

PDC Energy, Inc.
Fourth Quarter 2013 Groundwater Monitoring Summary

January 10, 2014

Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1 Tank Battery
SESW Section 25 T5N R68W
Weld County, API # 05-069-06179

This groundwater monitoring summary has been prepared by Tasman Geosciences, LLC for the Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1 tank battery. On October 31, 2013, groundwater sampling was conducted at two temporary monitoring well locations. Due to insufficient water in BH02, BH03, and BH05, groundwater samples were not collected from these locations. Groundwater samples were submitted for laboratory analysis of BTEX constituents using USEPA Method 8260B. Analytical results are summarized in Table 1 and are illustrated on Figure 1. The laboratory analytical report is included as Attachment A. Evaluation of fourth quarter analytical results indicates that BTEX concentrations are below COGCC regulatory standards at both sampled locations (BH01 and BH04R).

EFR/AS activities have been successful in mitigating residual dissolved phase petroleum hydrocarbon concentrations on site, as demonstrated by the annual decrease in benzene concentrations since activities commenced during the second quarter 2012. EFR/AS events were not performed during the third and fourth quarters 2013 due to low water levels at the site. A summary of the EFR/AS operational data through the second quarter 2013 is provided in Table 2.

First quarter 2014 groundwater sampling will be conducted during January 2014.

TABLE 1
RYAN 23-25U, 25BU, 14-25U/SCOTT 24-25U/MVS 1
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Depth to Water (feet)
GW01-BH-01	4/13/2012	320	810	44	490	NM
BH01	7/17/2012	<1.0	<1.0	<1.0	<1.0	14.39
BH01	10/1/2012	<1.0	<1.0	<1.0	<1.0	14.67
BH01	1/28/2013	<1.0	<1.0	<1.0	<1.0	14.9
BH01	5/3/2013	<1.0	<1.0	<1.0	<1.0	15.50
BH01	7/25/2013	<1.0	<1.0	<1.0	<1.0	16.29
BH01	10/31/2013	<1.0	<1.0	<1.0	<1.0	15.9
GW02-BH02	4/13/2012	7,100	14,000	420	4,400	NM
BH02	7/17/2012	DRY	DRY	DRY	DRY	DRY
BH02	10/1/2012	DRY	DRY	DRY	DRY	DRY
BH02	1/28/2013	DRY	DRY	DRY	DRY	DRY
BH02	5/3/2013	DRY	DRY	DRY	DRY	DRY
BH02	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH02	10/31/2013	DRY	DRY	DRY	DRY	DRY
GW03-BH03	4/13/2012	11,000	13,000	300	3,500	NM
BH03	7/17/2012	1,400	710	20	250	13.82
BH03	10/1/2012	41	47	3	32	14.2
BH03	1/28/2013	DRY	DRY	DRY	DRY	DRY
BH03	5/3/2013	<1.0	<1.0	<1.0	<1.0	14.81
BH03	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH03	10/31/2013	DRY	DRY	DRY	DRY	DRY
GW04-BH04	4/13/2012	3,100	3,900	150	1,700	NM
BH04	7/17/2012	1,500	490	<1.0	1,900	13.21
BH04 ⁽²⁾	10/1/2012	2,400	66	53	1,800	13.58
BH04R	1/28/2013	26	<1.0	<1.0	77	14.53
BH04R	5/3/2013	<1.0	<1.0	<1.0	<1.0	15.22
BH04R	7/25/2013	2	<1.0	<1.0	<1.0	16.12
BH04R	10/31/2013	<1.0	<1.0	<1.0	4.1	15.77

TABLE 1
RYAN 23-25U, 25BU, 14-25U/SCOTT 24-25U/MVS 1
GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE

Sample ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Depth to Water (feet)
GW05-BH05	4/13/2012	510	3,400	190	2,200	NM
BH05	7/17/2012	<1.0	<1.0	<1.0	<1.0	13.3
BH05	10/1/2012	<1.0	<1.0	<1.0	<1.0	15.6
BH05	1/28/2013	<1.0	<1.0	<1.0	<1.0	15.74
BH05	5/3/2013	<1.0	<1.0	<1.0	<1.0	16.45
BH05	7/25/2013	DRY	DRY	DRY	DRY	DRY
BH05	8/31/2013	DRY	DRY	DRY	DRY	DRY
BH05	10/31/2013	DRY	DRY	DRY	DRY	DRY
COGCC standards for Groundwater (ug/L) ⁽¹⁾		5	560	700	1,400	

Notes:

1). The environmental cleanup standards for groundwater that are applicable to this site are the Colorado Oil and Gas Conservation Commission (COGCC) standards for contaminants in groundwater according to Table 910-1 of the COGCC 900 Series Rule for E&P Waste Management.

