

Technical Report for

EnCana

Rodman Bruntz

Kos 257372 Well

Accutest Job Number: D50239

Sampling Date: 09/05/13

Report to:


EnCana Oil & Gas
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ATTN: Nathan Fons

Total number of pages in report: 85



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.



Scott Heideman
Laboratory Director

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Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

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Sample Summary

EnCana

Job No: D50239

Rodman Bruntz

Project No: Kos 257372 Well

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D50239-1	09/05/13	10:22 NF	09/06/13	AQ	Ground Water	KOS 257372 WELL
D50239-1B	09/05/13	10:22 NF	09/06/13	AQ	Ground Water	KOS 257372 WELL
D50239-1F	09/05/13	10:22 NF	09/06/13	AQ	Groundwater Filtered	KOS 257372 WELL



CASE NARRATIVE / CONFORMANCE SUMMARY

Client: EnCana

Job No D50239

Site: Rodman Bruntz

Report Date 9/17/2013 12:25:57 PM

On 09/06/2013, 1 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 2 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D50239 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix AQ **Batch ID:** V6V1149

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50164-10MS, D50264-3DUP, D50164-10MS were used as the QC samples indicated.
- The matrix spike (MS) recovery(s) of Ethylbenzene are outside control limits. Outside control limits due to high level in sample relative to spike amount.

Volatiles by GC By Method RSK175 MOD

Matrix AQ **Batch ID:** GFB411

- All samples were analyzed within the recommended method holding time.
- Sample(s) D50280-8MS, D50280-8MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- D50280-8MS and D50280-8MSD: Sample pH >2 at time of analysis.
- D50239-1: Sample pH >2 at time of analysis.

Extractables by GC By Method SW846-8015B

Matrix AQ **Batch ID:** OP8546

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48565-15MS, D48565-15MSD were used as the QC samples indicated.

Metals By Method EPA 200.7

Matrix AQ **Batch ID:** MP11020

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50239-1FMS, D50239-1FMSD were used as the QC samples for the metals analysis.
- The matrix spike (MS) recovery(s) of Sodium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

Metals By Method EPA 200.8

Matrix AQ	Batch ID: MP11024
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- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50228-1MS, D50228-1MSD were used as the QC samples for the metals analysis.

Wet Chemistry By Method EPA 300.0/SW846 9056

Matrix AQ	Batch ID: GP10861
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- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50253-1MS, D50253-1MSD were used as the QC samples for the Bromide, Chloride, Fluoride, Nitrogen, Nitrate, Nitrogen, Nitrite, Sulfate, Bromide analysis.
- D50239-1 for Nitrogen, Nitrite: Elevated detection limit due to matrix interference.
- D50239-1 for Nitrogen, Nitrate: Elevated detection limit due to matrix interference.
- D50239-1 for Sulfate: Elevated detection limit due to matrix interference.

Wet Chemistry By Method HACH IRB-BART

Matrix AQ	Batch ID: MB245
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- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method HACH SLYM-BART

Matrix AQ	Batch ID: MB246
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- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method HACH SRB-BART

Matrix AQ	Batch ID: MB247
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- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method HACH8190/SM4500P-B/E

Matrix AQ	Batch ID: GP10877
------------------	--------------------------

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50142-1DUP, D50142-1MS, D50142-1MSD were used as the QC samples for the Phosphorus, Total analysis.

Wet Chemistry By Method SM 2320B-2011

Matrix AQ **Batch ID:** GN21799

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50174-1DUP, D50174-1MS, D50174-1MSD were used as the QC samples for the Alkalinity, Total as CaCO₃ analysis.

Matrix AQ **Batch ID:** GN21800

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Matrix AQ **Batch ID:** GN21801

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method SM 2510B-2011

Matrix AQ **Batch ID:** GP10867

- Sample(s) D50161-1DUP were used as the QC samples for the Specific Conductivity analysis.

Wet Chemistry By Method SM 2540C-2011

Matrix AQ **Batch ID:** GN21817

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D50215-2DUP were used as the QC samples for the Solids, Total Dissolved analysis.

Wet Chemistry By Method SM4500HB+-2011/9040C

Matrix AQ **Batch ID:** GN21828

- The following samples were run outside of holding time for method SM4500HB+-2011/9040C: D50239-1

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D50239
Account: EnCana
Project: Rodman Bruntz
Collected: 09/05/13



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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D50239-1 KOS 257372 WELL

Methane ^a		13.8	0.020	0.010	mg/l	RSK175 MOD
Ethane ^a		0.0579	0.0016	0.00080	mg/l	RSK175 MOD
Alkalinity, Bicarbonate as CaCO3		625	5.0		mg/l	SM 2320B-2011
Alkalinity, Total as CaCO3		625	5.0		mg/l	SM 2320B-2011
Bromide		1.5	0.10		mg/l	EPA 300.0/SW846 9056
Chloride		152	5.0		mg/l	EPA 300.0/SW846 9056
Fluoride		3.0	0.20		mg/l	EPA 300.0/SW846 9056
Solids, Total Dissolved		932	10		mg/l	SM 2540C-2011
Specific Conductivity		1260	1.0		umhos/cm	SM 2510B-2011
pH		8.64			su	SM4500HB+ -2011/9040C

D50239-1B KOS 257372 WELL

Iron Reducing Bacteria		2300	25		CFU/ml	HACH IRB-BART
Slime Forming Bacteria		66500	500		CFU/ml	HACH SLYM-BART
Sulfate Reducing Bacteria		1200	200		CFU/ml	HACH SRB-BART

D50239-1F KOS 257372 WELL

Barium		105	10		ug/l	EPA 200.7
Boron		429	50		ug/l	EPA 200.7
Calcium		2840	400		ug/l	EPA 200.7
Magnesium		762	200		ug/l	EPA 200.7
Manganese		6.9	5.0		ug/l	EPA 200.7
Potassium		3260	1000		ug/l	EPA 200.7
Sodium		380000	400		ug/l	EPA 200.7
Strontium		125	5.0		ug/l	EPA 200.7

(a) Sample pH > 2 at time of analysis.

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Page 1 of 1

Client Sample ID: KOS 257372 WELL	
Lab Sample ID: D50239-1	Date Sampled: 09/05/13
Matrix: AQ - Ground Water	Date Received: 09/06/13
Method: SW846 8260B	Percent Solids: n/a
Project: Rodman Bruntz	

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	6V20749.D	1	09/10/13	BR	n/a	n/a	V6V1149
Run #2							

Run #1	Purge Volume
Run #1	5.0 ml
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.25	ug/l	
1330-20-7	Xylene (total)	ND	3.0	2.0	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	98%		62-130%
2037-26-5	Toluene-D8	111%		70-130%
460-00-4	4-Bromofluorobenzene	90%		69-130%

ND = Not detected MDL - Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Page 1 of 1

Client Sample ID: KOS 257372 WELL	Date Sampled: 09/05/13
Lab Sample ID: D50239-1	Date Received: 09/06/13
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: RSK175 MOD	
Project: Rodman Bruntz	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 ^a	FB09363.D	1	09/09/13	JS	n/a	n/a	GFB411
Run #2 ^a	FB09365.D	25	09/09/13	JS	n/a	n/a	GFB411

Run #	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	22.0 Deg. C
Run #2	39.0 ml	4.0 ml	500 ul	22.0 Deg. C

Methane, Ethane and Propane

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	13.8 ^b	0.020	0.010	mg/l	
74-84-0	Ethane	0.0579	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.022	0.011	mg/l	

(a) Sample pH > 2 at time of analysis.

(b) Result is from Run# 2

ND = Not detected MDL - Method Detection Limit
 RL = Reporting Limit

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Page 1 of 1

Client Sample ID: KOS 257372 WELL	Date Sampled: 09/05/13
Lab Sample ID: D50239-1	Date Received: 09/06/13
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846-8015B SW846 3510C	
Project: Rodman Bruntz	

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD28835.D	1	09/13/13	TU	09/11/13	OP8546	GFD1392
Run #2							

	Initial Volume	Final Volume
Run #1	1000 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.20	0.18	mg/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	66%		20-140%		

ND = Not detected MDL - Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: KOS 257372 WELL
Lab Sample ID: D50239-1
Matrix: AQ - Ground Water
Project: Rodman Bruntz

Date Sampled: 09/05/13
Date Received: 09/06/13
Percent Solids: n/a

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	625	5.0	mg/l	1	09/06/13	JD	SM 2320B-2011
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	09/06/13	JD	SM 2320B-2011
Alkalinity, Total as CaCO ₃	625	5.0	mg/l	1	09/06/13	JD	SM 2320B-2011
Bromide	1.5	0.10	mg/l	2	09/06/13 10:45	SK	EPA 300.0/SW846 9056
Chloride	152	5.0	mg/l	10	09/06/13 14:14	SK	EPA 300.0/SW846 9056
Fluoride	3.0	0.20	mg/l	2	09/06/13 10:45	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrate ^a	< 0.020	0.020	mg/l	2	09/06/13 10:45	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrite ^a	< 0.0080	0.0080	mg/l	2	09/06/13 10:45	SK	EPA 300.0/SW846 9056
Phosphorus, Total	< 0.010	0.010	mg/l	1	09/10/13	BF	HACH8190/SM4500P-B/E
Solids, Total Dissolved	932	10	mg/l	1	09/09/13	BF	SM 2540C-2011
Specific Conductivity	1260	1.0	umhos/cm	1	09/06/13	JD	SM 2510B-2011
Sulfate ^a	< 1.0	1.0	mg/l	2	09/06/13 10:45	SK	EPA 300.0/SW846 9056
pH	8.64		su	1	09/09/13 15:45	AK	SM4500HB+ -2011/9040C

(a) Elevated detection limit due to matrix interference.

RL = Reporting Limit

Report of Analysis

Client Sample ID: KOS 257372 WELL	Date Sampled: 09/05/13
Lab Sample ID: D50239-1B	Date Received: 09/06/13
Matrix: AQ - Ground Water	Percent Solids: n/a
Project: Rodman Bruntz	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Iron Reducing Bacteria	2300	25	CFU/ml	1	09/09/13	MM	HACH IRB-BART
Slime Forming Bacteria	66500	500	CFU/ml	1	09/09/13	MM	HACH SLYM-BART
Sulfate Reducing Bacteria	1200	200	CFU/ml	1	09/09/13	MM	HACH SRB-BART

RL = Reporting Limit

4.2
4

Report of Analysis

Client Sample ID: KOS 257372 WELL		Date Sampled: 09/05/13
Lab Sample ID: D50239-1F		Date Received: 09/06/13
Matrix: AQ - Groundwater Filtered		Percent Solids: n/a
Project: Rodman Bruntz		

Dissolved Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Barium	105	10	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Boron	429	50	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Calcium	2840	400	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Iron	< 10	10	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Magnesium	762	200	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Manganese	6.9	5.0	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Potassium	3260	1000	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Selenium	< 0.80	0.80	ug/l	2	09/09/13	09/10/13 JM	EPA 200.8 ²	EPA 200.8 ⁴
Sodium	380000	400	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³
Strontium	125	5.0	ug/l	1	09/09/13	09/09/13 JB	EPA 200.7 ¹	EPA 200.7 ³

- (1) Instrument QC Batch: MA3950
- (2) Instrument QC Batch: MA3957
- (3) Prep QC Batch: MP11020
- (4) Prep QC Batch: MP11024

RL = Reporting Limit

4.3
4

Misc. Forms

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Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D50239

Client: ENCANA

Immediate Client Services Action Required: No

Date / Time Received: 9/6/2013 8:40:00 AM

No. Coolers: 1

Client Service Action Required at Login: No

Project: RODMAN BRUNTZ

Airbill #'s: HD

<u>Cooler Security</u>	<u>Y or N</u>		<u>Y or N</u>	
1. Custody Seals Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/> <input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. Smp'l Dates/Time OK	<input checked="" type="checkbox"/> <input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y or N</u>	
1. Temp criteria achieved:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Cooler temp verification:	Infrared gun	
3. Cooler media:	Ice (bag)	

<u>Quality Control Preservation</u>	<u>Y or N</u>		<u>N/A</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>	<input type="checkbox"/>	
2. Trip Blank listed on COC:	<input type="checkbox"/>	<input type="checkbox"/>	
3. Samples preserved properly:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. VOCs headspace free:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>Sample Integrity - Documentation</u>	<u>Y or N</u>	
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y or N</u>	
1. Sample recvd within HT:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Condition of sample:	Intact	

<u>Sample Integrity - Instructions</u>	<u>Y or N</u>		<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Sufficient volume rec'd for analysis:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

5.1
5

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1149-MB	6V20746.D	1	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
1330-20-7	Xylene (total)	ND	3.0	2.0	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Limits	
17060-07-0	1,2-Dichloroethane-D4	96%	62-130%
2037-26-5	Toluene-D8	110%	70-130%
460-00-4	4-Bromofluorobenzene	91%	69-130%

Blank Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1149-BS	6V20747.D	1	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	50	48.9	98	70-130
100-41-4	Ethylbenzene	50	56.0	112	70-130
108-88-3	Toluene	50	55.4	111	70-130
1330-20-7	Xylene (total)	150	168	112	70-130
	TPH-GRO (C6-C10)		ND		39-144

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	91%	62-130%
2037-26-5	Toluene-D8	108%	70-130%
460-00-4	4-Bromofluorobenzene	97%	69-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1149-BS	6V20748.D	1	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
	TPH-GRO (C6-C10)	2200	1770	80	39-144

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	94%	62-130%
2037-26-5	Toluene-D8	109%	70-130%
460-00-4	4-Bromofluorobenzene	95%	69-130%

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D50164-10MS	6V20757.D	10	09/10/13	BR	n/a	n/a	V6V1149
D50164-10	6V20756.D	10	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	D50164-10 ug/l	Spike Q	ug/l	MS ug/l	MS %	Limits
71-43-2	Benzene	64.2		500	557	99	62-130
100-41-4	Ethylbenzene	2720	E	500	3450	146* a	63-130
108-88-3	Toluene	ND		500	550	110	60-130
1330-20-7	Xylene (total)	1800		1500	3360	104	67-130

CAS No.	Surrogate Recoveries	MS	D50164-10	Limits
17060-07-0	1,2-Dichloroethane-D4	93%	95%	62-130%
2037-26-5	Toluene-D8	108%	111%	70-130%
460-00-4	4-Bromofluorobenzene	96%	93%	69-130%

(a) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Matrix Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D50164-10MS	6V20761.D	10	09/10/13	BR	n/a	n/a	V6V1149
D50164-10	6V20756.D	10	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	D50164-10 ug/l	Spike Q ug/l	MS ug/l	MS %	Limits
	TPH-GRO (C6-C10)	13200	22000	32500	88	19-168

CAS No.	Surrogate Recoveries	MS	D50164-10	Limits
17060-07-0	1,2-Dichloroethane-D4	93%	95%	62-130%
2037-26-5	Toluene-D8	108%	111%	70-130%
460-00-4	4-Bromofluorobenzene	94%	93%	69-130%

* = Outside of Control Limits.

Duplicate Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D50264-3DUP	6V20763.D	5	09/10/13	BR	n/a	n/a	V6V1149
D50264-3	6V20762.D	5	09/10/13	BR	n/a	n/a	V6V1149

The QC reported here applies to the following samples:

Method: SW846 8260B

D50239-1

CAS No.	Compound	D50264-3 ug/l	DUP Q ug/l	Q	RPD	Limits
71-43-2	Benzene	70.1	70.5	1		30
100-41-4	Ethylbenzene	220	224	2		30
108-88-3	Toluene	ND	ND	nc		30
1330-20-7	Xylene (total)	33.8	33.2	2		30
	TPH-GRO (C6-C10)	8150	8560	5		30

CAS No.	Surrogate Recoveries	DUP	D50264-3	Limits
17060-07-0	1,2-Dichloroethane-D4	90%	96%	62-130%
2037-26-5	Toluene-D8	110%	111%	70-130%
460-00-4	4-Bromofluorobenzene	94%	92%	69-130%

* = Outside of Control Limits.

