated material to confirm constituent concentrations decreased below regulatory standards and material may be used for backfilling. Soil samples will be collected from the sidewalls and base of the final excavation extent to confirm soil impacts above regulatory standards were successfully removed. A summary of chemical remediation and sampling activities will be provided in a supplemental report.

State of Colorado
Oil and Gas Conservation Commission

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



Page 2

REMEDIATION WORKPLAN (CONT.)

OGCC Employee: _____

Tracking Number: _____
Name of Operator: PDC Energy, Inc.
OGCC Operator No: 69175
Received Date: _____
Well Name & No: State 14, 24-8
Facility Name & No.: State 14, 24-8

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
Groundwater was not encountered during initial excavation and assessment activities. Should groundwater be encountered during future remediation activities, a proposed monitoring plan will be provided in a subsequent report.

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 will be backfilled, compacted, and re-contoured to match pre-existing conditions. The decommissioned location will be reclaimed in accordance with COGCC 1004 Series rules.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.
Is further site investigation required? ☒ Y ☐ N If yes, describe:
Based on initial excavation and assessment activities, the vertical extent of petroleum hydrocarbon impacts has not been delineated below the southern excavation area. However, no additional site investigation will be completed prior to remedial activities as the vertical extent of impacts will be determined during excavation and soil mixing activities. Soil analytical results are summarized in Table 1 and the laboratory analytical reports are included as Attachment A.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Soil removed during initial excavation activities was disposed of at the Waste Management Facility in Ault, Colorado under PDC waste manifests.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: <u>6/16/2015</u>	Date Site Investigation Completed: <u>NA</u>	Remediation Plan Submitted: _____
Remediation Start Date: <u>1/1/2016</u>	Anticipated Completion Date: <u>NA</u>	Actual Completion Date: <u>TBD</u>

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

Print Name: Karen Olson

Signed: Karen Shahr Olson Title: Sr. EHS Manager Date: 11/25/15

OGCC Approved: _____ Title: _____ Date: _____

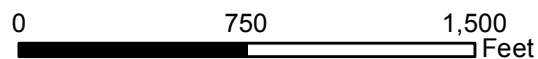
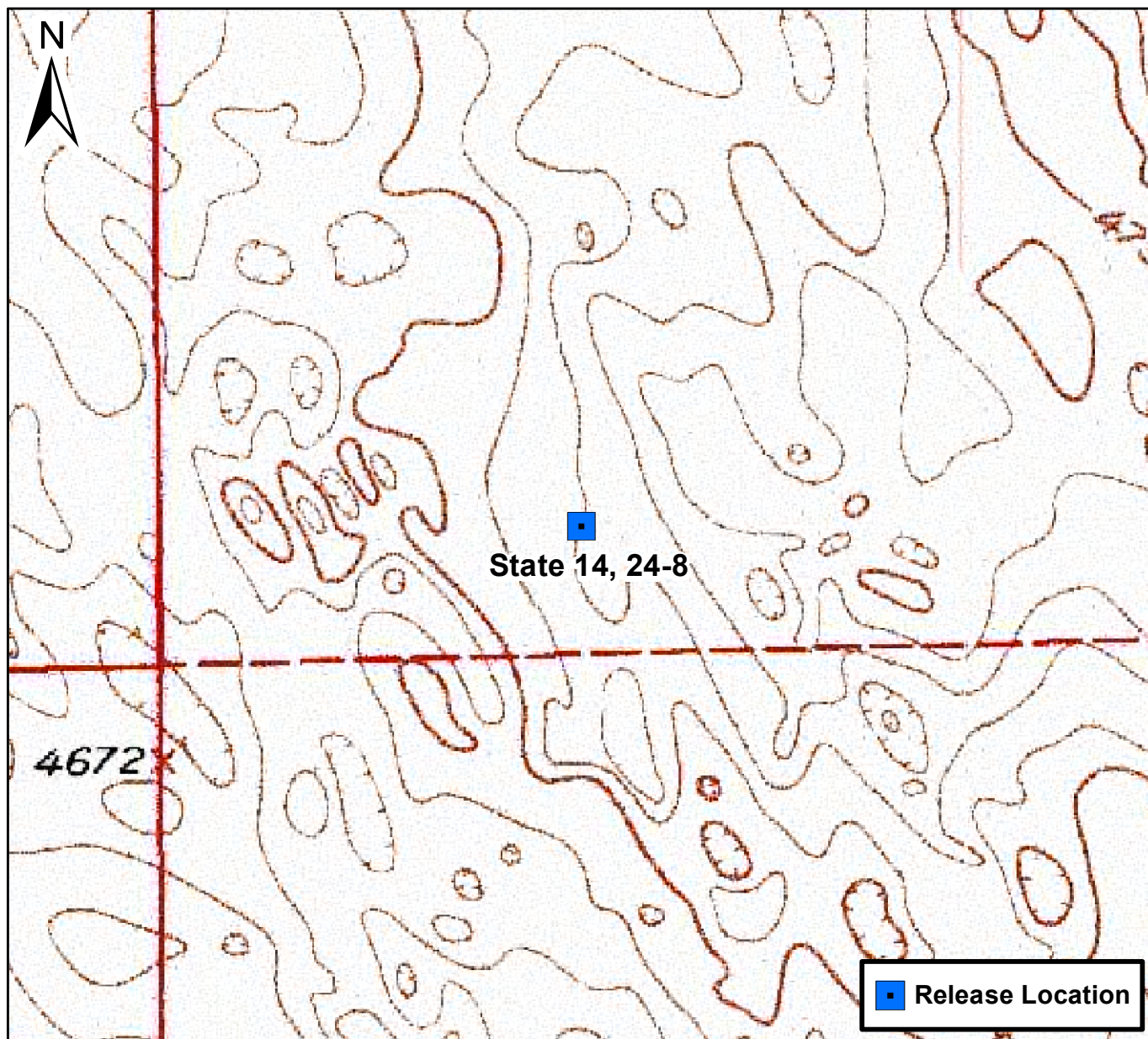