2). Groundwater sample collection at BH04 discontinued following installation of BH04R during the fourth quarter 2012.

Bold red values indicate an exceedance of the COGCC groundwater standards for the site.

ug/L= Micrograms per liter

NR - Not Recorded

NM - Not Measured

TABLE 2
RYAN 23-25U, 25BU, 14-25U/SCOTT 24-25U/MVS 1
AIR SPARGE / EFR OPERATIONAL SUMMARY TABLE

Second Quarter 2012					
Date	EFR Wells	Total EFR/AS Duration (hours)	Approximate Gallons Extracted	AS Wells	Injection Pressure (psi)
5/29/2012	BH01, BH02, BH03,	6	210	BH01, BH02, BH03,	8
6/13/2012	BH04, BH05	6	210	BH04, BH05	8
Quarterly Totals		12	420		-
Third Quarter 2012					
7/2/2012	BH01, BH02, BH03, BH04, BH05	6	252	BH01, BH02, BH03, BH04, BH05	8
7/10/2012		6	210		8
7/25/2012		6	207		8
8/18/2012		7	124.5		7.5
8/21/2012		8	124.5		8
9/4/2012		7	0		8
Quarterly Totals		40	918		-
Fourth Quarter 2012					
10/3/2012	BH01, BH02, BH03, BH04, BH05	7	83	BH01, BH02, BH03, BH04, BH05	8
10/30/2012		6	11.5		8
11/13/2012		6	23		8
11/29/2012		6.5	14.6		8
12/6/2012		6.5	7.5		8
Quarterly Totals		32	139.6		-
First Quarter 2013					
1/7/2013	BH03, BH04, BH05	5	10	BH03, BH04, BH05	10
3/25/2013		6	26		10
Quarterly Totals		11	36		-
Second Quarter 2013					
4/14/2013	BH03, BH04, BH05	6	23.5	BH03, BH04, BH05	10
4/25/2013		6	16		10
5/10/2013		6	22		10
Quarterly Totals		18	61.5		-



Surface
Drainage

BH03		
Compound (ug/L)	7/25/2013	10/31/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

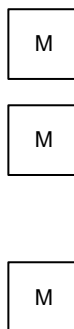
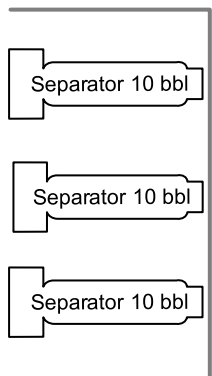
BH-03

BH04R		
Compound (ug/L)	7/25/2013	10/31/2013
Benzene	2	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0

BH-04R BH-04

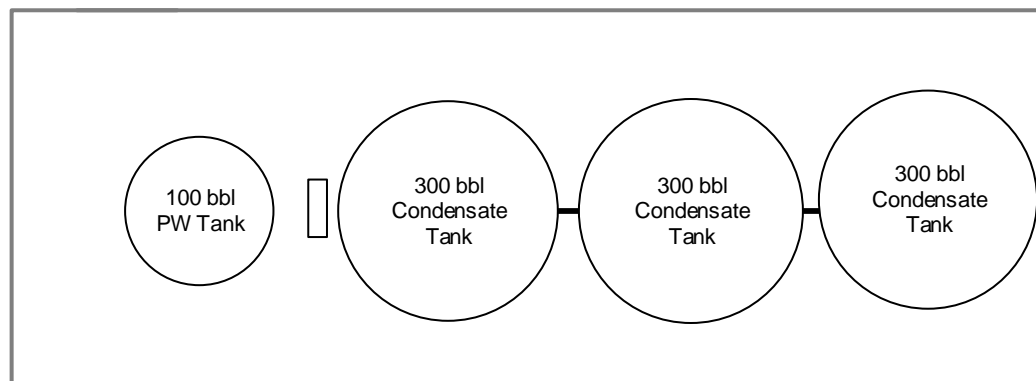
BH05		
Compound (ug/L)	7.25/2013	10/31/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

BH-05



BH01

BH01		
Compound (ug/L)	7/25/2013	10/31/2013
Benzene	<1.0	<1.0
Toluene	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Total Xylenes	<1.0	<1.0



