

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
4/23/2013

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>PDC Energy, Inc.</u>	OGCC Operator No: <u>69175</u>	Phone Numbers
Address: <u>1775 Sherman Street, Suite 3000</u>		No: <u>(303) 831-3971</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>brandon.bruns@pdce.com</u>

DESCRIPTION OF SPILL OR RELEASE

Date of Incident: <u>4/10/2013</u>	Facility Name & No: <u>Smith 32-25</u>	County: <u>Yuma</u>
Type of Facility (well, tank battery, flow line, pit): <u>Well</u>		QtrQtr: <u>SWNE</u> Section: <u>25</u>
Well Name and Number: <u>Smith 32-25</u>		Township: <u>1N</u> Range: <u>45W</u>
API Number: <u>05-125-09602</u>		Meridian: <u>6th</u>

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

Oil spilled: 0 Oil recov'd: 0 Water spilled: 120 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: ~300 ft² x 4 ft bgs

Current land use: Gas Production/ Livestock Weather conditions: Low 60s

Soil/geology description: Canyon-Rock outcrop complex, 9 to 25 percent slopes

IF LESS THAN A MILE, report distance IN FEET to nearest ... Surface water: ~ 660' NW Wetlands: NA Buildings: NA

Livestock: ~ 20' Water wells: ~ 2,500' W Depth to shallowest ground water: Unknown

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

On April 10, 2013, a release occurred at the Smith 32-25 wellhead (API# 05-125-09602). During a routine daily visit to the wellhead, a pumper discovered a release of produced water from a production line approximately 70 feet north of the wellhead. The pumper discovered the spill as the release surfaced along the alignment of the production line. A topographic map of the site location is included as Figure 1.

CORRECTIVE ACTION

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

PDC shut-in the well and valves. Excavation activities were completed on April 11, 2013. PDC excavated soil along the alignment of the production line from the wellhead out a distance of approximately 70 feet. The excavation extended down to the production line (depth of approximately 4 feet). Approximately 30 cubic yards (yd³) of soil was removed and temporarily stored adjacent to the trench. Excavated soil was field screened with a photoionization detector and visually inspected to determine the extent of the release. It was determined that the upper 2 feet of soil along the alignment of the trench was not impacted from the release. After soil samples were collected, all material was backfilled into the trench. The cause of the release was determined to be a split in the production line located approximately 70 feet north from the Smith 32-25 wellhead.

Describe any emergency pits constructed: NA

How was the extent of contamination determined?

On April 12, 2013, a background sample (BCKG) was collected approximately 15 feet west of the point of release in native soil. Two shallow soil samples (SS4 and SS5) were collected above the release location within the backfill material at approximately 2 feet below ground surface (bgs). Three trench samples (SS1, SS2, and SS3) were collected adjacent to the flow line at a depth of approximately 4 feet bgs. Additionally, one deep trench soil sample (SS1A) was collected directly below the release point at approximately 5.5 feet bgs. Soil samples were submitted to Summit Scientific Laboratories in Golden, Colorado for laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), and total petroleum hydrocarbons (TPH)- gasoline range organics (GRO) by USEPA Method 8260B, TPH-diesel range organics (DRO) by USEPA Method 8015, and specific conductance (EC) and pH by APHA/ASTM/EPA Methods. Sodium absorption ratio (SAR) was calculated based on cation concentrations. The soil analytical results are summarized in Table 1 and the extent of the excavation and soil sample locations are illustrated on Figure 2. The laboratory analytical report is included as Attachment A.

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

PDC is in the process of developing a remedial approach based on the elevated SAR concentration in soil sample SS4. This approach will be detailed in a Form 27 that will be submitted to the COGCC.

Describe measures taken to prevent problem from reoccurring:

PDC installed additional fencing and salt blocks and will continue monitoring the condition of the wellhead piping instrumentation.