GC/MS Volatiles

Raw Data

7

Quantitation Report (QT Reviewed)

Data Path : C:\msdchem\1\DATA\V6090913\
Data File : 6V20749.D
Acq On : 10 Sep 2013 3:14 am
Operator : BRIANR
Sample : D50239-1
Misc : MS6344,V6V1149,,,,,1
ALS Vial : 28 Sample Multiplier: 1

Quant Time: Sep 11 10:16:00 2013
Quant Method : C:\msdchem\1\METHODS\V6AP1137TVH1137.M
Quant Title : 8260
QLast Update : Tue Sep 03 16:10:24 2013
Response via : Initial Calibration

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
2) Pentafluorobenzene	11.567	168	159821	50.00	ug/l	0.00
37) 1,4-Difluorobenzene	12.359	114	274218	50.00	ug/l	0.00
56) Chlorobenzene-d5	15.005	117	258842	50.00	ug/l	0.00
77) 1,4-Dichlorobenzene-d4	16.968	152	134923	50.00	ug/l	0.00

System Monitoring Compounds						
35) 1,2-Dichloroethane-d4	11.951	102	17879	49.16	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	98.32%
64) Toluene-d8	13.762	98	279645	55.37	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	110.74%
72) 4-Bromofluorobenzene	15.950	95	86920	44.77	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	89.54%

Target Compounds						Qvalue
1) TVH-Gasoline	12.929	TIC	-9187m	40.82	ug/l	
9) Ethyl Alcohol	7.811	45	4985	176.68	ug/l #	77

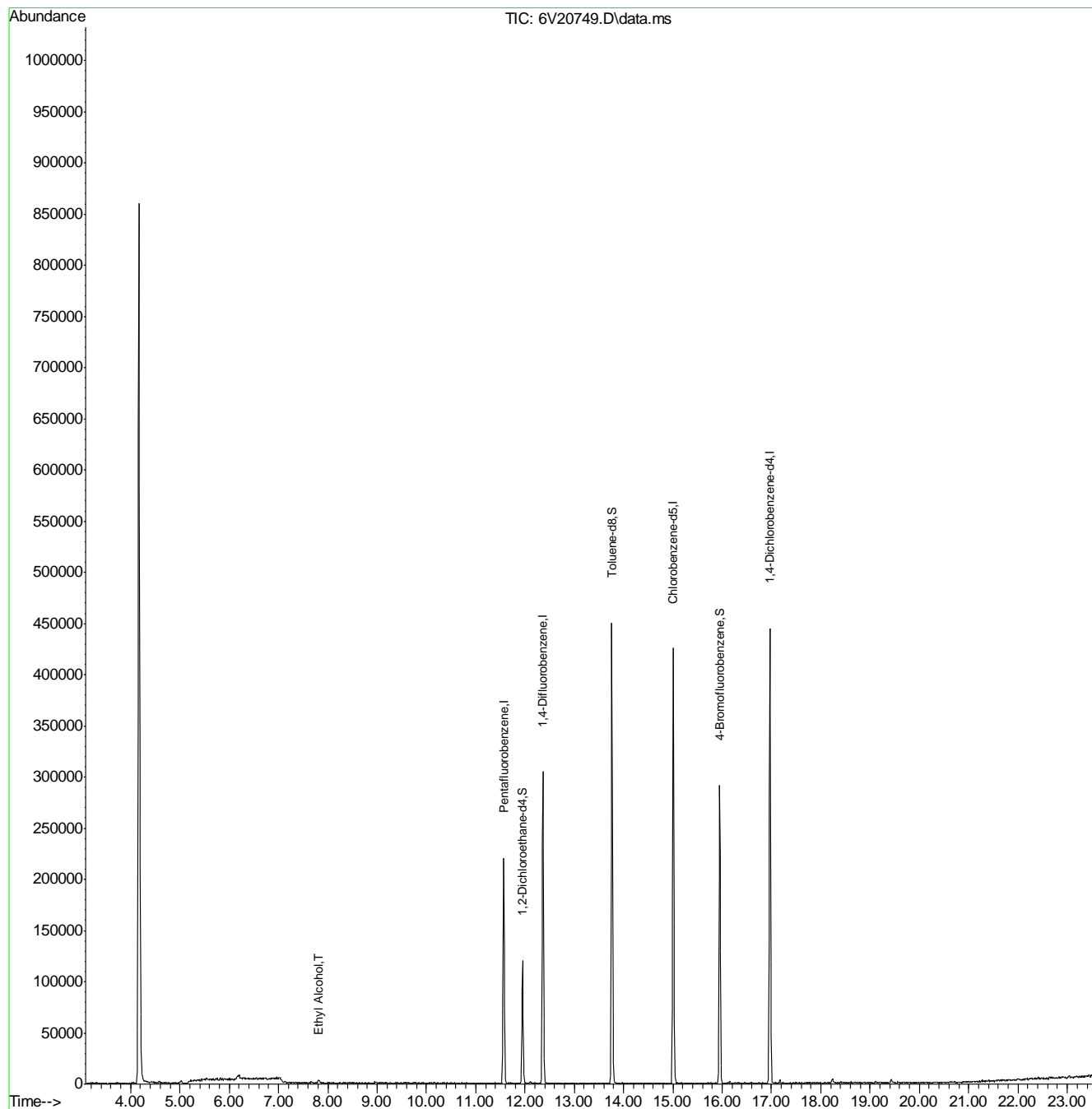
(#) = qualifier out of range (m) = manual integration (+) = signals summed

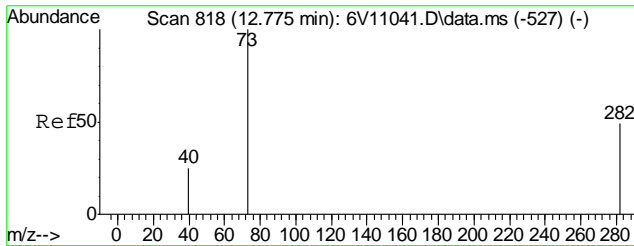
7.1.1
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Quantitation Report (QT Reviewed)

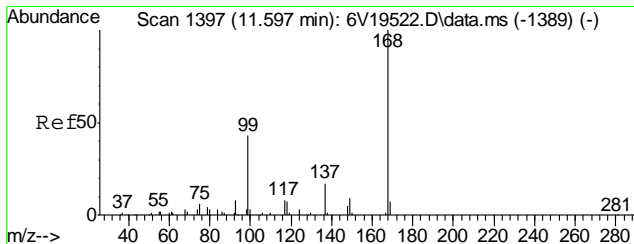
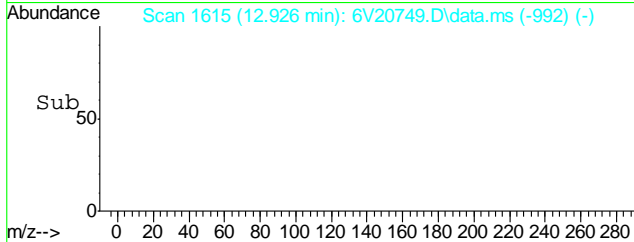
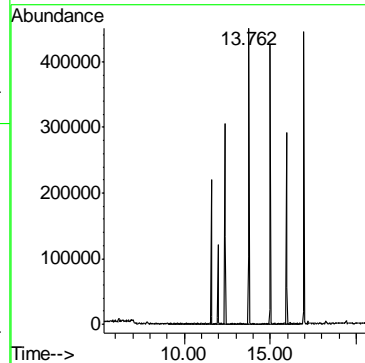
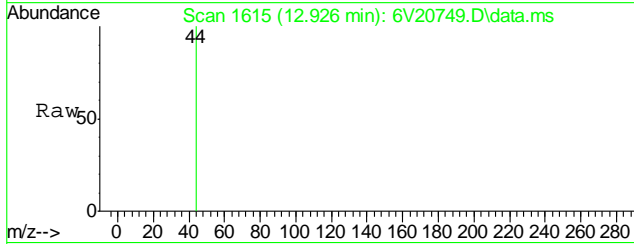
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Data File : 6V20749.D
Acq On : 10 Sep 2013 3:14 am
Operator : BRIANR
Sample : D50239-1
Misc : MS6344,V6V1149,,,,,1
ALS Vial : 28 Sample Multiplier: 1

Quant Time: Sep 11 10:16:00 2013
Quant Method : C:\msdchem\1\METHODS\V6AP1137TVH1137.M
Quant Title : 8260
QLast Update : Tue Sep 03 16:10:24 2013
Response via : Initial Calibration



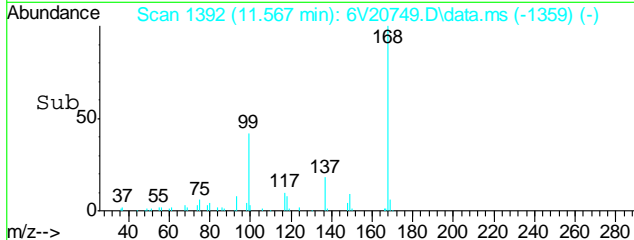
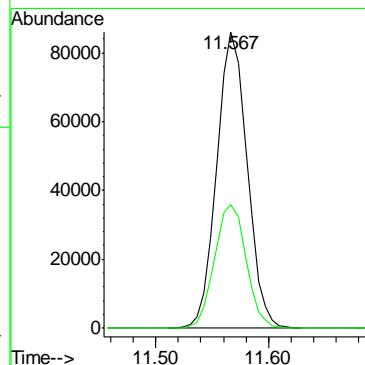
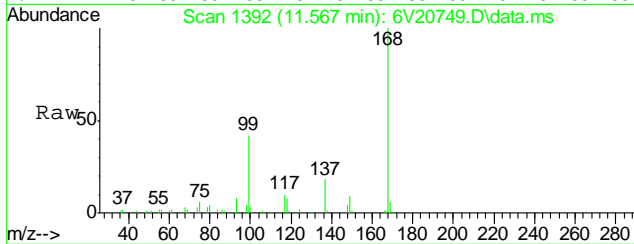


#1
 TVH-Gasoline
 Concen: 40.82 ug/l m
 RT: 12.929 min Scan# 1615
 Delta R.T. 0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am
 Tgt Ion:TIC Resp: -9187

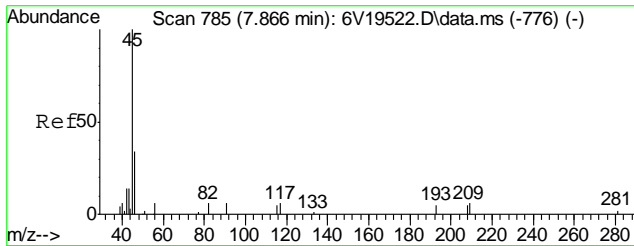


#2
 Pentafluorobenzene
 Concen: 50.00 ug/l
 RT: 11.567 min Scan# 1392
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am
 Tgt Ion:168 Resp: 159821

Ion	Ratio	Lower	Upper
168	100		
99	43.3	34.7	52.1

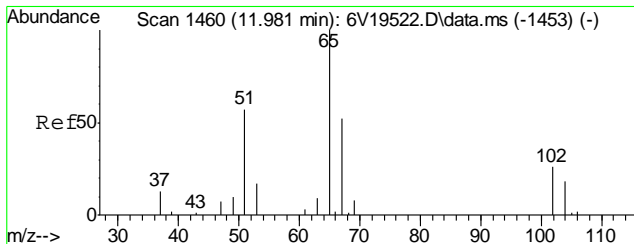
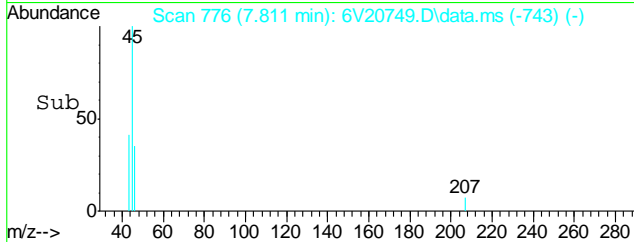
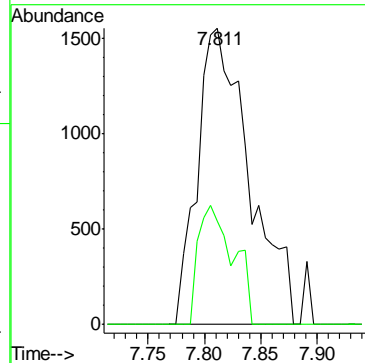
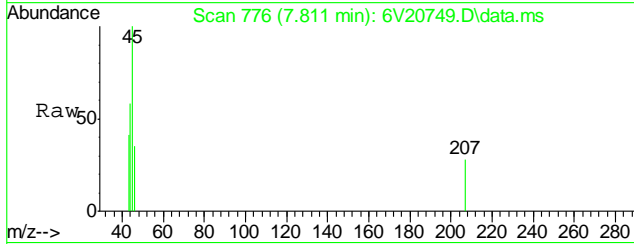


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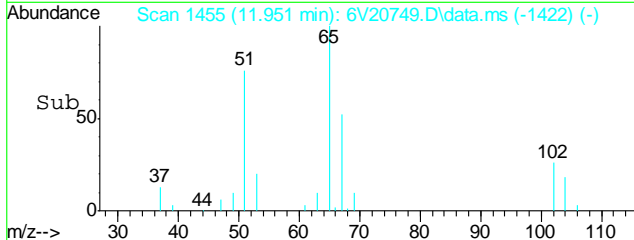
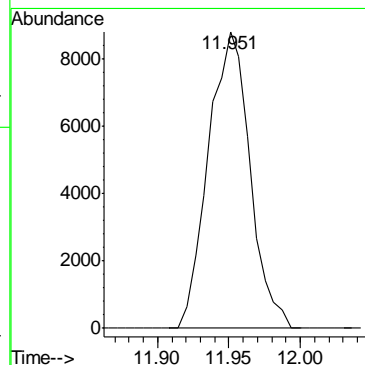
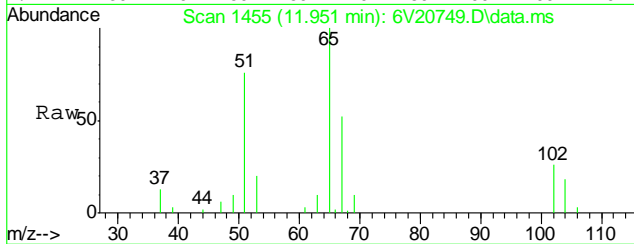
#9
 Ethyl Alcohol
 Concen: 176.68 ug/l
 RT: 7.811 min Scan# 776
 Delta R.T. 0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am

Tgt Ion: 45 Resp: 4985
 Ion Ratio Lower Upper
 45 100
 46 27.2 33.4 50.2#

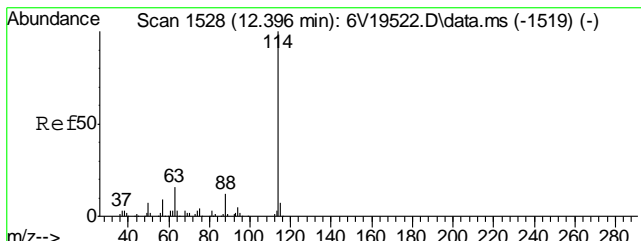


#35
 1,2-Dichloroethane-d4
 Concen: 49.16 ug/l
 RT: 11.951 min Scan# 1455
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am

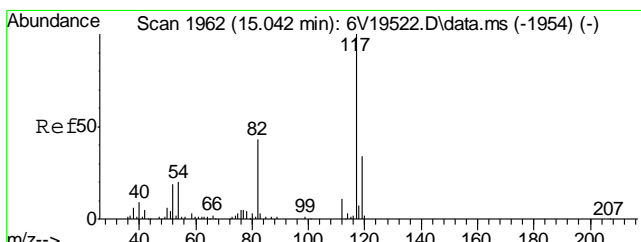
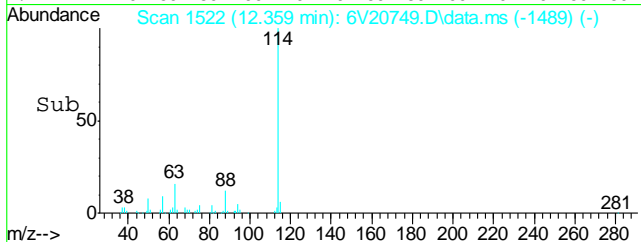
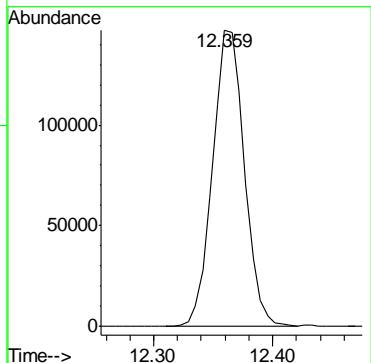
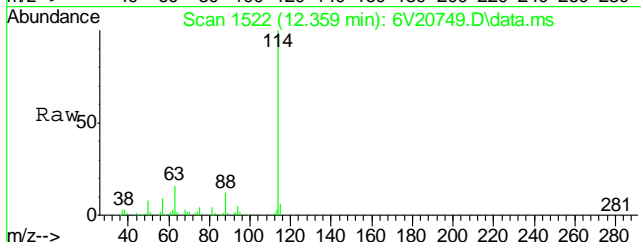
Tgt Ion: 102 Resp: 17879