BH02

BH02		
Compound (ug/L)	7/25/2013	10/31/2013
Benzene	DRY	DRY
Toluene	DRY	DRY
Ethylbenzene	DRY	DRY
Total Xylenes	DRY	DRY

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

DRAWN BY: BAM

DATE: 11/20/2013

Facility Diagram
PDC Energy – DJ Basin
Ryan 23-25U & 25BU, 14-25U/ Scott 24-25U/ MVS #1
SESW T5N R68W S25
Weld County, CO



6899 Pecos St., Unit C
Denver CO 80221

LEGEND

- Corrugated Steel Berm
- Monitoring Well Location. Soil and Groundwater Samples Collected
- Sampling Discontinued from Monitoring Well Location

M Meter Shed

FIGURE 1
GROUNDWATER
ANALYTICAL RESULTS
MAP
Not to Scale

ATTACHMENT A

Summit Scientific

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

November 07, 2013

Brandon Bruns

PDC Energy

1775 Sherman St. STE. 3000

Denver, CO 80203

RE: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Enclosed are the results of analyses for samples received by Summit Scientific on 10/31/13 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 be 'BS' or 'Shrewsbury', with a long, sweeping horizontal line extending to the right.

Ben Shrewsbury

President / Laboratory Manager



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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/07/13 18:17

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	R310333-01	Water	10/31/13 14:30	10/31/13 17:00
BH04R	R310333-02	Water	10/31/13 14:35	10/31/13 17:00

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: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/07/13 18:17

R310333

Summit Scientific

741 Corporate Circle Suite I • Golden, Colorado 80401
303-277-9310 • 303-374-5933 Fax

Client:	DOC Pasman
Address:	
City/State/Zip:	
Phone:	
Fac:	
Sample Name:	Eric 5100
Project Manager:	Brendon Bruns
E-Mail:	
Project Name:	Aug 73-75, 1258J, W20U, S20b 24-35U, M/S #1
Project Number:	
Page	of

Client: PDC / PDSunha

Project Manager: Bradon Bruns

E-Mail:

Project Name: Run 73-75, 2550V, N-25U/500 24-25U/MV5 #1

Project Number:

[illegible]

www.s2scientific.com

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[Signature]



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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/07/13 18:17

BH01
R310333-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/31/13 14:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	3110508	11/06/13	11/06/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/31/13 14:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		105 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		98.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		100 %	45-146		"	"	"	"	

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
11/07/13 18:17

BH04R
R310333-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **10/31/13 14:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	3110508	11/06/13	11/06/13	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	4.1	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **10/31/13 14:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		104 %	37-154		"	"	"	"	
Surrogate: Toluene-d8		99.9 %	45-149		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		101 %	45-146		"	"	"	"	

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1
Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/07/13 18:17

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 3110508 - EPA 5030 Water MS

Blank (3110508-BLK1)

Prepared & Analyzed: 11/05/13

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.6		"	13.2	102	37-154				
Surrogate: Toluene-d8	13.0		"	13.3	97.7	45-149				
Surrogate: 4-Bromofluorobenzene	13.3		"	13.3	100	45-146				

LCS (3110508-BS1)

Prepared & Analyzed: 11/05/13

Benzene	32.9	1.0	ug/l	33.3	98.7	51-132				
Toluene	33.6	1.0	"	33.3	101	51-138				
Ethylbenzene	34.7	1.0	"	33.3	104	58-146				
m,p-Xylene	67.7	2.0	"	66.7	102	57-144				
o-Xylene	33.1	1.0	"	33.3	99.2	53-146				
Surrogate: 1,2-Dichloroethane-d4	13.6		"	13.2	102	37-154				
Surrogate: Toluene-d8	13.4		"	13.3	100	45-149				
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3	98.0	45-146				

LCS (3110508-BS2)

Prepared & Analyzed: 11/05/13

Benzene	32.9	1.0	ug/l	33.3	98.8	51-132				
Toluene	33.6	1.0	"	33.3	101	51-138				
Ethylbenzene	35.3	1.0	"	33.3	106	58-146				
m,p-Xylene	69.1	2.0	"	66.7	104	57-144				
o-Xylene	34.0	1.0	"	33.3	102	53-146				
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.2	102	37-154				
Surrogate: Toluene-d8	13.4		"	13.3	101	45-149				
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3	98.9	45-146				

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
11/07/13 18:17

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 3110508 - EPA 5030 Water MS