OTHER NOTIFICATIONS

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

Date	Agency	Contact	Phone	Response
4/10/2013	COGCC	John Axelson	303-877-9964	Response email from Mr. Axelson

Spill/Release Tracking No: 2232783



0 375 750 1,500 Feet



Figure 1

Site Location Map
Smith 32-25
SWNE S25 T1N R45W
Yuma County, Colorado

Drawn By: CAW
Date: 04/18/2013

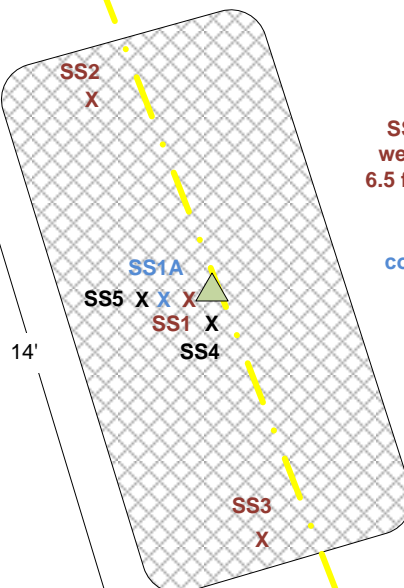

Tasman Geosciences



Surface
Drainage

Well Lines

BCKG
X
15 feet west from
Point of Release



SS2 and SS3
were collected
6.5 feet from SS1

SS1A was
collected directly
below SS1

SS4 and SS5 were
collected 1.5 feet from
Point of Release

Approximately 70 feet from
Point of Release to Smith 32-25
Wellhead

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

DRAWN BY: CAW

DATE: 4/12/2013

Facility Diagram
PDC Energy – NECO
Smith 32-25
SWNE S25 T1N R45W
Yuma County, CO



6899 Pecos Street
Unit C
Denver, CO 80221

LEGEND

- Excavation Extent for Sample Collection on April 12, 2013
- Point of Release
- Shallow Soil Sample at 2 feet bgs
- Trench Soil Sample at 4 feet bgs
- Deep Trench Soil Sample at 5.5 feet bgs

FIGURE 2

Not to Scale

TABLE 1
SMITH 32-25
SOIL ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Depth (Feet bgs)	PID Readings (ppm)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	TPH ⁽²⁾ (mg/kg)	EC ⁽³⁾ (mmhos/cm)	pH	SAR ⁽⁴⁾
SS1	4/12/2013	4	10.3	<0.005	<0.005	<0.005	<0.005	<50	3.99	8.6	13.2
SS1A	4/12/2013	5.5	2.8	<0.005	<0.005	<0.005	<0.005	<50	4.63	9.0	13.3
SS2	4/12/2013	4	1.4	<0.005	<0.005	<0.005	<0.005	<50	4.56	8.91	9.39
SS3	4/12/2013	4	0.9	<0.005	<0.005	<0.005	<0.005	<50	4.64	9.57	15.5
SS4	4/12/2013	2	3.2	<0.005	<0.005	<0.005	<0.005	<50	5.86	9.13	23.0
SS5	4/12/2013	2	6.0	<0.005	<0.005	<0.005	<0.005	<50	5.80	8.87	18.0
BCKG	4/12/2013	2	0.0	<0.005	<0.005	<0.005	<0.005	<50	0.484	8.39	0.05
COGCC standards for Soil (mg/kg) ⁽¹⁾				0.17	85	100	175	500	<4 mmhos/cm or 2x background	6-9	<12

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.

3). EC - Specific Conductance

4). SAR - Sodium Adsorption Ratio

GRO - Gasoline range organics.

DRO - Diesel range organics.

mg/kg= Milligrams per kilogram.

bgs - Below ground surface.

ppm - Parts per million

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

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

April 18, 2013

Brandon Bruns

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Deterding 23-25 & Smith 22,31,32-25

Enclosed are the results of analyses for samples received by Summit Scientific on 04/12/13 16:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Joseph J Egry IV For Ben Shrewsbury

President / Laboratory Manager

This report shall not be reproduced, except in its entirety, without the written approval of Summit Scientific. Test results relate only to samples analyzed.

Summit Scientific is the sole authority for authorizing edits or modifications to this document. Unauthorized modification of this report is strictly prohibited.