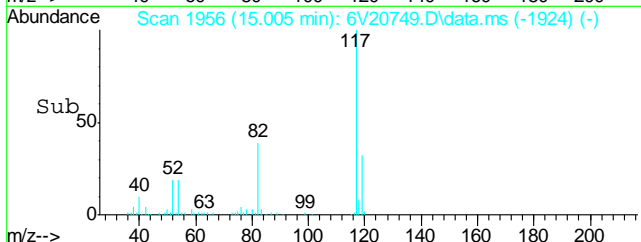
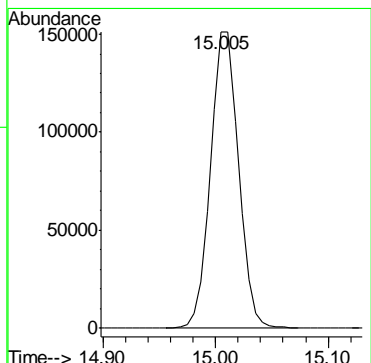
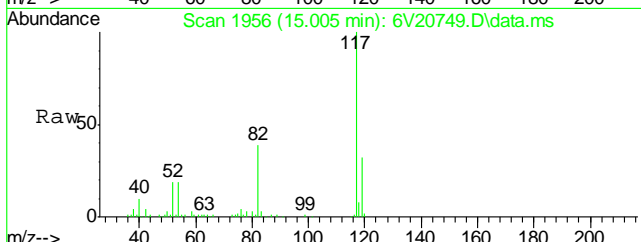
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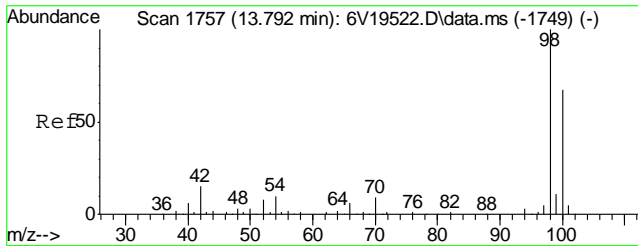
#37
 1,4-Difluorobenzene
 Concen: 50.00 ug/l
 RT: 12.359 min Scan# 1522
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am
 Tgt Ion:114 Resp: 274218



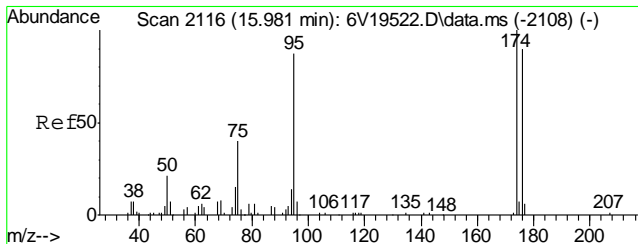
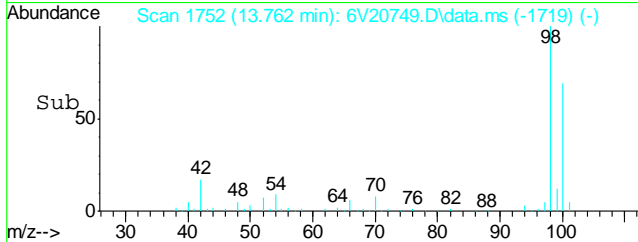
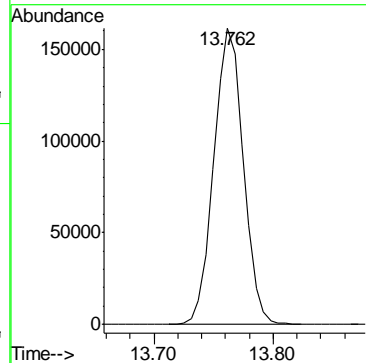
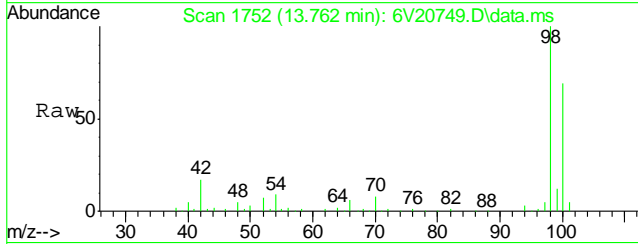
#56
 Chlorobenzene-d5
 Concen: 50.00 ug/l
 RT: 15.005 min Scan# 1956
 Delta R.T. -0.006 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am
 Tgt Ion:117 Resp: 258842



7.1.1
 7

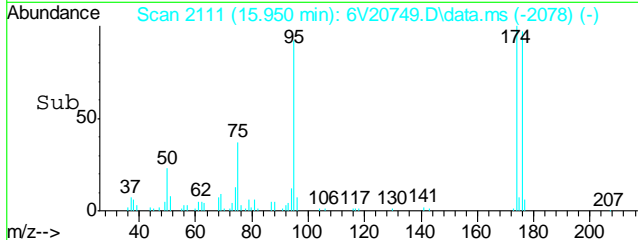
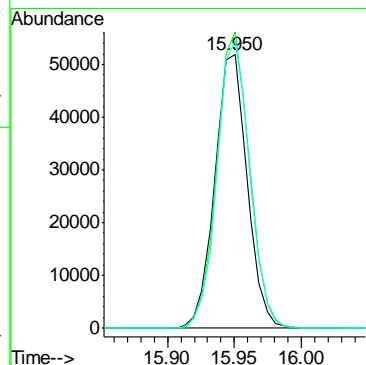
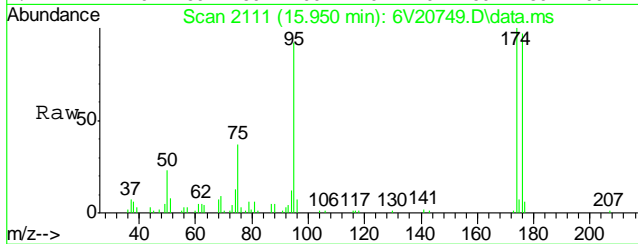


#64
 Toluene-d8
 Concen: 55.37 ug/l
 RT: 13.762 min Scan# 1752
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am
 Tgt Ion: 98 Resp: 279645

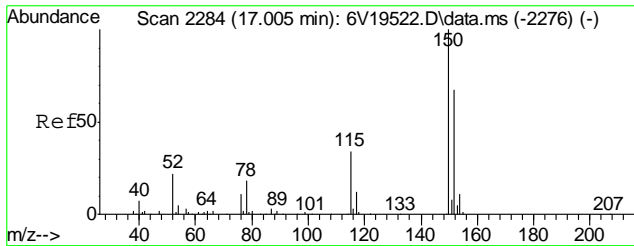


#72
 4-Bromofluorobenzene
 Concen: 44.77 ug/l
 RT: 15.950 min Scan# 2111
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am

Tgt Ion	Resp	Ion Ratio	Lower	Upper
95	86920	100		
174	109.7	86.9	126.9	
176	106.1	83.6	123.6	

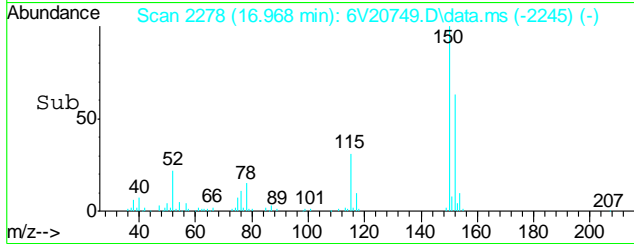
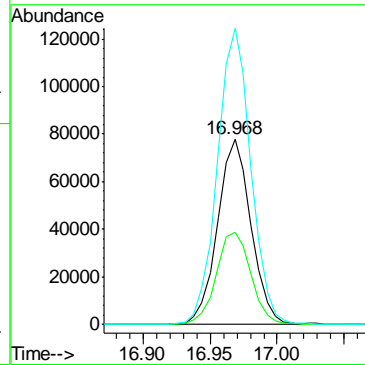
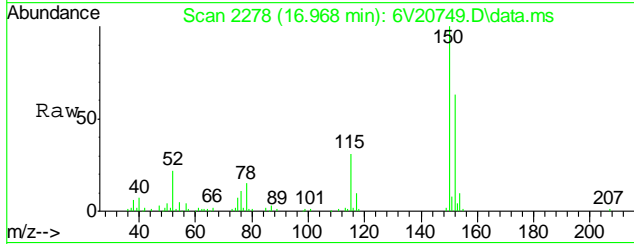


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#77
 1,4-Dichlorobenzene-d4
 Concen: 50.00 ug/l
 RT: 16.968 min Scan# 2278
 Delta R.T. -0.000 min
 Lab File: 6V20749.D
 Acq: 10 Sep 2013 3:14 am

Tgt Ion	Resp	Lower	Upper
152	134923		
152	100		
115	51.2	43.0	64.4
150	160.0	136.7	205.1



7.1.1
7

Quantitation Report (QT Reviewed)

Data Path : C:\msdchem\1\DATA\V6090913\
 Data File : 6V20746.D
 Acq On : 10 Sep 2013 1:30 am
 Operator : BRIANR
 Sample : MB
 Misc : MS6344,V6V1149,,,,,1
 ALS Vial : 25 Sample Multiplier: 1

Quant Time: Sep 11 10:13:39 2013
 Quant Method : C:\msdchem\1\METHODS\V6AP1137TVH1137.M
 Quant Title : 8260
 QLast Update : Tue Sep 03 16:10:24 2013
 Response via : Initial Calibration

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
2) Pentafluorobenzene	11.567	168	164958	50.00	ug/l	0.00
37) 1,4-Difluorobenzene	12.359	114	283313	50.00	ug/l	0.00
56) Chlorobenzene-d5	15.011	117	267943	50.00	ug/l	0.00
77) 1,4-Dichlorobenzene-d4	16.968	152	138183	50.00	ug/l	0.00

System Monitoring Compounds

35) 1,2-Dichloroethane-d4	11.951	102	18065	48.13	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	96.26%
64) Toluene-d8	13.761	98	286280	54.76	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	109.52%
72) 4-Bromofluorobenzene	15.950	95	91559	45.56	ug/l	0.00
Spiked Amount	50.000	Range	70 - 130	Recovery	=	91.12%

Target Compounds

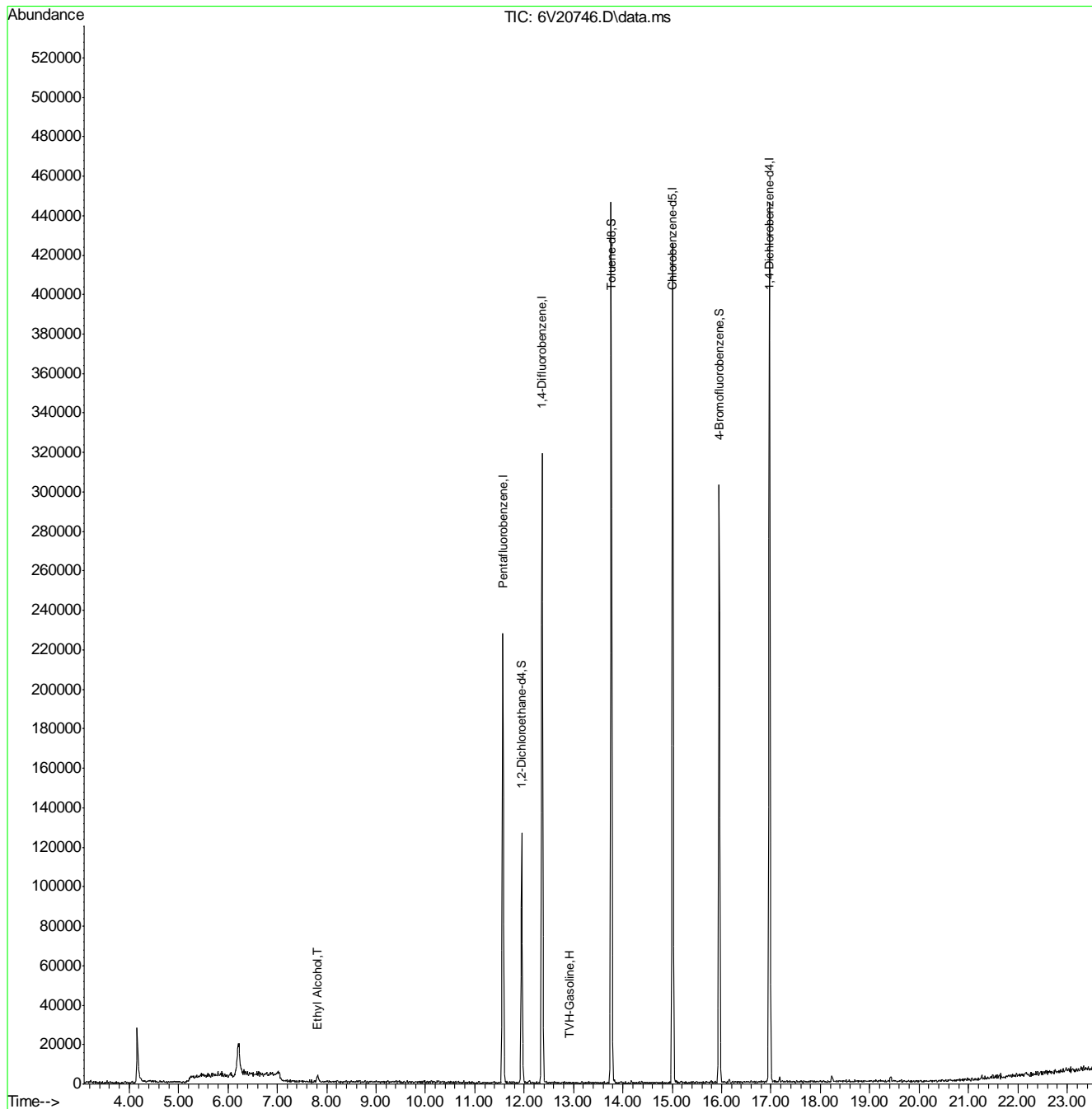
					Qvalue
1) TVH-Gasoline	12.929	TIC	36360m	46.59	ug/l
9) Ethyl Alcohol	7.823	45	4467	150.56	ug/l # 80

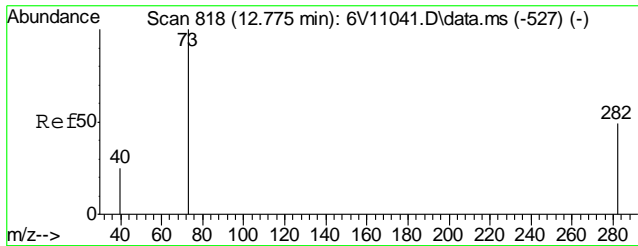
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

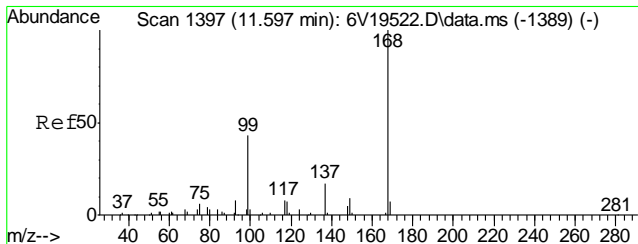
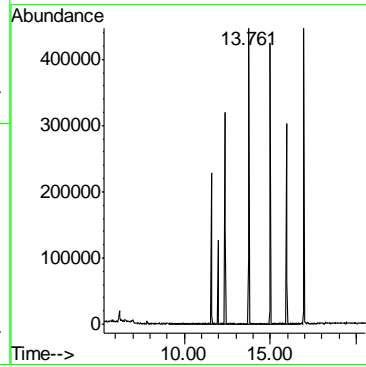
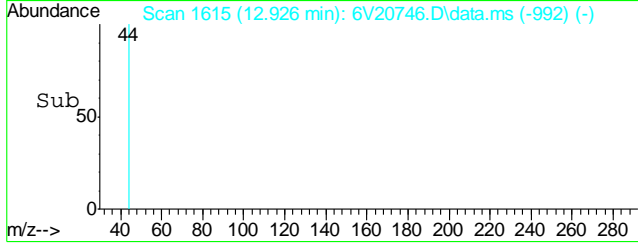
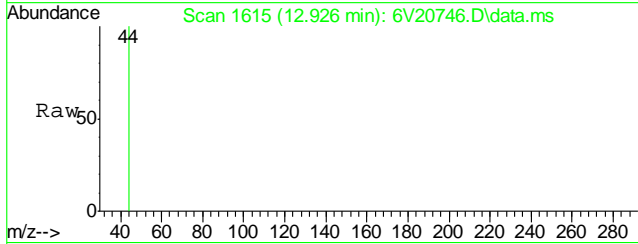
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Data File : 6V20746.D
Acq On : 10 Sep 2013 1:30 am
Operator : BRIANR
Sample : MB
Misc : MS6344,V6V1149,,,,,1
ALS Vial : 25 Sample Multiplier: 1