LCS Dup (3110508-BSD1)

Prepared & Analyzed: 11/05/13

Benzene	33.1	1.0	ug/l	33.3		99.3	51-132	0.606	17	
Toluene	33.6	1.0	"	33.3		101	51-138	0.0298	17	
Ethylbenzene	34.9	1.0	"	33.3		105	58-146	0.575	16	
m,p-Xylene	68.2	2.0	"	66.7		102	57-144	0.721	16	
o-Xylene	33.2	1.0	"	33.3		99.7	53-146	0.452	15	
Surrogate: 1,2-Dichloroethane-d4	13.4		"	13.2		101	37-154			
Surrogate: Toluene-d8	13.5		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.5	45-146			

LCS Dup (3110508-BSD2)

Prepared & Analyzed: 11/05/13

Benzene	32.9	1.0	ug/l	33.3		98.7	51-132	0.152	17	
Toluene	33.6	1.0	"	33.3		101	51-138	0.0298	17	
Ethylbenzene	35.6	1.0	"	33.3		107	58-146	0.902	16	
m,p-Xylene	69.5	2.0	"	66.7		104	57-144	0.649	16	
o-Xylene	34.0	1.0	"	33.3		102	53-146	0.0294	15	
Surrogate: 1,2-Dichloroethane-d4	13.6		"	13.2		103	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.2	45-146			

Matrix Spike (3110508-MS1)

Source: R310336-03

Prepared & Analyzed: 11/05/13

Benzene	32.8	1.0	ug/l	33.3	ND	98.6	34-141			
Toluene	33.6	1.0	"	33.3	ND	101	27-151			
Ethylbenzene	35.3	1.0	"	33.3	ND	106	29-160			
m,p-Xylene	68.8	2.0	"	66.7	ND	103	20-166			
o-Xylene	33.6	1.0	"	33.3	ND	101	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.6		"	13.2		103	37-154			
Surrogate: Toluene-d8	13.3		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.1	45-146			

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1
Project Number: [none]
Project Manager: Brandon Brunns

Reported:
11/07/13 18:17

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 3110508 - EPA 5030 Water MS

Matrix Spike (3110508-MS2)		Source: R310336-04			Prepared & Analyzed: 11/05/13					
Benzene	33.2	1.0	ug/l	33.3	ND	99.7	34-141			
Toluene	33.8	1.0	"	33.3	ND	101	27-151			
Ethylbenzene	35.3	1.0	"	33.3	ND	106	29-160			
m,p-Xylene	69.0	2.0	"	66.7	ND	104	20-166			
o-Xylene	33.2	1.0	"	33.3	ND	99.6	33-159			
Surrogate: 1,2-Dichloroethane-d4	13.6		"	13.2		102	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.3	45-146			

Matrix Spike Dup (3110508-MSD1)		Source: R310336-03			Prepared & Analyzed: 11/05/13					
Benzene	32.6	1.0	ug/l	33.3	ND	97.9	34-141	0.641	32	
Toluene	33.4	1.0	"	33.3	ND	100	27-151	0.626	25	
Ethylbenzene	35.1	1.0	"	33.3	ND	105	29-160	0.569	50	
m,p-Xylene	69.0	2.0	"	66.7	ND	103	20-166	0.232	36	
o-Xylene	33.3	1.0	"	33.3	ND	100	33-159	0.896	26	
Surrogate: 1,2-Dichloroethane-d4	13.9		"	13.2		105	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		101	45-149			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.4	45-146			

Matrix Spike Dup (3110508-MSD2)		Source: R310336-04			Prepared & Analyzed: 11/05/13					
Benzene	32.9	1.0	ug/l	33.3	ND	98.8	34-141	0.937	32	
Toluene	33.8	1.0	"	33.3	ND	101	27-151	0.0296	25	
Ethylbenzene	35.6	1.0	"	33.3	ND	107	29-160	1.04	50	
m,p-Xylene	69.8	2.0	"	66.7	ND	105	20-166	1.04	36	
o-Xylene	34.0	1.0	"	33.3	ND	102	33-159	2.29	26	
Surrogate: 1,2-Dichloroethane-d4	13.4		"	13.2		101	37-154			
Surrogate: Toluene-d8	13.4		"	13.3		100	45-149			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.2	45-146			

Summit Scientific

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

Project: Ryan 23-25U & 25BU,14-25U/Scott 24-25U/MVS #1

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/07/13 18:17

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 be 'JMM'.