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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BCKG	R304106-01	Soil	04/12/13 09:45	04/12/13 16:00
SS1@4'	R304106-02	Soil	04/12/13 10:10	04/12/13 16:00
SS1A@5.5'	R304106-03	Soil	04/12/13 10:25	04/12/13 16:00
SS2@4'	R304106-04	Soil	04/12/13 10:30	04/12/13 16:00
SS3@4'	R304106-05	Soil	04/12/13 10:40	04/12/13 16:00
SS4@2'	R304106-06	Soil	04/12/13 09:15	04/12/13 16:00
SS5@2'	R304106-07	Soil	04/12/13 09:05	04/12/13 16:00

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

BCKG
R304106-01 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		102 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		118 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		110 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 09:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

BCKG
R304106-01 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Calcium	515	2.72 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	
Magnesium	24.5	1.09	"	"	"	"	"	
Sodium	ND	5.43	"	"	"	"	"	

Date Sampled: 04/12/13 09:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.0500		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 04/12/13 09:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.484	0.00100 mmhos/cm	1	3041501	04/15/13	04/15/13	SM 2510B		

Date Sampled: 04/12/13 09:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.390		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: 04/12/13 09:45

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	92.0		%	"	3041506	04/15/13	04/17/13	% calculation	

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS1@4'
R304106-02 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		98.5 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		112 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		107 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	925	2.91	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS1@4'
R304106-02 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	50.0	1.16 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	
Sodium	1520	5.82 "	"	"	"	"	"	

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	13.2		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	3.99	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.600		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: **04/12/13 10:10**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	85.9		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

SS1A@5.5'
R304106-03 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 10:25**

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: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		111 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		99.8 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		108 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	1290	2.94	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS1A@5.5'
R304106-03 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	74.1	1.18 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)
Sodium	1810	5.89 "	"	"	"	"	"

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	13.3		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	4.63	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	9.000		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: **04/12/13 10:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	84.9		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS2@4'
R304106-04 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		102 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		114 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		110 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	998	2.95	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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1775 Sherman St. STE. 3000
Denver CO, 80203

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS2@4'
R304106-04 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	48.7	1.18 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	
Sodium	1120	5.90 "	"	"	"	"	"	

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	9.39		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	4.56	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.910		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: **04/12/13 10:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	84.7		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS3@4'
R304106-05 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		96.7 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		114 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		112 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	682	2.83	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS3@4'
R304106-05 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	36.7	1.13 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)
Sodium	1530	5.66 "	"	"	"	"	"

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	15.5		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	4.64	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	9.570		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: **04/12/13 10:40**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	88.4		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS4@2'
R304106-06 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 09:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 09:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		101 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 09:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 09:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		99.0 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		111 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 09:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	754	2.99	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS4@2'
R304106-06 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	50.1	1.20 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	
Sodium	2420	5.99 "	"	"	"	"	"	

Date Sampled: 04/12/13 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	23.0		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 04/12/13 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	5.86	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: 04/12/13 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	9.130		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: 04/12/13 09:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	83.5		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

SS5@2'
R304106-07 (Soil)

Summit Scientific

Total Petroleum Hydrocarbons by 8015

Date Sampled: **04/12/13 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	3041224	04/12/13	04/13/13	8015 DRO	

Date Sampled: **04/12/13 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		102 %	30-150		"	"	"	"	

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **04/12/13 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0050	mg/kg	1	3041223	04/12/13	04/13/13	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.0050	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	0.50	"	"	"	"	"	"	

Date Sampled: **04/12/13 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		111 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		115 %	21-167		"	"	"	"	

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Date Sampled: **04/12/13 09:05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	1210	2.97	mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

SS5@2'
R304106-07 (Soil)

Summit Scientific

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis

Magnesium	69.1	1.19 mg/kg dry	1	3041302	04/13/13	04/15/13	EPA 6020/Mod. USDA60 6(2, 3A)	
Sodium	2380	5.93 "	"	"	"	"	"	