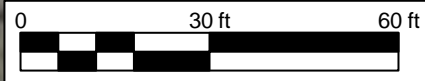
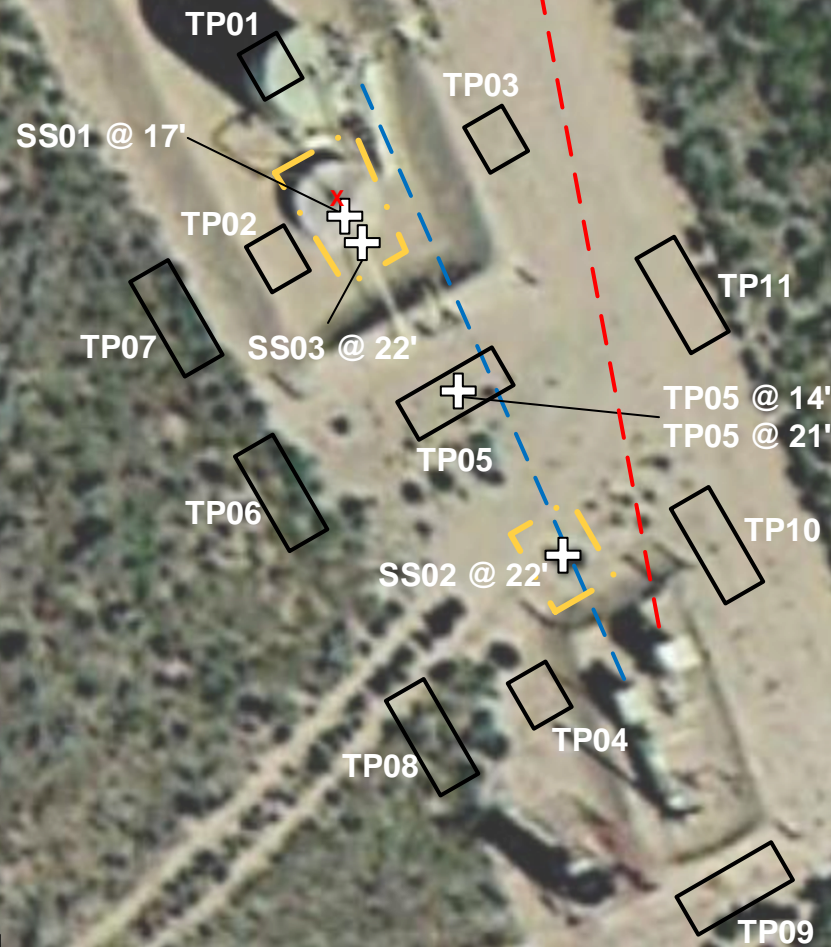
Figure 1