Quant Time: Sep 11 10:13:39 2013
Quant Method : C:\msdchem\1\METHODS\V6AP1137TVH1137.M
Quant Title : 8260
QLast Update : Tue Sep 03 16:10:24 2013
Response via : Initial Calibration

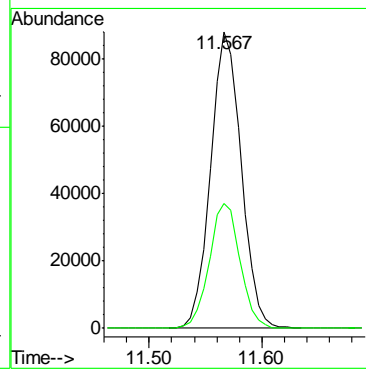
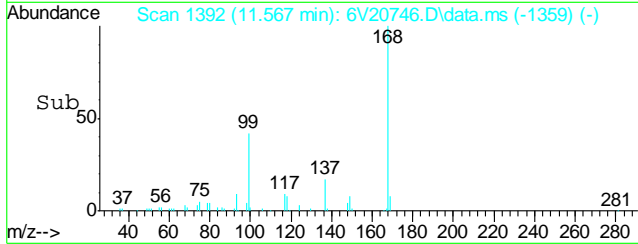
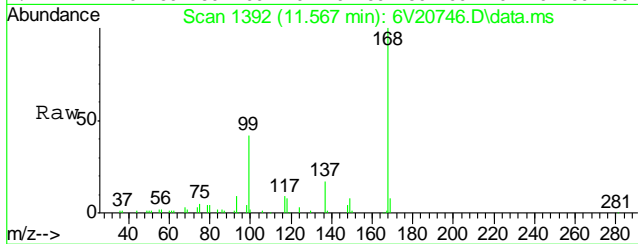




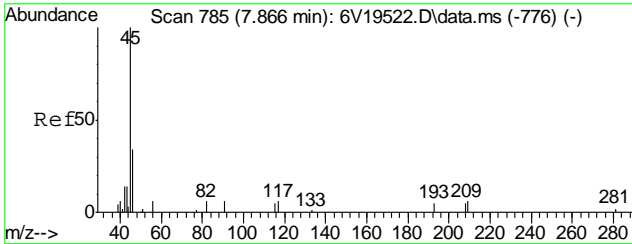
#1
 TVH-Gasoline
 Concen: 46.59 ug/l m
 RT: 12.929 min Scan# 1615
 Delta R.T. 0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am
 Tgt Ion:TIC Resp: 36360



#2
 Pentafluorobenzene
 Concen: 50.00 ug/l
 RT: 11.567 min Scan# 1392
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am
 Tgt Ion:168 Resp: 164958
 Ion Ratio Lower Upper
 168 100
 99 42.2 34.7 52.1

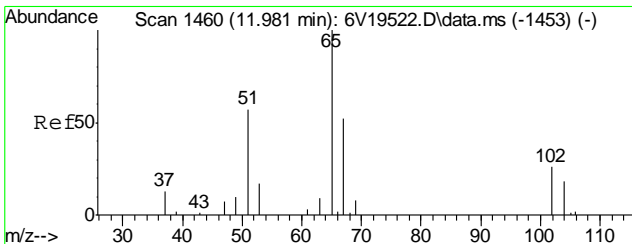
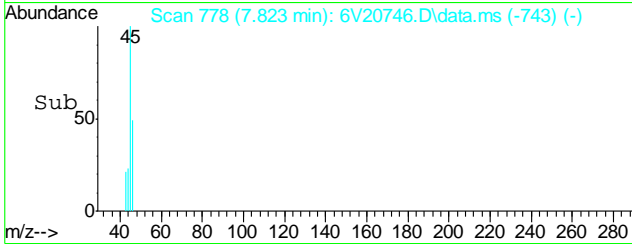
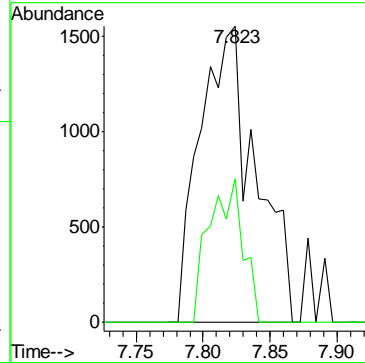
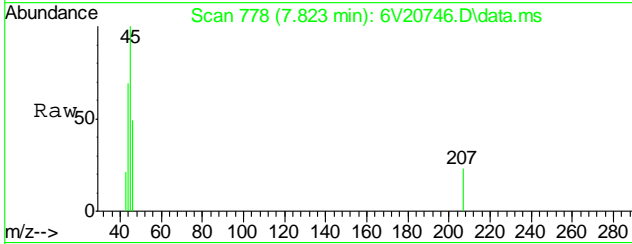


7.2.1
 7



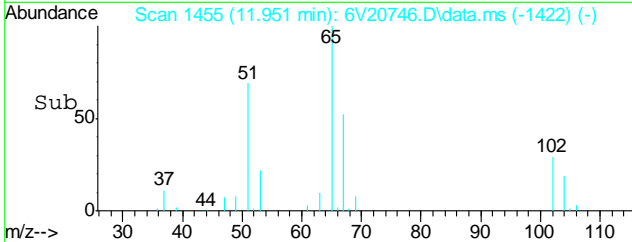
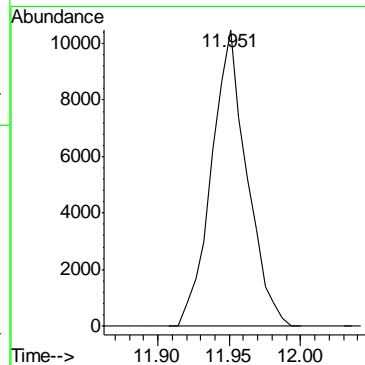
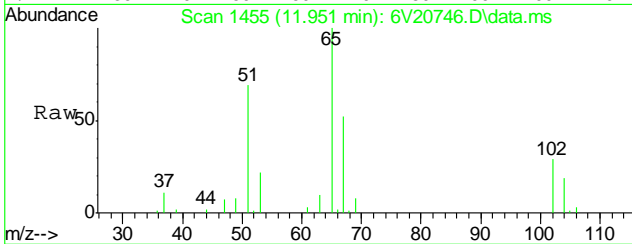
#9
 Ethyl Alcohol
 Concen: 150.56 ug/l
 RT: 7.823 min Scan# 778
 Delta R.T. 0.012 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am

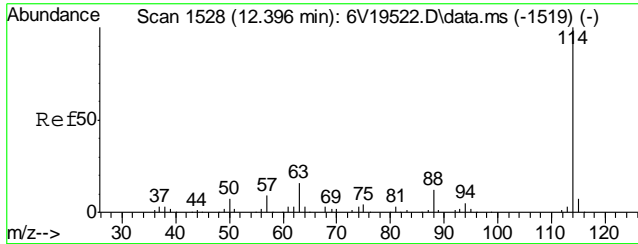
Tgt Ion: 45 Resp: 4467
 Ion Ratio Lower Upper
 45 100
 46 29.4 33.4 50.2#



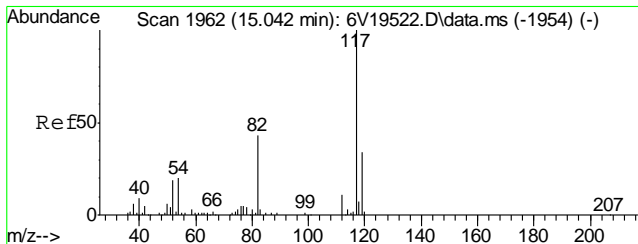
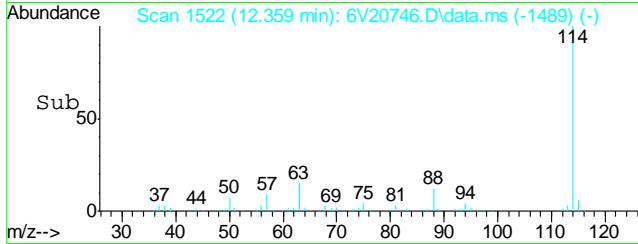
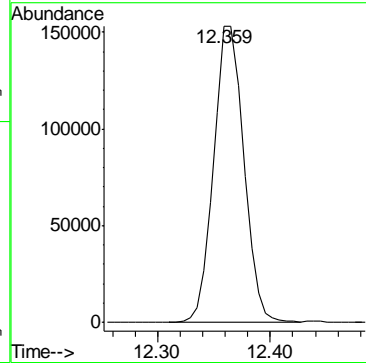
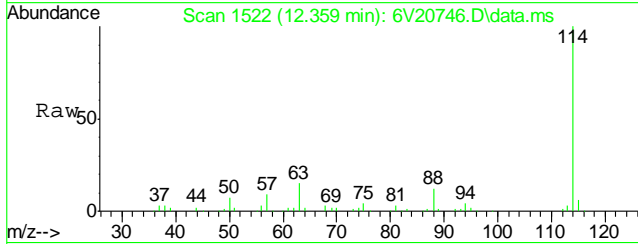
#35
 1,2-Dichloroethane-d4
 Concen: 48.13 ug/l
 RT: 11.951 min Scan# 1455
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am

Tgt Ion: 102 Resp: 18065

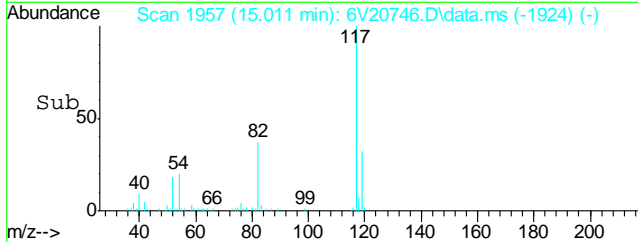
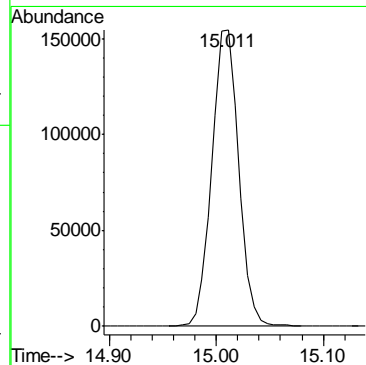
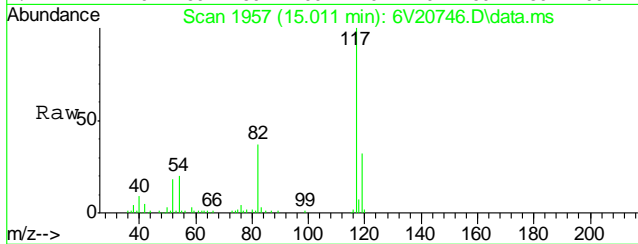




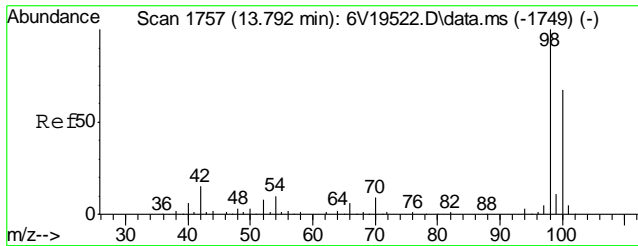
#37
 1,4-Difluorobenzene
 Concen: 50.00 ug/l
 RT: 12.359 min Scan# 1522
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am
 Tgt Ion:114 Resp: 283313



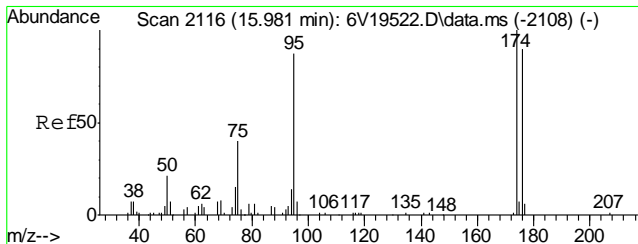
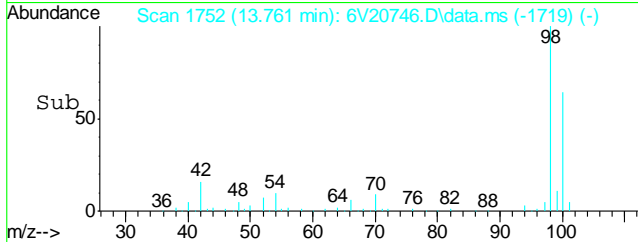
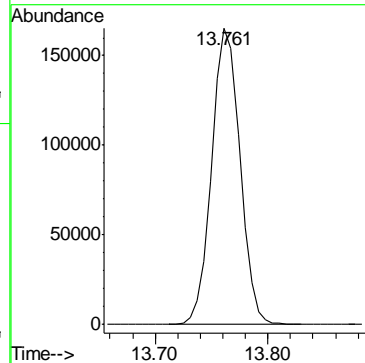
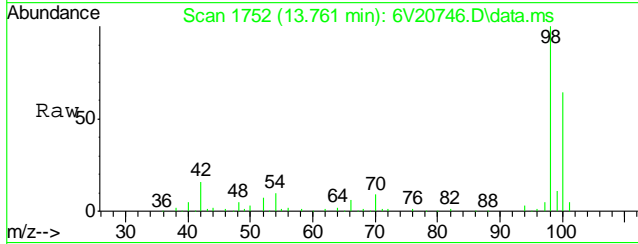
#56
 Chlorobenzene-d5
 Concen: 50.00 ug/l
 RT: 15.011 min Scan# 1957
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am
 Tgt Ion:117 Resp: 267943



7.2.1
 7

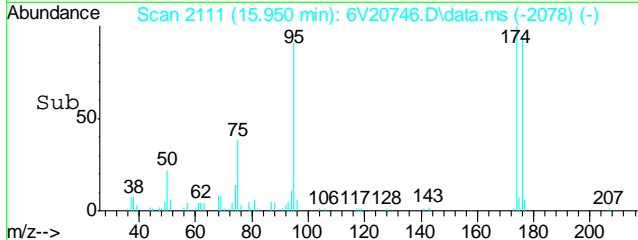
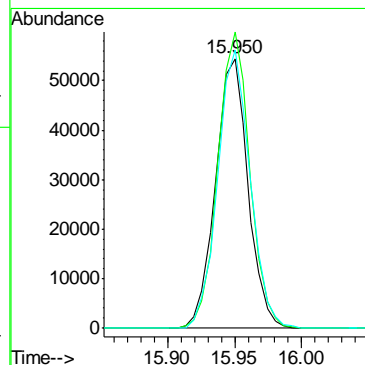
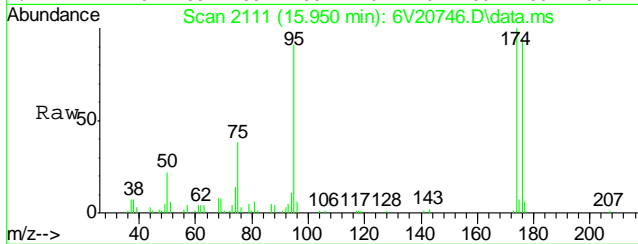


#64
 Toluene-d8
 Concen: 54.76 ug/l
 RT: 13.761 min Scan# 1752
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am
 Tgt Ion: 98 Resp: 286280

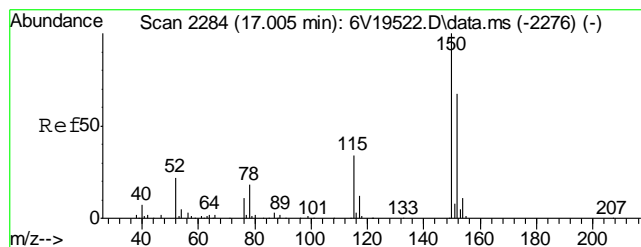


#72
 4-Bromofluorobenzene
 Concen: 45.56 ug/l
 RT: 15.950 min Scan# 2111
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am