Date Sampled: 04/12/13 09:05

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	18.0		units	"	3041709	04/17/13	04/17/13	"	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: 04/12/13 09:05

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	5.80	0.00100 mmhos/cm		1	3041501	04/15/13	04/15/13	SM 2510B	

Date Sampled: 04/12/13 09:05

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.870		pH Units	"	3041502	04/15/13	04/15/13	EPA 9045B	

Date Sampled: 04/12/13 09:05

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	84.3		%	"	3041506	04/15/13	04/17/13	% calculation	

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

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 3041224 - EPA 3550A

Blank (3041224-BLK1)

Prepared & Analyzed: 04/12/13

C10-C28 (DRO) ND 50 mg/kg

LCS (3041224-BS1)

Prepared: 04/12/13 Analyzed: 04/13/13

C10-C28 (DRO) 537 50 mg/kg 501 107 73-134

LCS Dup (3041224-BSD1)

Prepared: 04/12/13 Analyzed: 04/13/13

C10-C28 (DRO) 562 50 mg/kg 501 112 73-134 4.44 11

Matrix Spike (3041224-MS1)

Source: R304106-01

Prepared: 04/12/13 Analyzed: 04/13/13

C10-C28 (DRO) 595 50 mg/kg 501 ND 119 50-148

Matrix Spike Dup (3041224-MSD1)

Source: R304106-01

Prepared: 04/12/13 Analyzed: 04/13/13

C10-C28 (DRO) 582 50 mg/kg 501 ND 116 50-148 2.27 13

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

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 3041223 - EPA 5030 Soil MS

Blank (3041223-BLK1)

Prepared: 04/12/13 Analyzed: 04/13/13

Benzene	ND	0.0050	mg/kg							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.0050	"							
Gasoline Range Hydrocarbons	ND	0.50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0417		"	0.0397	105	23-173				
Surrogate: Toluene-d8	0.0392		"	0.0400	98.0	20-170				
Surrogate: 4-Bromofluorobenzene	0.0431		"	0.0400	108	21-167				

LCS (3041223-BS1)

Prepared: 04/12/13 Analyzed: 04/13/13

Benzene	0.0889	0.0050	mg/kg	0.100	88.9	58-130				
Toluene	0.103	0.0050	"	0.100	103	61-134				
Ethylbenzene	0.116	0.0050	"	0.100	116	74-139				
m,p-Xylene	0.220	0.010	"	0.200	110	73-137				
o-Xylene	0.113	0.0050	"	0.100	113	73-141				
Surrogate: 1,2-Dichloroethane-d4	0.0393		"	0.0397	99.1	23-173				
Surrogate: Toluene-d8	0.0390		"	0.0400	97.4	20-170				
Surrogate: 4-Bromofluorobenzene	0.0423		"	0.0400	106	21-167				

LCS Dup (3041223-BSD1)

Prepared: 04/12/13 Analyzed: 04/13/13

Benzene	0.0886	0.0050	mg/kg	0.100	88.6	58-130	0.372	13		
Toluene	0.104	0.0050	"	0.100	104	61-134	0.926	16		
Ethylbenzene	0.117	0.0050	"	0.100	117	74-139	0.746	12		
m,p-Xylene	0.223	0.010	"	0.200	112	73-137	1.39	14		
o-Xylene	0.114	0.0050	"	0.100	114	73-141	1.35	12		
Surrogate: 1,2-Dichloroethane-d4	0.0425		"	0.0397	107	23-173				
Surrogate: Toluene-d8	0.0397		"	0.0400	99.3	20-170				
Surrogate: 4-Bromofluorobenzene	0.0439		"	0.0400	110	21-167				