Site Location Map
State 14, 24-8
SESW S8 T5N R63W
Weld County, Colorado





Surface
Drainage



Note: Surface drainage direction
is estimated based on site
topography and is not related to
regional topography.

DRAWN BY: ESS

DATE: 9/24/2015

Facility Diagram
PDC Energy, Inc. – DJ Basin
State 14, 24-8 Tank Battery
SESW S8 T5N R63W
Weld County, CO



6899 Pecos Street, Unit C
Denver, CO 80221

LEGEND

- Excavation Extent
- PDC Dump Line Location
- DCP Sales Line Location
- Point of Release
- Soil Sample Location
- Test Pit Location

All locations are
approximate unless
otherwise noted

FIGURE 2
EXCAVATION
SITE MAP

TABLE 1
STATE 14, 24-8 TANK BATTERY
SOIL ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Depth (feet bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Naphthalene (mg/kg)	TPH ⁽²⁾ (mg/kg)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	23	500
SS01 @ 17'	9/16/2015	17	<0.0020	<0.0050	0.18	2.5	0.17	610
SS02 @ 22'	9/18/2015	22	0.61	1.1	0.24	1.7	0.064	212
SS03 @ 22'	9/18/2015	22	0.039	<0.0050	0.020	0.083	0.014	5.8
TP05 @ 14'	9/23/2015	14	0.53	0.15	2.7	83	0.46	6,100
TP05 @ 21'	9/23/2015	21	0.017	0.0050	<0.0050	0.014	<0.010	<50

Notes:

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

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

COGCC = Colorado Oil and Gas Conservation Commission

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

GRO = Total volatile petroleum hydrocarbons - gasoline range organics

DRO = Total extractable petroleum hydrocarbons - diesel range organics

mg/kg = Milligrams per kilogram

bgs = Below ground surface

BOLD = Analytical result is in exceedance of COGCC soil standards.

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

November 06, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: State 14 & 24-8

Enclosed are the results of analyses for samples received by Summit Scientific on 09/16/15 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

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

Paul Shrewsbury
President



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/06/15 07:19

SS01@17'
1509140-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/16/15 13:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	360	50	mg/kg	1	1509153	09/16/15	09/16/15	8015M	

Date Sampled: 09/16/15 13:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		106 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/16/15 13:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.17	0.010	mg/kg	1	1509152	09/16/15	09/17/15	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	0.18	0.0050	"	"	"	"	"	"	
Xylenes (total)	2.5	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	250	5.0	"	10	"	"	09/17/15	"	

Date Sampled: 09/16/15 13:10

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	09/17/15	"	
Surrogate: Toluene-d8		125 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		151 %	21-167		"	"	"	"	

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/06/15 07:19

Extractable 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 1509153 - EPA 3550A

Blank (1509153-BLK1)

Prepared & Analyzed: 09/16/15

C10-C28 (DRO)	ND	50	mg/kg							
Surrogate: o-Terphenyl	12.5		"	12.2	103		30-150			

LCS (1509153-BS1)

Prepared & Analyzed: 09/16/15

C10-C28 (DRO)	555	50	mg/kg	499	111		73-134			
Surrogate: o-Terphenyl	12.9		"	12.2	106		30-150			

Matrix Spike (1509153-MS1)

Source: 1509137-02

Prepared & Analyzed: 09/16/15

C10-C28 (DRO)	465	50	mg/kg	493	15.8	91.2	50-148			
Surrogate: o-Terphenyl	12.3		"	12.1	102		30-150			

Matrix Spike Dup (1509153-MSD1)