Tgt Ion	Resp	Ion Ratio	Lower	Upper
95	91559	100		
174		108.3	86.9	126.9
176		102.9	83.6	123.6

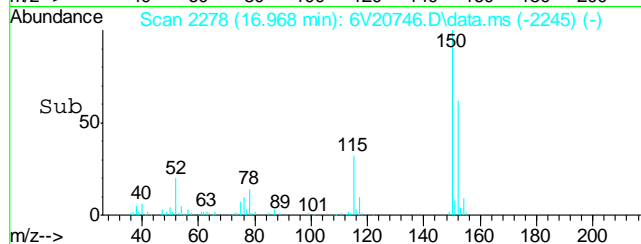
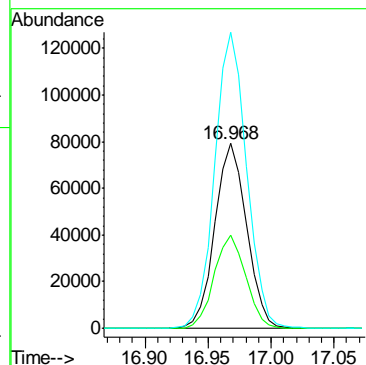
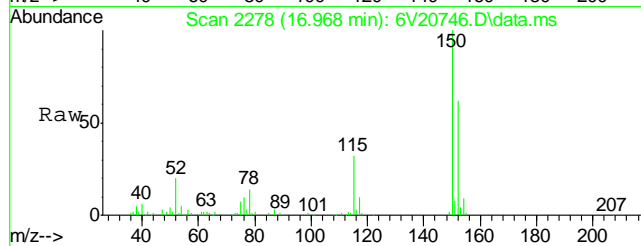


7.2.1
 7



#77
 1,4-Dichlorobenzene-d4
 Concen: 50.00 ug/l
 RT: 16.968 min Scan# 2278
 Delta R.T. -0.000 min
 Lab File: 6V20746.D
 Acq: 10 Sep 2013 1:30 am

Tgt Ion	Resp	Lower	Upper
152	138183		
152	100		
115	50.1	43.0	64.4
150	160.2	136.7	205.1



7.2.1
7

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB411-MB	FB09358.D	1	09/09/13	JS	n/a	n/a	GFB411

The QC reported here applies to the following samples:

Method: RSK175 MOD

D50239-1

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.022	0.011	mg/l	

Blank Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB411-BS	FB09359.D	10	09/09/13	JS	n/a	n/a	GFB411

The QC reported here applies to the following samples:

Method: RSK175 MOD

D50239-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
74-82-8	Methane	0.51	0.574	113	70-146
74-84-0	Ethane	0.956	0.916	96	70-130
74-98-6	Propane	1.4	1.46	104	67-130

8.2.1
8

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D50280-8MS ^a	FB09360.D	10	09/09/13	JS	n/a	n/a	GFB411
D50280-8MSD ^a	FB09361.D	10	09/09/13	JS	n/a	n/a	GFB411
D50280-8 ^a	FB09362.D	1	09/09/13	JS	n/a	n/a	GFB411

The QC reported here applies to the following samples:

Method: RSK175 MOD

D50239-1

CAS No.	Compound	D50280-8 mg/l	Spike Q mg/l	MS mg/l	MS %	MSD mg/l	MSD %	RPD	Limits Rec/RPD
74-82-8	Methane	0.0198	0.51	0.574	109	0.573	108	0	67-155/30
74-84-0	Ethane	0.0020	0.956	0.876	91	0.877	92	0	55-130/30
74-98-6	Propane	ND	1.4	1.39	99	1.39	99	0	53-130/30

(a) Sample pH > 2 at time of analysis.

* = Outside of Control Limits.

GC Volatiles

Raw Data

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FB090913\FB09363.D Vial: 8
 Acq On : 9 Sep 2013 10:21 am Operator: JOHNS
 Sample : D50239-1 Inst : FID 4
 Misc : GC3857,GFB411,39,22,500,4,1 Multiplr: 1.00
 IntFile : AUTOINT1.E
 Quant Time: Sep 09 10:15:14 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
 Title : RSK 175 Methane, Ethene, Ethane, and Propane
 Last Update : Thu Sep 05 09:56:51 2013
 Response via : Initial Calibration
 DataAcq Meth : GAS.M

Volume Inj. : 100ul
 Signal Phase : Porapak Q 80/100
 Signal Info : 1/8 in

Compound	R.T.	Response	Conc Units

Target Compounds			
1) Methane	0.46	928541384	190030.953 rawvp
2) Ethene	0.00	0	N.D. rawvp
3) Ethane	1.11	3408870	374.606 rawvp
4) Propane	0.00	0	N.D. rawvp

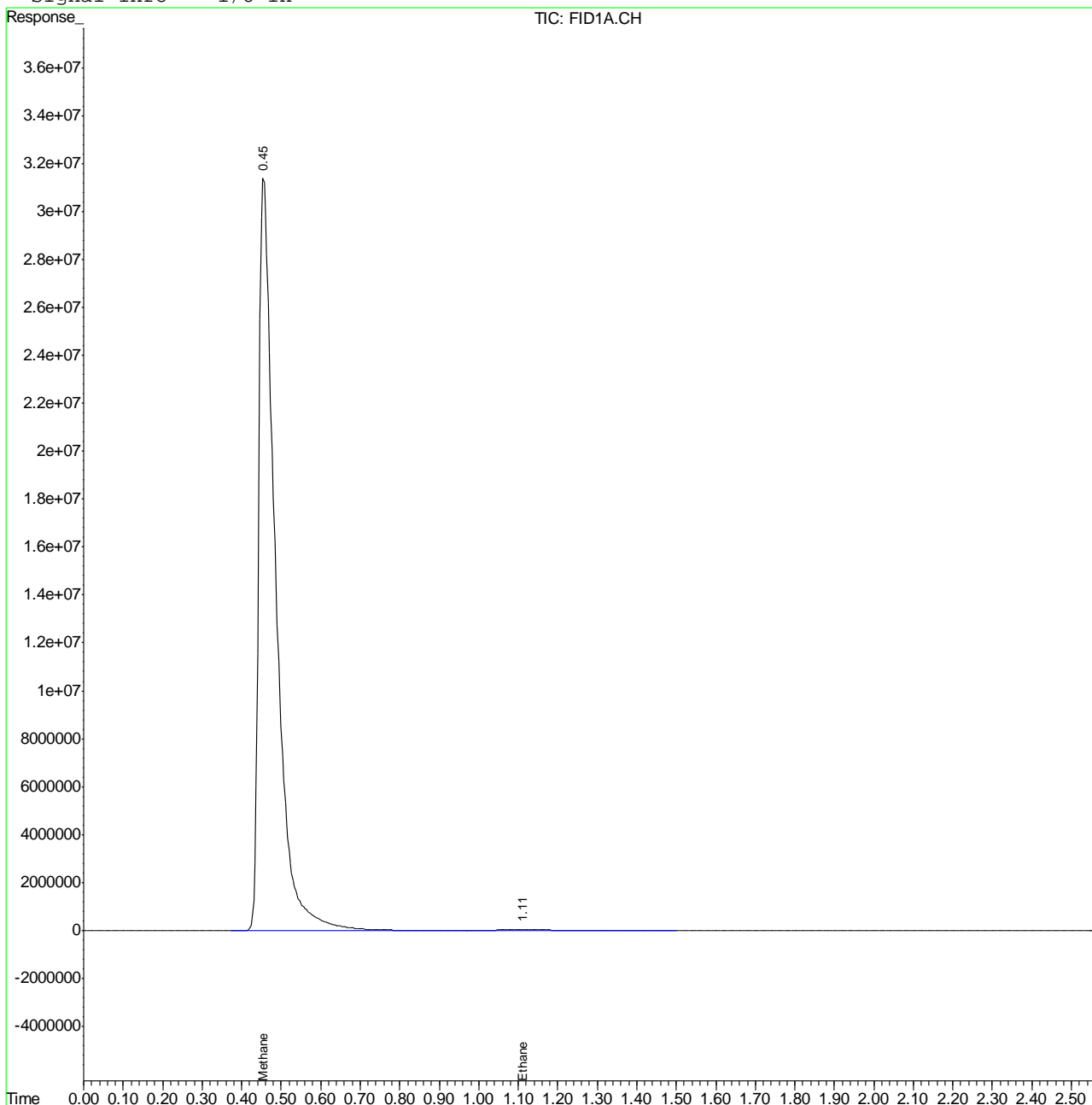
9.1.1
9

Quantitation Report (QT Reviewed)

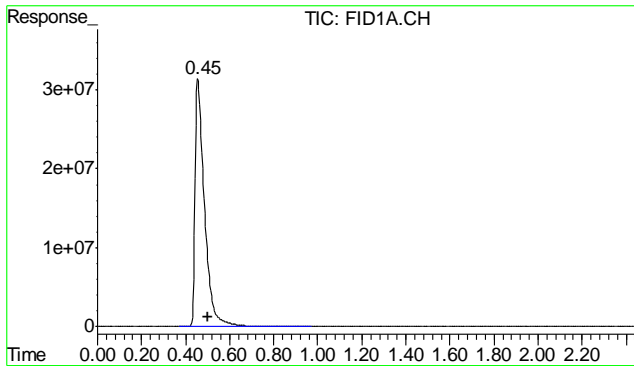
Data File : C:\SHARED\FB090913\FB09363.D Vial: 8
Acq On : 9 Sep 2013 10:21 am Operator: JOHNS
Sample : D50239-1 Inst : FID 4
Misc : GC3857,GFB411,39,22,500,4,1 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 9 10:15 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Thu Sep 05 09:56:51 2013
Response via : Multiple Level Calibration
DataAcq Meth : GAS.M

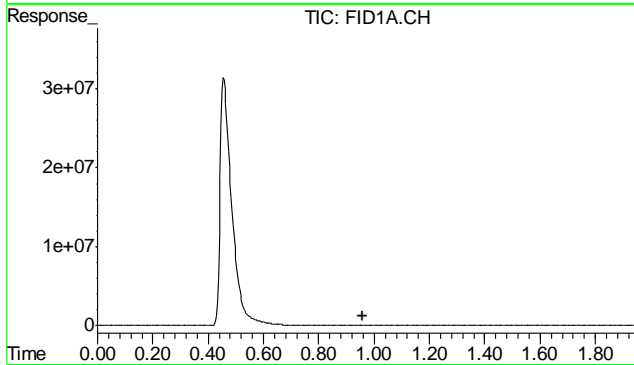
Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in



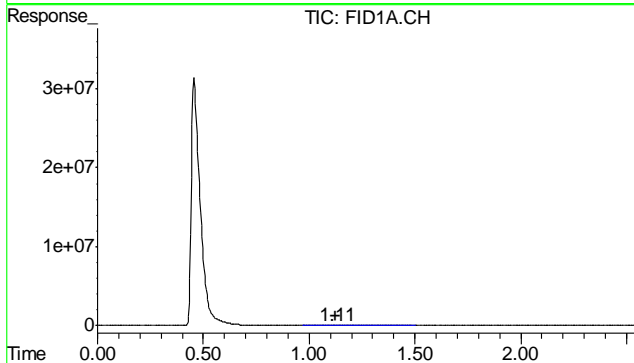
9.1.1
9



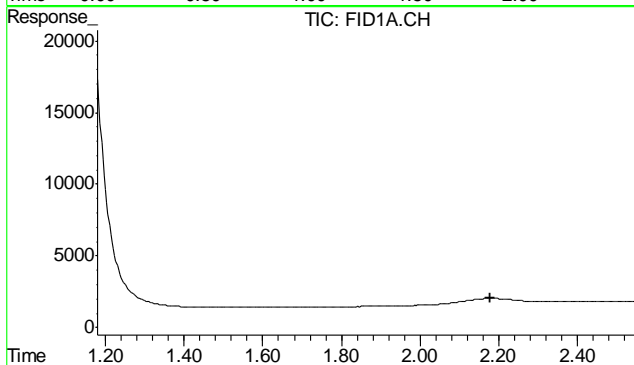
#1 Methane
 R.T.: 0.457 min
 Delta R.T.: -0.043 min
 Response: 928541384
 Conc: 190030.95 rawvppm



#2 Ethene
 R.T.: 0.000 min
 Exp R.T. : 0.956 min
 Response: 0
 Conc: N.D.



#3 Ethane
 R.T.: 1.112 min
 Delta R.T.: -0.014 min
 Response: 3408870
 Conc: 374.61 rawvppm



#4 Propane
 R.T.: 0.000 min
 Exp R.T. : 2.180 min
 Response: 0
 Conc: N.D.

9.1.1
9

Dissolved Gases Raw Data Summary

Sample Number: D50239-1 **Sample Volume:** 39.0 ml
Lab FileID: FB09363.D **Headspace:** 4.0 ml
Injection Time: 09/09/13 10:21 **Volume Injected:** 500 ul
Method: RSK175 MOD **Temperature:** 22.0 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	190030.95	39080	13.9	mg/l
Ethane	74-84-0	30	374.61	27860	0.0579	mg/l
Ethene	74-85-1	28	0	10680	0.0	mg/l
Propane	74-98-6	44	0	33643	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

9.1.1.1
9

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FB090913\FB09365.D Vial: 10
 Acq On : 9 Sep 2013 10:31 am Operator: JOHNS
 Sample : D50239-1, 25X Inst : FID 4
 Misc : GC3857,GFB411,39,22,500,4,25 Multiplr: 1.00
 IntFile : AUTOINT1.E
 Quant Time: Sep 09 10:25:20 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
 Title : RSK 175 Methane, Ethene, Ethane, and Propane
 Last Update : Thu Sep 05 09:56:51 2013
 Response via : Initial Calibration
 DataAcq Meth : GAS.M

Volume Inj. : 100ul
 Signal Phase : Porapak Q 80/100
 Signal Info : 1/8 in

Compound	R.T.	Response	Conc	Units

Target Compounds				
1) Methane	0.49	36646166	7499.834	rawvp
2) Ethene	0.00	0	N.D.	rawvp
3) Ethane	1.12	136811	15.034	rawvp
4) Propane	0.00	0	N.D.	rawvp

9.12
9

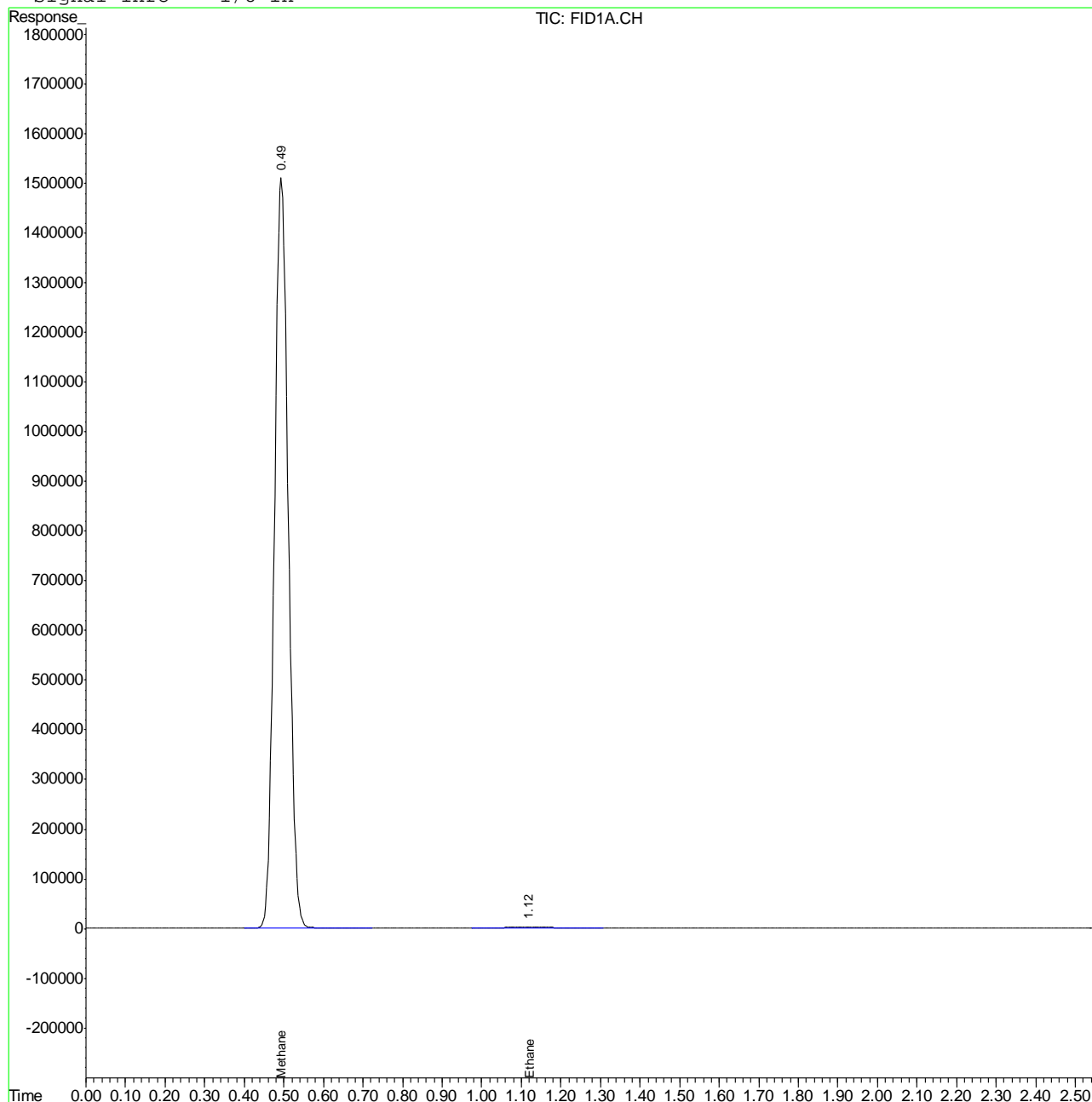
 (f)=RT Delta > 1/2 Window (m)=manual int.
 FB09365.D MEEP-GFB318.M Mon Sep 09 11:18:39 2013 GCFA