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
04/18/13 09:06

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 3041223 - EPA 5030 Soil MS

Matrix Spike (3041223-MS1)		Source: R304106-01			Prepared: 04/12/13		Analyzed: 04/13/13			
Benzene	0.0937	0.0050	mg/kg	0.100	ND	93.7	30-131			
Toluene	0.110	0.0050	"	0.100	ND	110	30-134			
Ethylbenzene	0.117	0.0050	"	0.100	ND	117	22-153			
m,p-Xylene	0.226	0.010	"	0.200	ND	113	10-159			
o-Xylene	0.116	0.0050	"	0.100	ND	116	31-151			
Surrogate: 1,2-Dichloroethane-d4	0.0434		"	0.0397		109	23-173			
Surrogate: Toluene-d8	0.0403		"	0.0400		101	20-170			
Surrogate: 4-Bromofluorobenzene	0.0430		"	0.0400		108	21-167			
Matrix Spike Dup (3041223-MSD1)		Source: R304106-01			Prepared: 04/12/13		Analyzed: 04/13/13			
Benzene	0.0935	0.0050	mg/kg	0.100	ND	93.5	30-131	0.192	34	
Toluene	0.105	0.0050	"	0.100	ND	105	30-134	4.12	30	
Ethylbenzene	0.120	0.0050	"	0.100	ND	120	22-153	2.20	24	
m,p-Xylene	0.231	0.010	"	0.200	ND	115	10-159	1.81	68	
o-Xylene	0.117	0.0050	"	0.100	ND	117	31-151	0.978	38	
Surrogate: 1,2-Dichloroethane-d4	0.0413		"	0.0397		104	23-173			
Surrogate: Toluene-d8	0.0396		"	0.0400		99.1	20-170			
Surrogate: 4-Bromofluorobenzene	0.0430		"	0.0400		107	21-167			

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis - Quality Control
Summit Scientific

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

Batch 3041302 - General Preparation

Blank (3041302-BLK1)

Prepared: 04/13/13 Analyzed: 04/15/13

Calcium	ND	2.50	mg/kg wet
Magnesium	ND	1.00	"
Sodium	ND	5.00	"

LCS (3041302-BS1)

Prepared: 04/13/13 Analyzed: 04/15/13

Calcium	388	2.50	mg/kg wet	400	97.0	77-118
Magnesium	192	1.00	"	200	96.0	77-117
Sodium	657	5.00	"	700	93.8	80-119

LCS Dup (3041302-BSD1)

Prepared: 04/13/13 Analyzed: 04/15/13

Calcium	383	2.50	mg/kg wet	400	95.8	77-118	1.24	14
Magnesium	198	1.00	"	200	98.9	77-117	2.99	12
Sodium	652	5.00	"	700	93.1	80-119	0.745	14

Matrix Spike (3041302-MS1)

Source: R304106-01

Prepared: 04/13/13 Analyzed: 04/15/13

Calcium	965	2.72	mg/kg dry	415	515	108	13-170
Magnesium	237	1.09	"	208	24.5	102	34-152
Sodium	719	5.43	"	727	3.97	98.4	43-155

Matrix Spike Dup (3041302-MSD1)

Source: R304106-01

Prepared: 04/13/13 Analyzed: 04/15/13

Calcium	903	2.72	mg/kg dry	416	515	93.4	13-170	6.64	37
Magnesium	220	1.09	"	208	24.5	93.9	34-152	7.53	33
Sodium	708	5.43	"	728	3.97	96.7	43-155	1.59	25

Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

Physical Parameters by APHA/ASTM/EPA Methods - Quality Control
Summit Scientific

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

Batch 3041501 - General Preparation

Duplicate (3041501-DUP1) **Source: R304106-01** Prepared & Analyzed: 04/15/13

Specific Conductance (EC)	0.476	0.00100	mmhos/cm	0.484	1.56	20
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Batch 3041502 - General Preparation

Duplicate (3041502-DUP1) **Source: R304106-01** Prepared & Analyzed: 04/15/13

pH	8.300		pH Units	8.390	1.08	4.95
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Batch 3041506 - General Preparation

Duplicate (3041506-DUP1) **Source: R304106-01** Prepared: 04/15/13 Analyzed: 04/17/13

% Solids	93.2		%	92.0	1.30	20
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Summit Scientific

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

Project: Deterding 23-25 & Smith 22,31,32-25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
04/18/13 09:06

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

A handwritten signature in black ink, appearing to read 'Daniel A. Bruns IV'.