Source: 1509137-02

Prepared & Analyzed: 09/16/15

C10-C28 (DRO)	468	50	mg/kg	493	15.8	91.8	50-148	0.602	13	
Surrogate: o-Terphenyl	11.8		"	12.1	98.1		30-150			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/06/15 07:19

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 1509152 - EPA 5030 Soil MS

Blank (1509152-BLK1)

Prepared & Analyzed: 09/16/15

Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0470</i>		<i>"</i>	<i>0.0396</i>		<i>119</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0418</i>		<i>"</i>	<i>0.0400</i>		<i>104</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0432</i>		<i>"</i>	<i>0.0400</i>		<i>108</i>	<i>21-167</i>			

LCS (1509152-BS1)

Prepared & Analyzed: 09/16/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.117	0.0020	"	0.100		117	58-130			
Toluene	0.107	0.0050	"	0.100		107	61-134			
Ethylbenzene	0.116	0.0050	"	0.0992		117	74-139			
m,p-Xylene	0.224	0.010	"	0.200		112	73-137			
o-Xylene	0.121	0.0050	"	0.0984		123	73-141			
Xylenes (total)	0.345	0.010	"				0-200			
Gasoline Range Hydrocarbons	2.04	0.50	"				30-150			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0488</i>		<i>"</i>	<i>0.0396</i>		<i>123</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0427</i>		<i>"</i>	<i>0.0400</i>		<i>107</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0434</i>		<i>"</i>	<i>0.0400</i>		<i>108</i>	<i>21-167</i>			

Matrix Spike (1509152-MS1)

Source: 1509137-02

Prepared & Analyzed: 09/16/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.111	0.0020	"	0.0938	ND	118	30-131			
Toluene	0.0993	0.0050	"	0.0938	ND	106	30-134			
Ethylbenzene	0.107	0.0050	"	0.0931	ND	115	22-153			
m,p-Xylene	0.204	0.010	"	0.187	ND	109	10-159			
o-Xylene	0.112	0.0050	"	0.0923	ND	122	31-151			
Xylenes (total)	0.316	0.010	"		0.00		30-160			
Gasoline Range Hydrocarbons	2.07	0.50	"		0.240		30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0473</i>		<i>"</i>	<i>0.0371</i>		<i>127</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0398</i>		<i>"</i>	<i>0.0375</i>		<i>106</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0402</i>		<i>"</i>	<i>0.0375</i>		<i>107</i>	<i>21-167</i>			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/06/15 07:19

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 1509152 - EPA 5030 Soil MS

Matrix Spike Dup (1509152-MSD1)		Source: 1509137-02			Prepared & Analyzed: 09/16/15					
Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.115	0.0020	"	0.0998	ND	115	30-131	3.77	34	
Toluene	0.104	0.0050	"	0.0998	ND	104	30-134	4.88	30	
Ethylbenzene	0.117	0.0050	"	0.0990	ND	118	22-153	9.30	24	
m,p-Xylene	0.223	0.010	"	0.199	ND	112	10-159	9.03	68	
o-Xylene	0.123	0.0050	"	0.0982	ND	125	31-151	9.13	38	
Xylenes (total)	0.346	0.010	"		0.00		30-160	9.06	30	
Gasoline Range Hydrocarbons	2.29	0.50	"		0.240		30-160	10.4	30	
Surrogate: 1,2-Dichloroethane-d4	0.0482		"	0.0395		122	23-173			
Surrogate: Toluene-d8	0.0416		"	0.0399		104	20-170			
Surrogate: 4-Bromofluorobenzene	0.0434		"	0.0399		109	21-167			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
11/06/15 07:19

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

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

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

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

September 19, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: State 14 & 24-8

Enclosed are the results of analyses for samples received by Summit Scientific on 09/18/15 17:21. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

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

Paul Shrewsbury
President



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS03@22'	1509158-01	Soil	09/18/15 09:06	09/18/15 17:21
SS02@22'	1509158-02	Soil	09/18/15 10:51	09/18/15 17:21

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

SS03@22'
1509158-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **09/18/15 09:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509178	09/18/15	09/18/15	8015M	