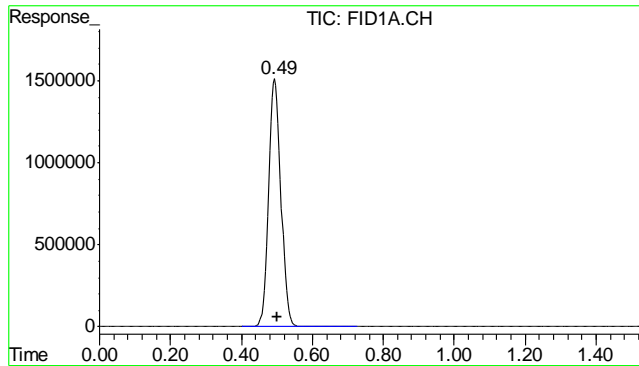
Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FB090913\FB09365.D Vial: 10
Acq On : 9 Sep 2013 10:31 am Operator: JOHNS
Sample : D50239-1, 25X Inst : FID 4
Misc : GC3857,GFB411,39,22,500,4,25 Multiplr: 1.00
IntFile : AUTOINT1.E
Quant Time: Sep 9 10:25 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
Title : RSK 175 Methane, Ethene, Ethane, and Propane
Last Update : Thu Sep 05 09:56:51 2013
Response via : Multiple Level Calibration
DataAcq Meth : GAS.M

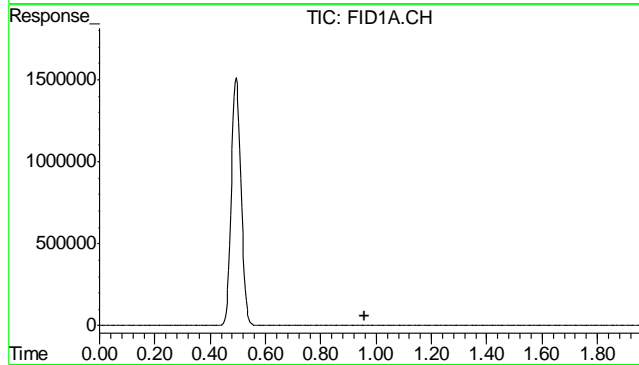
Volume Inj. : 100ul
Signal Phase : Porapak Q 80/100
Signal Info : 1/8 in





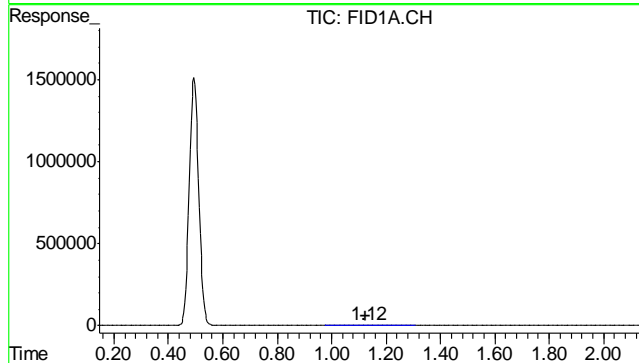
#1 Methane

R.T.: 0.494 min
 Delta R.T.: -0.005 min
 Response: 36646166
 Conc: 7499.83 rawvppm



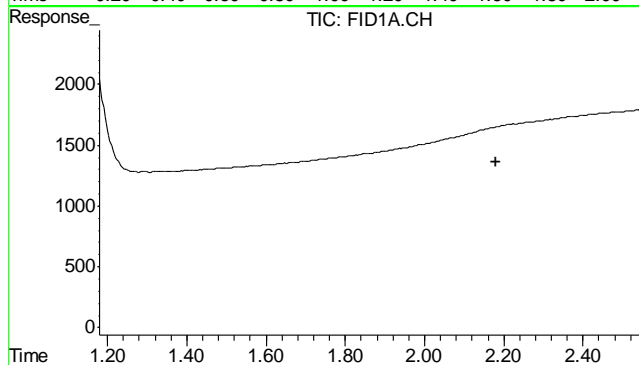
#2 Ethene

R.T.: 0.000 min
 Exp R.T. : 0.956 min
 Response: 0
 Conc: N.D.



#3 Ethane

R.T.: 1.120 min
 Delta R.T.: -0.006 min
 Response: 136811
 Conc: 15.03 rawvppm



#4 Propane

R.T.: 0.000 min
 Exp R.T. : 2.180 min
 Response: 0
 Conc: N.D.

Dissolved Gases Raw Data Summary

Sample Number: D50239-1 **Sample Volume:** 39.0 ml
Lab FileID: FB09365.D **Headspace:** 4.0 ml
Injection Time: 09/09/13 10:31 **Volume Injected:** 500 ul
Method: RSK175 MOD **Temperature:** 22.0 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	7499.83	39080	13.8	mg/l
Ethane	74-84-0	30	15.03	27860	0.0581	mg/l
Ethene	74-85-1	28	0	10680	0.0	mg/l
Propane	74-98-6	44	0	33643	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

9.1.2.1

9

Quantitation Report (QT Reviewed)

Data File : C:\SHARED\FB090913\FB09358.D Vial: 3
 Acq On : 9 Sep 2013 9:55 am Operator: JOHNS
 Sample : MB Inst : FID 4
 Misc : GC3857,GFB411,39,22,500,4,1 Multiplr: 1.00
 IntFile : AUTOINT1.E
 Quant Time: Sep 09 09:49:29 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
 Title : RSK 175 Methane, Ethene, Ethane, and Propane
 Last Update : Thu Sep 05 09:56:51 2013
 Response via : Initial Calibration
 DataAcq Meth : GAS.M

Volume Inj. : 100ul
 Signal Phase : Porapak Q 80/100
 Signal Info : 1/8 in

Compound	R.T.	Response	Conc Units

Target Compounds			
1) Methane	0.49	11747	2.404 rawvpm
2) Ethene	0.00	0	N.D. rawvp
3) Ethane	0.00	0	N.D. rawvp
4) Propane	0.00	0	N.D. rawvp

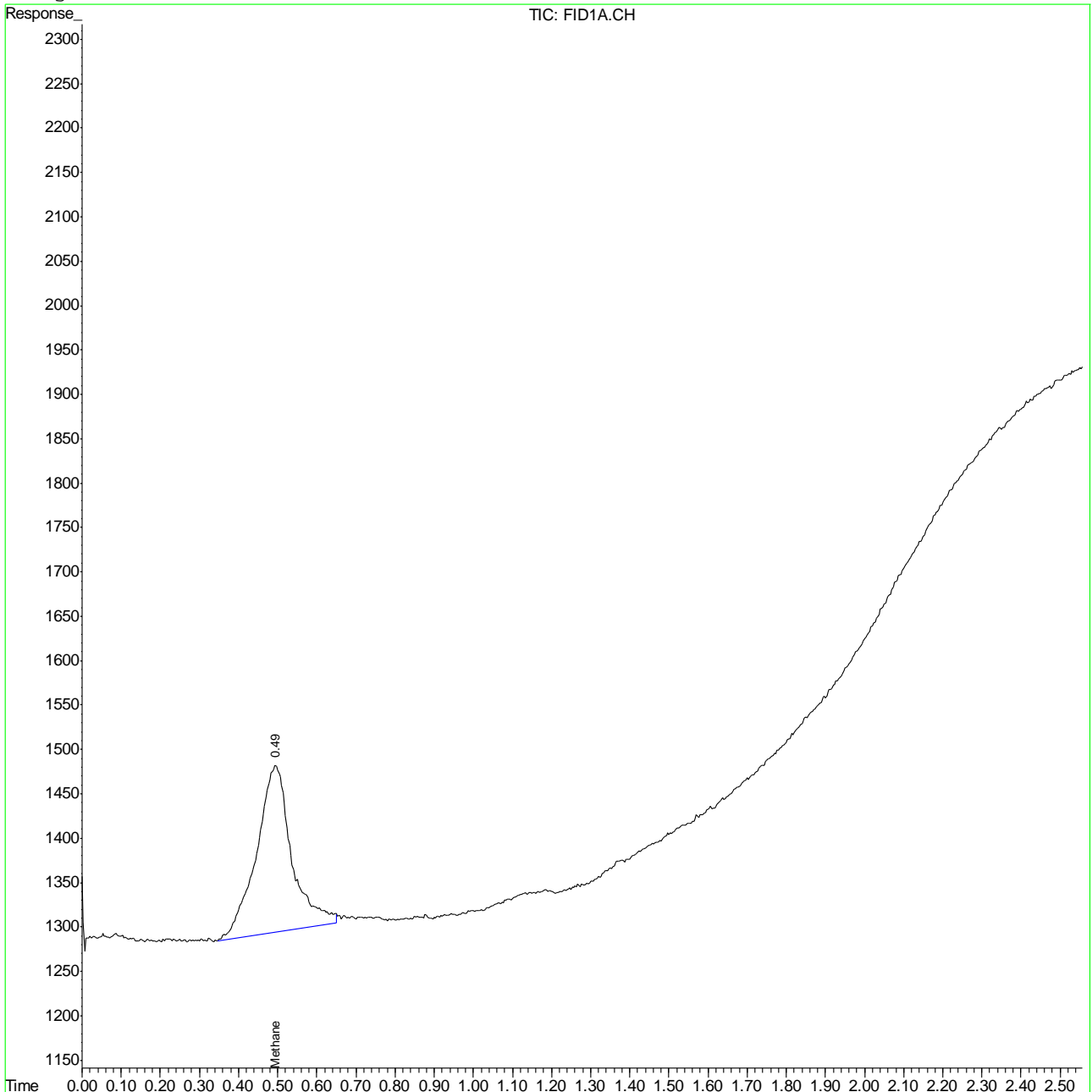
9.2.1
9

Quantitation Report (QT Reviewed)

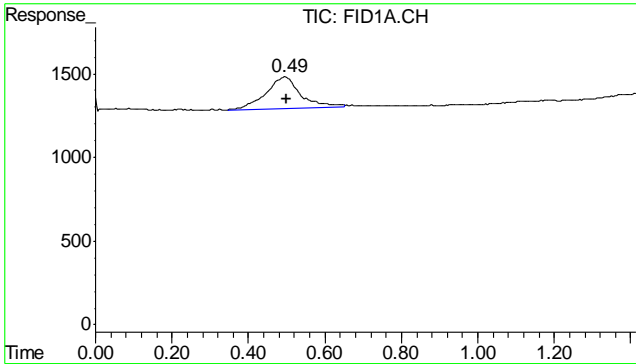
Data File : C:\SHARED\FB090913\FB09358.D Vial: 3
 Acq On : 9 Sep 2013 9:55 am Operator: JOHNS
 Sample : MB Inst : FID 4
 Misc : GC3857,GFB411,39,22,500,4,1 Multiplr: 1.00
 IntFile : AUTOINT1.E
 Quant Time: Sep 9 9:50 2013 Quant Results File: MEEP-GFB318.RES

Quant Method : C:\MSDCHEM\2...\MEEP-GFB318.M (Chemstation Integrator)
 Title : RSK 175 Methane, Ethene, Ethane, and Propane
 Last Update : Thu Sep 05 09:56:51 2013
 Response via : Multiple Level Calibration
 DataAcq Meth : GAS.M

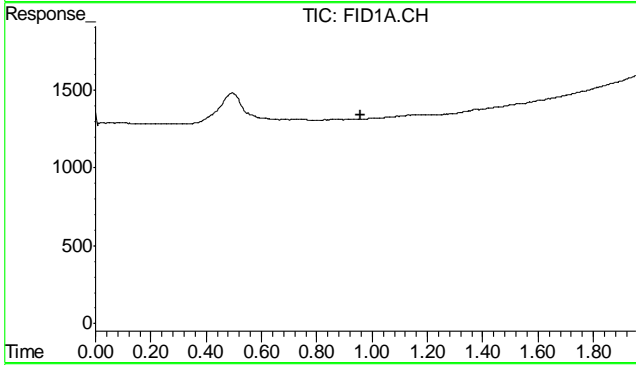
Volume Inj. : 100ul
 Signal Phase : Porapak Q 80/100
 Signal Info : 1/8 in



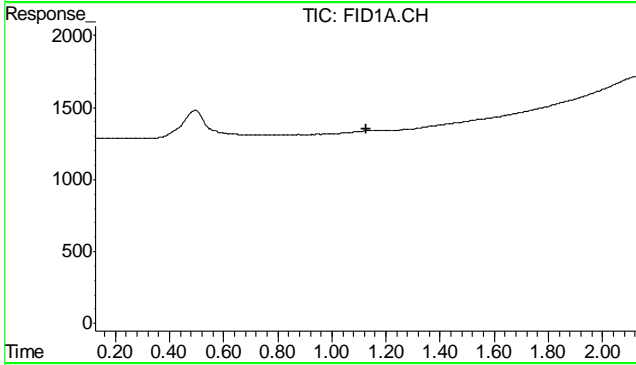
9.2.1
9



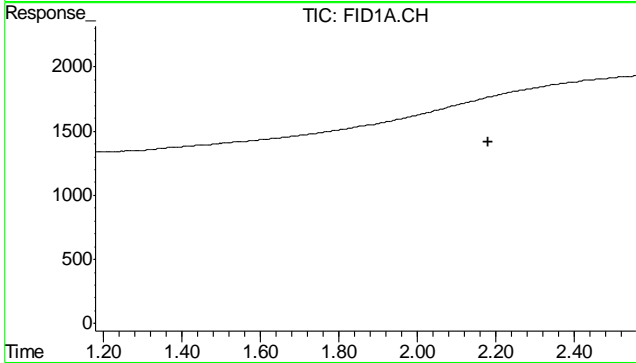
#1 Methane
 R.T.: 0.494 min
 Delta R.T.: -0.005 min
 Response: 11747
 Conc: 2.40 rawvppm m



#2 Ethene
 R.T.: 0.000 min
 Exp R.T. : 0.956 min
 Response: 0
 Conc: N.D.



#3 Ethane
 R.T.: 0.000 min
 Exp R.T. : 1.126 min
 Response: 0
 Conc: N.D.



#4 Propane
 R.T.: 0.000 min
 Exp R.T. : 2.180 min
 Response: 0
 Conc: N.D.