Date Sampled: **09/18/15 09:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		99.5 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/18/15 09:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.014	0.010	mg/kg	1	1509179	"	09/19/15	EPA 8260B	
Benzene	0.039	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	0.020	0.0050	"	"	"	"	"	"	
Xylenes (total)	0.083	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	5.8	0.50	"	"	"	"	"	"	

Date Sampled: **09/18/15 09:06**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		100 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.7 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.2 %	21-167		"	"	"	"	

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

SS02@22'
1509158-02 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **09/18/15 10:51**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	190	50	mg/kg	1	1509178	09/18/15	09/18/15	8015M	

Date Sampled: **09/18/15 10:51**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: o-Terphenyl</i>		109 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/18/15 10:51**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.064	0.010	mg/kg	1	1509179	"	09/19/15	EPA 8260B	
Benzene	0.61	0.0020	"	"	"	"	"	"	
Toluene	1.1	0.0050	"	"	"	"	"	"	
Ethylbenzene	0.24	0.0050	"	"	"	"	"	"	
Xylenes (total)	1.7	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	22	0.50	"	"	"	"	"	"	

Date Sampled: **09/18/15 10:51**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		96.1 %	23-173		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		75.2 %	20-170		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		122 %	21-167		"	"	"	"	

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

Extractable 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 1509178 - EPA 3550A

Blank (1509178-BLK1)

Prepared & Analyzed: 09/18/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 13.4 " 12.2 110 30-150

LCS (1509178-BS1)

Prepared & Analyzed: 09/18/15

C10-C28 (DRO) 473 50 mg/kg 499 94.8 73-134

Surrogate: o-Terphenyl 12.5 " 12.2 103 30-150

Matrix Spike (1509178-MS1)

Source: 1509161-01

Prepared & Analyzed: 09/18/15

C10-C28 (DRO) 445 50 mg/kg 499 11.0 87.1 50-148

Surrogate: o-Terphenyl 12.4 " 12.2 101 30-150

Matrix Spike Dup (1509178-MSD1)

Source: 1509161-01

Prepared & Analyzed: 09/18/15

C10-C28 (DRO) 444 50 mg/kg 499 11.0 86.7 50-148 0.442 13

Surrogate: o-Terphenyl 12.2 " 12.2 99.7 30-150

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

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 1509179 - EPA 5030 Soil MS

Blank (1509179-BLK1)

Prepared & Analyzed: 09/18/15

Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0391</i>		<i>"</i>	<i>0.0396</i>		<i>98.7</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0399</i>		<i>"</i>	<i>0.0400</i>		<i>99.8</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0411</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>	<i>21-167</i>			

LCS (1509179-BS1)

Prepared & Analyzed: 09/18/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.103	0.0020	"	0.100		103	58-130			
Toluene	0.104	0.0050	"	0.100		104	61-134			
Ethylbenzene	0.113	0.0050	"	0.0992		114	74-139			
m,p-Xylene	0.208	0.010	"	0.200		104	73-137			
o-Xylene	0.103	0.0050	"	0.0984		104	73-141			
Xylenes (total)	0.311	0.010	"				0-200			
Gasoline Range Hydrocarbons	2.58	0.50	"				30-150			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0392</i>		<i>"</i>	<i>0.0396</i>		<i>98.9</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0408</i>		<i>"</i>	<i>0.0400</i>		<i>102</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0381</i>		<i>"</i>	<i>0.0400</i>		<i>95.3</i>	<i>21-167</i>			

Matrix Spike (1509179-MS1)

Source: 1509161-01

Prepared & Analyzed: 09/18/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0962	0.0020	"	0.100	ND	96.2	30-131			
Toluene	0.0958	0.0050	"	0.100	ND	95.8	30-134			
Ethylbenzene	0.106	0.0050	"	0.0992	ND	107	22-153			
m,p-Xylene	0.194	0.010	"	0.200	ND	97.3	10-159			
o-Xylene	0.0958	0.0050	"	0.0984	ND	97.4	31-151			
Xylenes (total)	0.290	0.010	"		0.00		30-160			
Gasoline Range Hydrocarbons	2.35	0.50	"		ND		30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0398</i>		<i>"</i>	<i>0.0396</i>		<i>100</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0404</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0371</i>		<i>"</i>	<i>0.0400</i>		<i>92.8</i>	<i>21-167</i>			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

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 1509179 - EPA 5030 Soil MS

Matrix Spike Dup (1509179-MSD1)		Source: 1509161-01			Prepared & Analyzed: 09/18/15					
Naphthalene	ND	0.010	mg/kg		ND		10-158		42	
Benzene	0.0929	0.0020	"	0.100	ND	92.9	30-131	3.55	34	
Toluene	0.0922	0.0050	"	0.100	ND	92.2	30-134	3.86	30	
Ethylbenzene	0.100	0.0050	"	0.0992	ND	101	22-153	5.69	24	
m,p-Xylene	0.185	0.010	"	0.200	ND	92.6	10-159	5.00	68	
o-Xylene	0.0907	0.0050	"	0.0984	ND	92.1	31-151	5.57	38	
Xylenes (total)	0.275	0.010	"		0.00		30-160	5.19	30	
Gasoline Range Hydrocarbons	2.17	0.50	"		ND		30-160	8.17	30	
Surrogate: 1,2-Dichloroethane-d4	0.0403		"	0.0396		102	23-173			
Surrogate: Toluene-d8	0.0413		"	0.0400		103	20-170			
Surrogate: 4-Bromofluorobenzene	0.0385		"	0.0400		96.2	21-167			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/19/15 14:51

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

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

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

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

September 24, 2015

Mark Longhurst
PDC Energy
1775 Sherman St. STE. 3000
Denver, CO 80203
RE: State 14 & 24-8

Enclosed are the results of analyses for samples received by Summit Scientific on 09/23/15 16:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

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

Paul Shrewsbury
President



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
TP05@14'	1509191-01	Soil	09/23/15 09:15	09/23/15 16:15
TP05@21'	1509191-02	Soil	09/23/15 09:50	09/23/15 16:15

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.

Page 2 of 8



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

TP05@14'
1509191-01 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: 09/23/15 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	3700	50	mg/kg	1	1509222	09/23/15	09/23/15	8015M	

Date Sampled: 09/23/15 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		152 %	30-150		"	"	"	"	S-02

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: 09/23/15 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	0.46	0.010	mg/kg	1	1509223	09/23/15	09/24/15	EPA 8260B	
Benzene	0.53	0.0020	"	"	"	"	"	"	
Toluene	0.15	0.0050	"	"	"	"	"	"	
Ethylbenzene	2.7	0.050	"	10	"	"	"	"	
Xylenes (total)	83	0.10	"	"	"	"	"	"	E
Gasoline Range Hydrocarbons	2400	5.0	"	"	"	"	"	"	E

Date Sampled: 09/23/15 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		100 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		241 %	20-170		"	"	"	"	S-02
Surrogate: 4-Bromofluorobenzene		590 %	21-167		"	"	"	"	S-02

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

TP05@21'
1509191-02 (Soil)

Summit Scientific

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **09/23/15 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1509222	09/23/15	09/23/15	8015M	

Date Sampled: **09/23/15 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		112 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/23/15 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1509223	09/23/15	09/24/15	EPA 8260B	
Benzene	0.017	0.0020	"	"	"	"	"	"	
Toluene	0.0050	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	0.014	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **09/23/15 09:50**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		133 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		107 %	21-167		"	"	"	"	

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

Extractable 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 1509222 - EPA 3550A

Blank (1509222-BLK1)

Prepared & Analyzed: 09/23/15

C10-C28 (DRO) ND 50 mg/kg

Surrogate: o-Terphenyl 12.1 " 12.2 99.3 30-150

LCS (1509222-BS1)

Prepared & Analyzed: 09/23/15

C10-C28 (DRO) 517 50 mg/kg 499 104 73-134

Surrogate: o-Terphenyl 12.4 " 12.2 102 30-150

Matrix Spike (1509222-MS1)

Source: 1509188-01

Prepared & Analyzed: 09/23/15

C10-C28 (DRO) 526 50 mg/kg 498 8.49 104 50-148

Surrogate: o-Terphenyl 12.2 " 12.2 100 30-150

Matrix Spike Dup (1509222-MSD1)

Source: 1509188-01

Prepared & Analyzed: 09/23/15

C10-C28 (DRO) 525 50 mg/kg 489 8.49 106 50-148 0.330 13

Surrogate: o-Terphenyl 12.1 " 12.0 102 30-150

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

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 1509223 - EPA 5030 Soil MS

Blank (1509223-BLK1)

Prepared: 09/23/15 Analyzed: 09/24/15

Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0473</i>		<i>"</i>	<i>0.0396</i>		<i>120</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0417</i>		<i>"</i>	<i>0.0400</i>		<i>104</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0434</i>		<i>"</i>	<i>0.0400</i>		<i>109</i>	<i>21-167</i>			

LCS (1509223-BS1)

Prepared: 09/23/15 Analyzed: 09/24/15

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.115	0.0020	"	0.100		115	58-130			
Toluene	0.104	0.0050	"	0.100		104	61-134			
Ethylbenzene	0.113	0.0050	"	0.0992		114	74-139			
m,p-Xylene	0.222	0.010	"	0.200		111	73-137			
o-Xylene	0.116	0.0050	"	0.0984		118	73-141			
Xylenes (total)	0.339	0.010	"				0-200			
Gasoline Range Hydrocarbons	2.13	0.50	"				30-150			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0460</i>		<i>"</i>	<i>0.0396</i>		<i>116</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0434</i>		<i>"</i>	<i>0.0400</i>		<i>109</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0441</i>		<i>"</i>	<i>0.0400</i>		<i>110</i>	<i>21-167</i>			

Matrix Spike (1509223-MS1)

Source: 1509188-01

Prepared: 09/23/15 Analyzed: 09/24/15

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.113	0.0020	"	0.0963	ND	117	30-131			
Toluene	0.100	0.0050	"	0.0963	ND	104	30-134			
Ethylbenzene	0.117	0.0050	"	0.0956	ND	122	22-153			
m,p-Xylene	0.230	0.010	"	0.192	ND	120	10-159			
o-Xylene	0.122	0.0050	"	0.0948	ND	128	31-151			
Xylenes (total)	0.352	0.010	"		0.00		30-160			
Gasoline Range Hydrocarbons	2.47	0.50	"		ND		30-160			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0454</i>		<i>"</i>	<i>0.0382</i>		<i>119</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0407</i>		<i>"</i>	<i>0.0385</i>		<i>106</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0430</i>		<i>"</i>	<i>0.0385</i>		<i>112</i>	<i>21-167</i>			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8
Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

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 1509223 - EPA 5030 Soil MS

Matrix Spike Dup (1509223-MSD1)		Source: 1509188-01			Prepared: 09/23/15		Analyzed: 09/24/15			
Naphthalene	ND	0.010	mg/kg		ND		10-158			42
Benzene	0.114	0.0020	"	0.0963	ND	118	30-131	0.561		34
Toluene	0.103	0.0050	"	0.0963	ND	107	30-134	2.87		30
Ethylbenzene	0.120	0.0050	"	0.0956	ND	126	22-153	2.81		24
m,p-Xylene	0.234	0.010	"	0.192	ND	122	10-159	1.41		68
o-Xylene	0.125	0.0050	"	0.0948	ND	131	31-151	2.30		38
Xylenes (total)	0.358	0.010	"		0.00		30-160	1.72		30
Gasoline Range Hydrocarbons	2.60	0.50	"		ND		30-160	5.14		30
Surrogate: 1,2-Dichloroethane-d4	0.0463		"	0.0382		121	23-173			
Surrogate: Toluene-d8	0.0403		"	0.0385		104	20-170			
Surrogate: 4-Bromofluorobenzene	0.0429		"	0.0385		111	21-167			

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.



PDC Energy
1775 Sherman St. STE. 3000
Denver CO, 80203

Project: State 14 & 24-8

Project Number: [none]
Project Manager: Mark Longhurst

Reported:
09/24/15 09:44

Notes and Definitions

S-02 The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.

E The concentration indicated for this analyte is an estimated value above the calibration range of the instrument.

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