Dissolved Gases Raw Data Summary

Sample Number: GFB411-MB **Sample Volume:** 39.0 ml
Lab FileID: FB09358.D **Headspace:** 4.0 ml
Injection Time: 09/09/13 09:55 **Volume Injected:** 500 ul
Method: RSK175 MOD **Temperature:** 22.0 Deg. C

Parameter	CAS	MW	Result (ppmv)	Henry's Constant	Total	Units
Methane	74-82-8	16	2.4	39080	0.0	mg/l
Ethane	74-84-0	30	0	27860	0.0	mg/l
Ethene	74-85-1	28	0	10680	0.0	mg/l
Propane	74-98-6	44	0	33643	0.0	mg/l

Henry's Constants	17	18	19	20	21	22	23	24	25	26	27
Methane	35290	36060	36830	37600	38340	39080	39820	40560	41300	42020	42740
Ethane	24020	24780	25540	26300	27080	27860	28640	29420	30200	31000	31800
Ethene	9480	9720	9960	10200	10440	10680	10920	11160	11400	11660	11920
Propane	28308	29352	30408	31474	32552	33643	34744	35857	36978	38107	39244

9.2.1.1
9

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8546-MB	FD28789.D	1	09/12/13	TU	09/11/13	OP8546	GFD1390

The QC reported here applies to the following samples:

Method: SW846-8015B

D50239-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.20	0.18	mg/l	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	44% 20-140%

Blank Spike Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8546-BS	FD28791.D	1	09/12/13	TU	09/11/13	OP8546	GFD1390

The QC reported here applies to the following samples:

Method: SW846-8015B

D50239-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
	TPH-DRO (C10-C28)	20	17.4	87	36-140

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	78%	20-140%

10.2.1
10

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D50239
Account: ENCACODN EnCana
Project: Rodman Bruntz

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8546-MS	FD28793.D	1	09/12/13	TU	09/11/13	OP8546	GFD1390
OP8546-MSD	FD28795.D	1	09/12/13	TU	09/11/13	OP8546	GFD1390
D48565-15	FD28797.D	1	09/12/13	TU	09/11/13	OP8546	GFD1390

The QC reported here applies to the following samples:

Method: SW846-8015B

D50239-1

CAS No.	Compound	D48565-15 mg/l	Spike Q mg/l	MS mg/l	MS %	MSD mg/l	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND	20	13.6	68	13.0	65	5	28-140/30

CAS No.	Surrogate Recoveries	MS	MSD	D48565-15	Limits
84-15-1	o-Terphenyl	57%	56%	38%	20-140%

10.3.1
10

* = Outside of Control Limits.



GC Semi-volatiles

Raw Data



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\2\DATA\2013\AUG\FD091313\FD28835.D Vial: 6
 Acq On : 13 Sep 2013 12:31 pm Operator: TIMU
 Sample : D50239-1 Inst : FID5
 Misc : OP8546,GFD1392,1000,,,1,1 Multiplr: 1.00
 IntFile : autoint1.e
 Quant Time: Sep 13 13:23:44 2013 Quant Results File: DRO-GFD1366F.RES

Quant Method : C:\MSDCHEM\2...\DRO-GFD1366F.M (Chemstation Integrator)
 Title : 8015B TEH
 Last Update : Fri Sep 13 08:35:52 2013
 Response via : Initial Calibration
 DataAcq Meth : DRO_DUAL.M

Volume Inj. : 1ul
 Signal Phase : RTX-5
 Signal Info : 530um

Compound	R.T.	Response	Conc Units

System Monitoring Compounds			
1) S O-Terphenyl	6.87	7998300	1320.503 mg/L
Target Compounds			
2) H TPH-DRO (C10-C32)	6.65	581087	109.764 mg/L
3) H TPH-DRO (C10-C28)	6.00	334190	66.155 mg/L

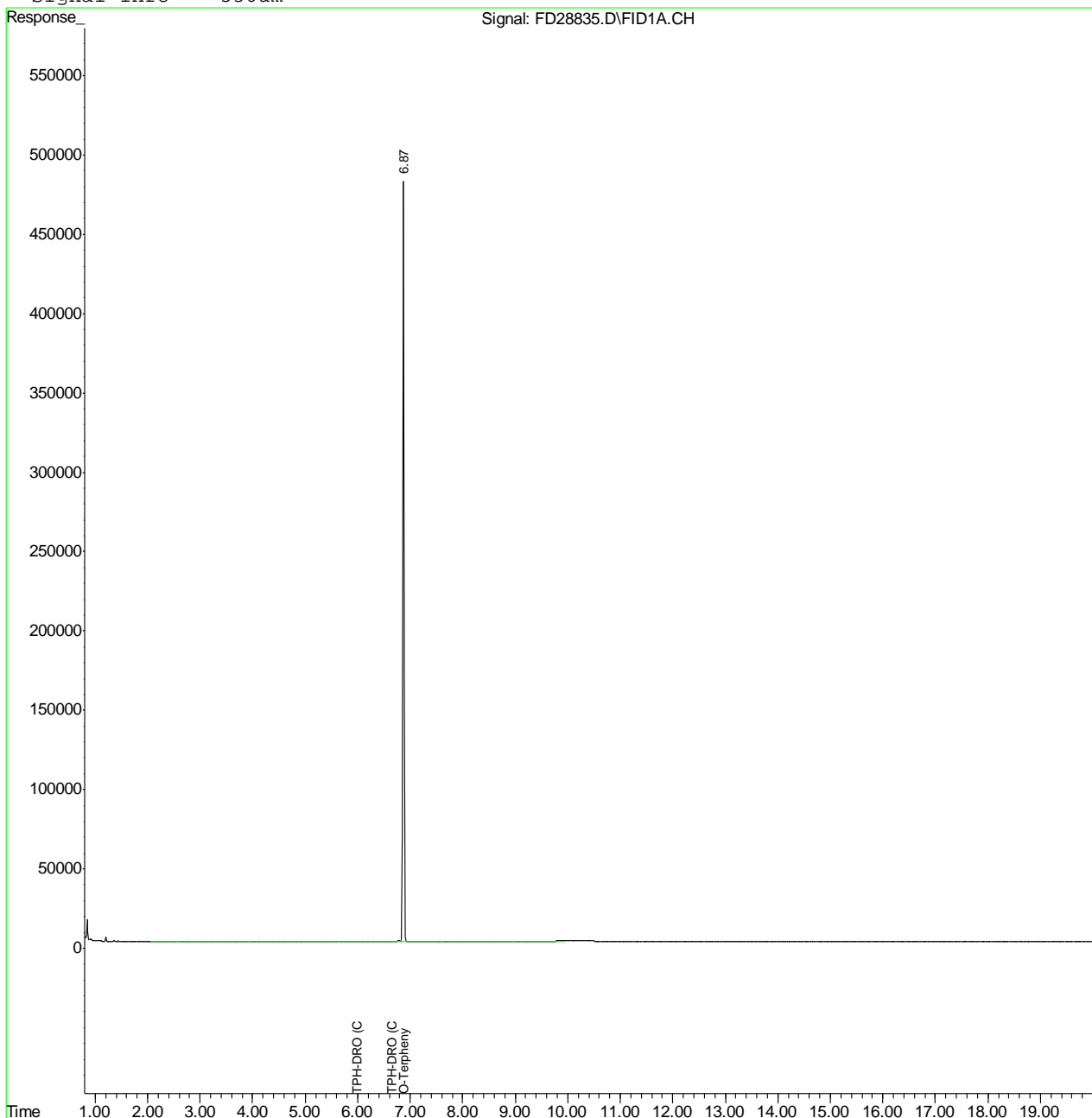
 (f)=RT Delta > 1/2 Window (m)=manual int.
 FD28835.D DRO-GFD1366F.M Fri Sep 13 13:24:28 2013 GC

Quantitation Report (QT Reviewed)

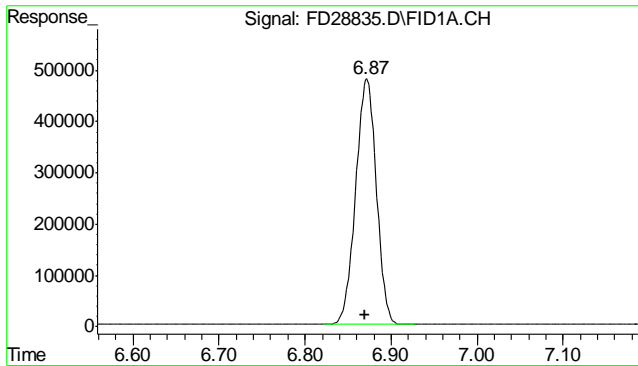
Data File : C:\MSDCHEM\2\DATA\2013\AUG\FD091313\FD28835.D Vial: 6
Acq On : 13 Sep 2013 12:31 pm Operator: TIMU
Sample : D50239-1 Inst : FID5
Misc : OP8546,GFD1392,1000,,,1,1 Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Sep 13 13:23 2013 Quant Results File: DRO-GFD1366F.RES

Quant Method : C:\MSDCHEM\2...\DRO-GFD1366F.M (Chemstation Integrator)
Title : 8015B TEH
Last Update : Fri Sep 13 08:35:52 2013
Response via : Multiple Level Calibration
DataAcq Meth : DRO_DUAL.M

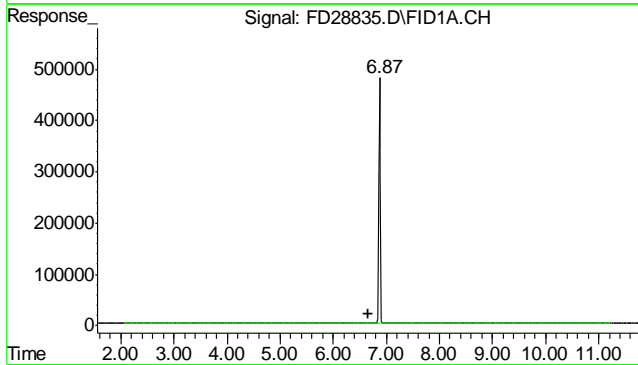
Volume Inj. : 1ul
Signal Phase : RTX-5
Signal Info : 530um



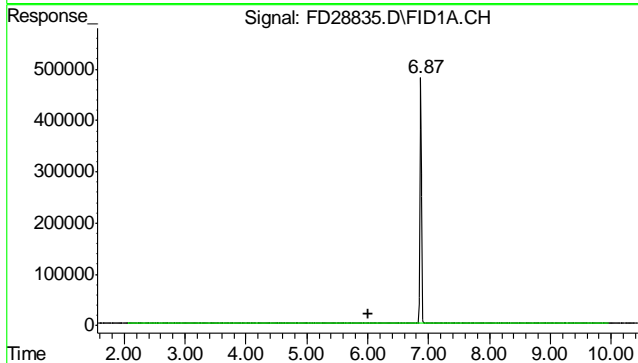
11.11
11



#1 O-Terphenyl
 R.T.: 6.872 min
 Delta R.T.: 0.002 min
 Response: 7998300
 Conc: 1320.50 mg/L



#2 TPH-DRO (C10-C32)
 R.T.: 6.650 min
 Delta R.T.: 0.000 min
 Response: 581087
 Conc: 109.76 mg/L m



#3 TPH-DRO (C10-C28)
 R.T.: 6.000 min
 Delta R.T.: 0.000 min
 Response: 334190
 Conc: 66.15 mg/L m

11.11
 11

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\2\DATA\2013\AUG\FD091213\FD28789.D Vial: 3
 Acq On : 9-12-2013 01:50:20 PM Operator: TIMU
 Sample : OP8546-MB Inst : FID5
 Misc : OP8546,GFD1390,1000,,,1,1 Multiplr: 1.00
 IntFile : autoint1.e
 Quant Time: Sep 13 08:36:11 2013 Quant Results File: DRO-GFD1366F.RES

Quant Method : C:\MSDCHEM\2...\DRO-GFD1366F.M (Chemstation Integrator)
 Title : 8015B TEH
 Last Update : Fri Sep 13 08:35:52 2013
 Response via : Initial Calibration
 DataAcq Meth : DRO_DUAL.M

Volume Inj. : 1ul
 Signal Phase : RTX-5
 Signal Info : 530um

Compound	R.T.	Response	Conc Units

System Monitoring Compounds			
1) S O-Terphenyl	6.88	5337958	881.286 mg/L
Target Compounds			
2) H TPH-DRO (C10-C32)	6.65	739339	139.657 mg/L
3) H TPH-DRO (C10-C28)	6.00	447730	88.630 mg/L

11.21
11

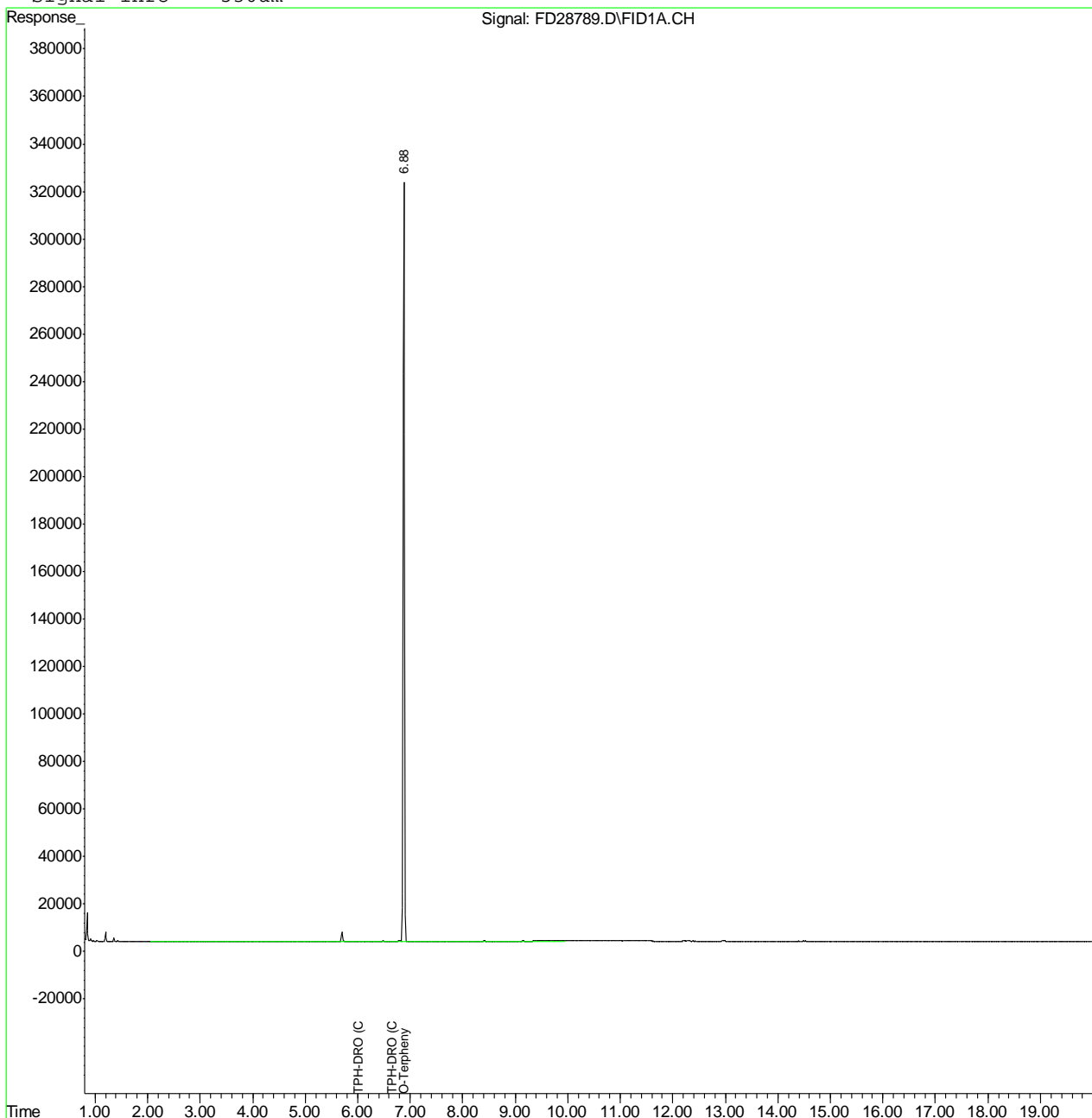
 (f)=RT Delta > 1/2 Window (m)=manual int.
 FD28789.D DRO-GFD1366F.M Fri Sep 13 08:51:33 2013 GC

Quantitation Report (QT Reviewed)

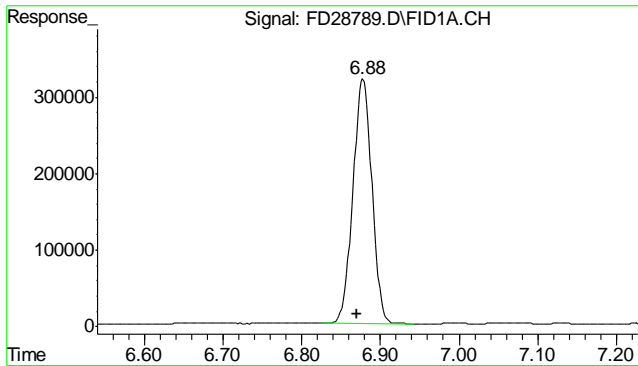
Data File : C:\MSDCHEM\2\DATA\2013\AUG\FD091213\FD28789.D Vial: 3
Acq On : 9-12-2013 01:50:20 PM Operator: TIMU
Sample : OP8546-MB Inst : FID5
Misc : OP8546,GFD1390,1000,,,1,1 Multiplr: 1.00
IntFile : autoint1.e
Quant Time: Sep 13 8:36 2013 Quant Results File: DRO-GFD1366F.RES

Quant Method : C:\MSDCHEM\2...\DRO-GFD1366F.M (Chemstation Integrator)
Title : 8015B TEH
Last Update : Fri Sep 13 08:35:52 2013
Response via : Multiple Level Calibration
DataAcq Meth : DRO_DUAL.M

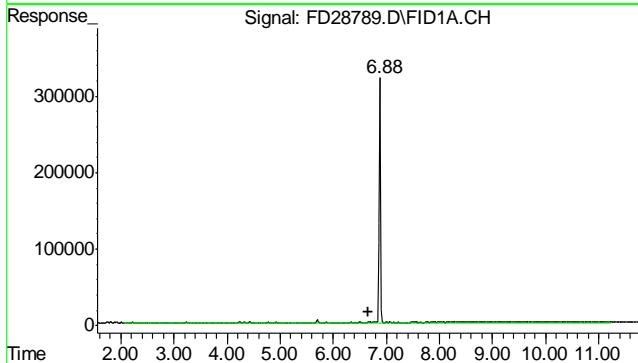
Volume Inj. : 1ul
Signal Phase : RTX-5
Signal Info : 530um



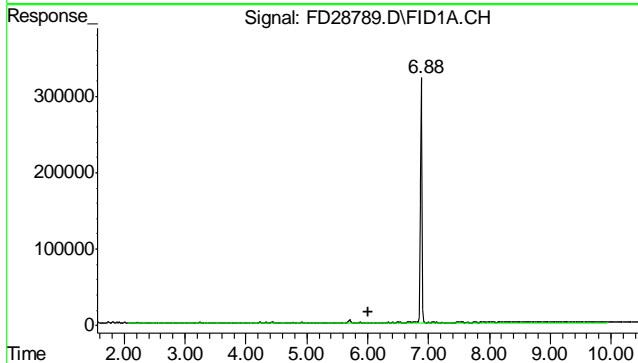
11.21
11



#1 O-Terphenyl
 R.T.: 6.878 min
 Delta R.T.: 0.008 min
 Response: 5337958
 Conc: 881.29 mg/L



#2 TPH-DRO (C10-C32)
 R.T.: 6.650 min
 Delta R.T.: 0.000 min
 Response: 739339
 Conc: 139.66 mg/L m



#3 TPH-DRO (C10-C28)
 R.T.: 6.000 min
 Delta R.T.: 0.000 min
 Response: 447730
 Conc: 88.63 mg/L m

11.21
 11

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11020
Matrix Type: AQUEOUS

Methods: EPA 200.7
Units: ug/l

Prep Date: 09/09/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	8.6	11		
Antimony	30	3.2	21		
Arsenic	25	5.2	9		
Barium	10	1.4	1.4	-0.30	<10
Beryllium	10	.8	1.7		
Boron	50	6.7	6.6	2.8	<50
Cadmium	10	.4	.36		
Calcium	400	2.2	66	5.7	<400
Chromium	10	.4	1.4		
Cobalt	5.0	.4	.51		
Copper	10	1.2	1.5		
Iron	10	2.2	3.2	0.40	<10
Lead	50	3.6	4.1		
Lithium	5.0	1.9	1.9		
Magnesium	200	14	29	12.8	<200
Manganese	5.0	.01	.29	0.0	<5.0
Molybdenum	10	.8	1.1		
Nickel	30	.9	.87		
Phosphorus	100	15	24		
Potassium	1000	130	230	-16	<1000
Selenium	50	8.8	9.3		
Silicon	50	5.2	5.6		
Silver	30	.4	.4		
Sodium	400	4.9	36	57.8	<400
Strontium	5.0	.01	.12	0.0	<5.0
Thallium	10	2.9	4.9		
Tin	50	13	13		
Titanium	10	.15	.43		
Uranium	50	3.7	3.9		
Vanadium	10	.4	.39		
Zinc	30	.6	1.9		

Associated samples MP11020: D50239-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

12.1.1
12

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11020
Matrix Type: AQUEOUS

Methods: EPA 200.7
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

12.1.1
12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11020
 Matrix Type: AQUEOUS

Methods: EPA 200.7
 Units: ug/l

Prep Date: 09/09/13

Metal	D50239-1F Original MS		SpikeLot ICPAL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	105	2170	2000	103.3	70-130
Beryllium					
Boron	429	1520	1000	109.1	70-130
Cadmium	anr				
Calcium	2840	28500	25000	102.6	70-130
Chromium	anr				
Cobalt	anr				
Copper	anr				
Iron	9.4	4970	5000	99.2	70-130
Lead	anr				
Lithium					
Magnesium	762	26800	25000	104.2	70-130
Manganese	6.9	509	500	100.4	70-130
Molybdenum	anr				
Nickel	anr				
Phosphorus					
Potassium	3260	34400	25000	124.6	70-130
Selenium					
Silicon					
Silver	anr				
Sodium	380000	415000	25000	140.0(a)	70-130
Strontium	125	638	500	102.6	70-130
Thallium					
Tin	anr				
Titanium					
Uranium					
Vanadium					
Zinc	anr				

Associated samples MP11020: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

12.1.2
 12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11020
Matrix Type: AQUEOUS

Methods: EPA 200.7
Units: ug/l

Prep Date:

Metal

- (N) Matrix Spike Rec. outside of QC limits
- (anr) Analyte not requested
- (a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

12.1.2
12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11020
 Matrix Type: AQUEOUS

Methods: EPA 200.7
 Units: ug/l

Prep Date: 09/09/13

Metal	D50239-1F Original MSD		SpikeLot ICPAL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	105	2130	2000	101.3	1.9	20
Beryllium						
Boron	429	1520	1000	109.1	0.0	20
Cadmium	anr					
Calcium	2840	28400	25000	102.2	0.4	20
Chromium	anr					
Cobalt	anr					
Copper	anr					
Iron	9.4	4930	5000	98.4	0.8	20
Lead	anr					
Lithium						
Magnesium	762	26500	25000	103.0	1.1	20
Manganese	6.9	507	500	100.0	0.4	20
Molybdenum	anr					
Nickel	anr					
Phosphorus						
Potassium	3260	34000	25000	123.0	1.2	20
Selenium						
Silicon						
Silver	anr					
Sodium	380000	404000	25000	96.0	2.7	20
Strontium	125	623	500	99.6	2.4	20
Thallium						
Tin	anr					
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP11020: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

12.1.2
 12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11020
Matrix Type: AQUEOUS

Methods: EPA 200.7
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

12.1.2
12

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11020
 Matrix Type: AQUEOUS

Methods: EPA 200.7
 Units: ug/l

Prep Date: 09/09/13

Metal	BSP Result	SpikeLot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	2080	2000	104.0	85-115
Beryllium				
Boron	1050	1000	105.0	85-115
Cadmium	anr			
Calcium	26500	25000	106.0	85-115
Chromium	anr			
Cobalt	anr			
Copper	anr			
Iron	5000	5000	100.0	85-115
Lead	anr			
Lithium				
Magnesium	26600	25000	106.4	85-115
Manganese	508	500	101.6	85-115
Molybdenum	anr			
Nickel	anr			
Phosphorus				
Potassium	27500	25000	110.0	85-115
Selenium				
Silicon				
Silver	anr			
Sodium	26600	25000	106.4	85-115
Strontium	518	500	103.6	85-115
Thallium				
Tin	anr			
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP11020: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits

12.1.3
 12

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11020
Matrix Type: AQUEOUS

Methods: EPA 200.7
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

12.1.3
12

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

QC Batch ID: MP11024
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 09/09/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	50	1.1	2		
Antimony	0.40	.0022	.011		
Arsenic	0.20	.017	.044		
Barium	2.0	.016	.079		
Beryllium	0.20	.016	.069		
Boron	40	.49	2.1		
Cadmium	0.10	.036	.042		
Calcium	400	5.6	12		
Chromium	2.0	.053	.053		
Cobalt	0.20	.0049	.015		
Copper	2.0	.06	.13		
Iron	10	3.5	4.6		
Lead	0.50	.0079	.008		
Magnesium	100	1.3	1.3		
Manganese	1.0	.12	.13		
Molybdenum	1.0	.049	.029		
Nickel	2.0	.0088	.027		
Phosphorus	60	2.6	4.3		
Potassium	200	2.9	2.9		
Selenium	0.40	.06	.21	-0.0050	<0.40
Silver	0.10	.0019	.008		
Sodium	500	4.9	4.9		
Strontium	20	.01	.015		
Thallium	0.20	.0024	.005		
Tin	10	.063	1.3		
Titanium	2.0	.059	.092		
Uranium	0.20	.0017	.002		
Vanadium	1.0	.037	.2		
Zinc	10	.21	.96		

Associated samples MP11024: D50239-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

12.2.1
12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11024
 Matrix Type: AQUEOUS

Methods: EPA 200.8
 Units: ug/l

Prep Date: 09/09/13

Metal	D50228-1 Original MS	Spikelot ICPALL2	% Rec	QC Limits	
Aluminum	anr				
Antimony					
Arsenic	anr				
Barium					
Beryllium					
Boron					
Cadmium	anr				
Calcium	anr				
Chromium	anr				
Cobalt	anr				
Copper	anr				
Iron	anr				
Lead	anr				
Magnesium	anr				
Manganese	anr				
Molybdenum	anr				
Nickel	anr				
Phosphorus					
Potassium	anr				
Selenium	0.19	196	200	97.9	70-130
Silver	anr				
Sodium	anr				
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	anr				

Associated samples MP11024: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

12.2.2
 12

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11024
 Matrix Type: AQUEOUS

Methods: EPA 200.8
 Units: ug/l

Prep Date: 09/09/13

Metal	D50228-1 Original MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit	
Aluminum	anr					
Antimony						
Arsenic	anr					
Barium						
Beryllium						
Boron						
Cadmium	anr					
Calcium	anr					
Chromium	anr					
Cobalt	anr					
Copper	anr					
Iron	anr					
Lead	anr					
Magnesium	anr					
Manganese	anr					
Molybdenum	anr					
Nickel	anr					
Phosphorus						
Potassium	anr					
Selenium	0.19	200	200	99.9	2.0	20
Silver	anr					
Sodium	anr					
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP11024: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

12.2.2
 12

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D50239
 Account: ENCACODN - EnCana
 Project: Rodman Bruntz

QC Batch ID: MP11024
 Matrix Type: AQUEOUS

Methods: EPA 200.8
 Units: ug/l

Prep Date: 09/09/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum	anr			
Antimony				
Arsenic	anr			
Barium				
Beryllium				
Boron				
Cadmium	anr			
Calcium	anr			
Chromium	anr			
Cobalt	anr			
Copper	anr			
Iron	anr			
Lead	anr			
Magnesium	anr			
Manganese	anr			
Molybdenum	anr			
Nickel	anr			
Phosphorus				
Potassium	anr			
Selenium	217	200	108.5	85-115
Silver	anr			
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP11024: D50239-1F

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

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General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Alkalinity, Bicarbonate as CaC	GN21800	5.0	0.0	mg/l	100	96.4	96.4	90-110%
Alkalinity, Carbonate	GN21801	5.0	0.0	mg/l	100	96.4	96.4	80-120%
Alkalinity, Total as CaCO3	GN21799	5.0	0.0	mg/l	100	96.4	96.4	90-110%
Bromide	GP10861/GN21808	0.050	0.0	mg/l	20	21.2	106.0	90-110%
Chloride	GP10861/GN21808	0.50	0.0	mg/l	20	20.3	101.5	90-110%
Fluoride	GP10861/GN21808	0.10	0.0	mg/l	10	9.91	99.1	90-110%
Iron Reducing Bacteria	MB245	25	<25	CFU/ml				
Nitrogen, Nitrate	GP10861/GN21808	0.010	0.0	mg/l	4.52	4.58	101.4	90-110%
Nitrogen, Nitrite	GP10861/GN21808	0.0040	0.0	mg/l	6.09	6.43	105.6	90-110%
Phosphorus, Total	GP10877/GN21848	0.010	0.0	mg/l	0.304	0.32	105.2	80-120%
Slime Forming Bacteria	MB246	500	<500	CFU/ml				
Solids, Total Dissolved	GN21817	10	0.0	mg/l	400	386	96.5	90-110%
Specific Conductivity	GP10867/GN21811			umhos/cm	99.7	96.3	96.6	90-110%
Sulfate	GP10861/GN21808	0.50	0.0	mg/l	30	30.1	100.3	90-110%
Sulfate Reducing Bacteria	MB247	200	<200	CFU/ml				
pH	GN21828			su	8.00	8.00	100.0	99.3-100.7%

Associated Samples:

Batch MB245: D50239-1B
Batch MB246: D50239-1B
Batch MB247: D50239-1B
Batch GN21799: D50239-1
Batch GN21800: D50239-1
Batch GN21801: D50239-1
Batch GN21817: D50239-1
Batch GN21828: D50239-1
Batch GP10861: D50239-1
Batch GP10867: D50239-1
Batch GP10877: D50239-1

(*) Outside of QC limits

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DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Alkalinity, Total as CaCO3	GN21799	D50174-1	mg/l	103	105	1.4	0-20%
Phosphorus, Total	GP10877/GN21848	D50142-1	mg/l	0.0	0.0	0.0	0-20%
Solids, Total Dissolved	GN21817	D50215-2	mg/l	336	328	2.4	0-20%
Specific Conductivity	GP10867/GN21811	D50161-1	umhos/cm	567	572	0.9	0-20%

Associated Samples:

Batch GN21799: D50239-1

Batch GN21817: D50239-1

Batch GP10867: D50239-1

Batch GP10877: D50239-1

(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Alkalinity, Total as CaCO3	GN21799	D50174-1	mg/l	103	100	194	90.8	80-120%
Bromide	GP10861/GN21808	D50253-1	mg/l	0.0	125	136	108.8	80-120%
Chloride	GP10861/GN21808	D50253-1	mg/l	119	500	649	106.0	80-120%
Fluoride	GP10861/GN21808	D50253-1	mg/l	0.0	125	132	105.6	80-120%
Nitrogen, Nitrate	GP10861/GN21808	D50253-1	mg/l	12.8	28.3	43.0	106.9	80-120%
Nitrogen, Nitrite	GP10861/GN21808	D50253-1	mg/l	0.80	15.2	17.2	107.8	80-120%
Phosphorus, Total	GP10877/GN21848	D50142-1	mg/l	0.0	0.40	0.41	102.5	80-120%
Sulfate	GP10861/GN21808	D50253-1	mg/l	113	500	650	107.4	80-120%

Associated Samples:

Batch GN21799: D50239-1

Batch GP10861: D50239-1

Batch GP10877: D50239-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D50239
Account: ENCACODN - EnCana
Project: Rodman Bruntz

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Alkalinity, Total as CaCO3	GN21799	D50174-1	mg/l	103	100	193	0.3	20%
Bromide	GP10861/GN21808	D50253-1	mg/l	0.0	125	136	0.0	20%
Chloride	GP10861/GN21808	D50253-1	mg/l	119	500	647	0.3	20%
Fluoride	GP10861/GN21808	D50253-1	mg/l	0.0	125	131	0.8	20%
Nitrogen, Nitrate	GP10861/GN21808	D50253-1	mg/l	12.8	28.3	42.9	0.2	20%
Nitrogen, Nitrite	GP10861/GN21808	D50253-1	mg/l	0.80	15.2	16.9	1.8	20%
Phosphorus, Total	GP10877/GN21848	D50142-1	mg/l	0.0	0.40	0.430	-4.8	20%
Sulfate	GP10861/GN21808	D50253-1	mg/l	113	500	646	0.6	20%

Associated Samples:

Batch GN21799: D50239-1

Batch GP10861: D50239-1

Batch GP10877: D50239-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits