





IT'S ALL IN THE CHEMISTRY

02/09/10

## Technical Report for

**ENCANA**

**H27NW-CUTTINGS-012110**



**Accutest Job Number: T46172**

**Sampling Date: 01/21/10**

### Report to:

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Parachute, CO 81635  
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**ATTN: Chris Hines**

**Total number of pages in report: 62**



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.

*Paul K Canevaro*

**Paul Canevaro  
Laboratory Director**



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Certifications: TX (T104704220-06-TX) AR (88-0756) FL (E87628) KS (E-10366) LA (85695/04004)  
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Test results relate only to samples analyzed.

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## Sample Summary

ENCANA

Job No: T46172

H27NW-CUTTINGS-012110

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
T46172-1	01/21/10	10:20 AS	01/22/10	SO	Soil	H27NW-CUTTINGS-012110
T46172-1A	01/21/10	10:20 AS	01/22/10	SO	Soil	H27NW-CUTTINGS-012110
T46172-1B	01/21/10	10:20 AS	01/22/10	SO	Soil	H27NW-CUTTINGS-012110
T46172-1C	01/21/10	10:20 AS	01/22/10	SO	Soil	H27NW-CUTTINGS-012110

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Soil samples reported on a dry weight basis unless otherwise indicated on result page.



## SAMPLE DELIVERY GROUP CASE NARRATIVE

**Client:** ENCANA

**Job No** T46172

**Site:** H27NW-CUTTINGS-012110

**Report Date** 2/8/2010 4:14:24 PM

1 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were collected on 01/21/2010 and were received at Accutest on 01/22/2010 properly preserved, at 3 Deg. C and intact. These Samples received an Accutest job number of T46172. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

### Volatiles by GCMS By Method SW846 8260B

<b>Matrix</b> SO	<b>Batch ID:</b> VM955
------------------	------------------------

- All samples were analyzed within the recommended method holding time.
- Sample(s) T46540-4MS, T46540-4MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

### Extractables by GCMS By Method SW846 8270C BY SIM

<b>Matrix</b> SO	<b>Batch ID:</b> OP13925
------------------	--------------------------

- 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) T46169-3MS, T46169-3MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for 2-Methylnaphthalene are outside control limits. Outside control limits due to high level in sample relative to spike amount.

### Volatiles by GC By Method SW846 8015

<b>Matrix</b> SO	<b>Batch ID:</b> GEE2600
------------------	--------------------------

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

### Extractables by GC By Method SW846 8015 M

<b>Matrix</b> SO	<b>Batch ID:</b> OP13926
------------------	--------------------------

- 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) T46007-1MS, T46007-1MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for TPH (C10-C28) are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- Sample(s) OP13926-MS, OP13926-MSD have surrogates outside control limits. Probable cause due to matrix interference.

## Metals By Method SW846 6010B

**Matrix** AQ

**Batch ID:** MP11052

- 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) T46169-3ADUP, T46169-3ASDL were used as the QC samples for metals.

**Matrix** AQ

**Batch ID:** MP11062

- 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) T46169-3CDUP, T46169-3CSDL were used as the QC samples for metals.

**Matrix** SO

**Batch ID:** MP11051

- 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) T46169-4BDUP, T46169-4BMSD, T46169-4BSDL were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Barium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

**Matrix** SO

**Batch ID:** MP11060

- 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) T46077-1DUP, T46077-1MS, T46077-1MSD, T46077-1SDL, T46077-1DUP were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Barium are outside control limits. Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- RPD(s) for Duplicate for Barium, Lead, Arsenic are outside control limits for sample MP11060-D1. High RPD due to possible sample nonhomogeneity.
- RPD(s) for MSD for Barium are outside control limits for sample MP11060-S2. High RPD due to possible matrix interference.
- RPD(s) for Serial Dilution for Cadmium, Lead, Selenium, Silver, Zinc are outside control limits for sample MP11060-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP11060-D1 for Arsenic: RPD acceptable due to low duplicate and sample concentrations.
- MP11060-SD1 for Zinc: Serial dilution indicates possible matrix interference.

## Metals By Method SW846 7471A

**Matrix** SO

**Batch ID:** MP11036

- 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) T46199-2DUP, T46199-2MS, T46199-2MSD were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Mercury are outside control limits. Probable cause due to matrix interference.
- Matrix Spike Duplicate Recovery(s) for Mercury are outside control limits. Probable cause due to matrix interference.

## Wet Chemistry By Method EPA 120.1

**Matrix** AQ

**Batch ID:** GN20474

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) T46322-1DUP were used as the QC samples for Specific Conductivity.

## Wet Chemistry By Method LADNR29B

**Matrix** SO

**Batch ID:** MP11062

- T46172-1C for Sodium Adsorption Ratio: Calculated as:  $(\text{Na meq/L}) / \sqrt{(\text{Ca meq/L}) + (\text{Mg meq/L})/2}$

## Wet Chemistry By Method SM 2540 G

**Matrix** SO

**Batch ID:** GN20337

- Sample(s) T46165-1DUP were used as the QC samples for Solids, Percent.

## Wet Chemistry By Method SW846 1010

**Matrix** SO

**Batch ID:** GN20628

- Sample(s) T46170-1DUP were used as the QC samples for Ignitability (Flashpoint).

## Wet Chemistry By Method SW846 3060/7196A

**Matrix** SO

**Batch ID:** GN20579

- All method blanks for this batch meet method specific criteria.
- Sample(s) T46169-3DUP, T46169-3MS were used as the QC samples for Chromium, Hexavalent.

## Wet Chemistry By Method SW846 6010/7196A M

**Matrix** SO

**Batch ID:** R20762

- T46172-1 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

## Wet Chemistry By Method SW846 9045C

**Matrix** SO

**Batch ID:** GN20353

- Sample(s) T46172-1DUP were used as the QC samples for pH.

Accutest Laboratories Gulf Coast (ALGC) certifies that this report meets the project requirements for analytical data produced for the samples as received at ALGC and as stated on the COC. ALGC certifies that the data meets the Data Quality Objectives for precision, accuracy and completeness as specified in the ALGC Quality Manual except as noted above. This report is to be used in its entirety. ALGC is not responsible for any assumptions of data quality if partial data packages are used



## Sample Results

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### Report of Analysis

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**Report of Analysis**

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**Client Sample ID:** H27NW-CUTTINGS-012110  
**Lab Sample ID:** T46172-1  
**Matrix:** SO - Soil  
**Method:** SW846 8260B  
**Project:** H27NW-CUTTINGS-012110

**Date Sampled:** 01/21/10  
**Date Received:** 01/22/10  
**Percent Solids:** 58.3

	<b>File ID</b>	<b>DF</b>	<b>Analyzed</b>	<b>By</b>	<b>Prep Date</b>	<b>Prep Batch</b>	<b>Analytical Batch</b>
Run #1	M0023678.D	1	02/01/10	JL	n/a	n/a	VM955
Run #2							

	<b>Initial Weight</b>	<b>Final Volume</b>
Run #1	5.34 g	5.0 ml
Run #2		

**Purgeable Aromatics**

<b>CAS No.</b>	<b>Compound</b>	<b>Result</b>	<b>RL</b>	<b>MDL</b>	<b>Units</b>	<b>Q</b>
71-43-2	Benzene	3.3	8.0	1.1	ug/kg	J
108-88-3	Toluene	9.8	8.0	1.5	ug/kg	
100-41-4	Ethylbenzene	10.2	8.0	1.5	ug/kg	
1330-20-7	Xylene (total)	45.5	24	3.4	ug/kg	

<b>CAS No.</b>	<b>Surrogate Recoveries</b>	<b>Run# 1</b>	<b>Run# 2</b>	<b>Limits</b>
1868-53-7	Dibromofluoromethane	89%		70-121%
2037-26-5	Toluene-D8	116%		76-132%
460-00-4	4-Bromofluorobenzene	133%		73-165%
17060-07-0	1,2-Dichloroethane-D4	75%		57-122%

ND = Not detected MDL - Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

**Report of Analysis**

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3**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1**Date Sampled:** 01/21/10**Matrix:** SO - Soil**Date Received:** 01/22/10**Method:** SW846 8270C BY SIM SW846 3550B**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110

	<b>File ID</b>	<b>DF</b>	<b>Analyzed</b>	<b>By</b>	<b>Prep Date</b>	<b>Prep Batch</b>	<b>Analytical Batch</b>
Run #1	P08351.D	1	01/28/10	GJ	01/26/10	OP13925	EP397
Run #2							

	<b>Initial Weight</b>	<b>Final Volume</b>
Run #1	30.5 g	1.0 ml
Run #2		

**BN PAH List**

<b>CAS No.</b>	<b>Compound</b>	<b>Result</b>	<b>RL</b>	<b>MDL</b>	<b>Units</b>	<b>Q</b>
83-32-9	Acenaphthene	ND	11	1.9	ug/kg	
208-96-8	Acenaphthylene	ND	11	3.9	ug/kg	
120-12-7	Anthracene	5.1	11	2.1	ug/kg	J
56-55-3	Benzo(a)anthracene	ND	11	1.8	ug/kg	
50-32-8	Benzo(a)pyrene	ND	11	6.0	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	11	6.0	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	11	11	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	11	7.3	ug/kg	
218-01-9	Chrysene	4.6	11	2.8	ug/kg	J
53-70-3	Dibenz(a,h)anthracene	ND	11	11	ug/kg	
206-44-0	Fluoranthene	ND	11	2.5	ug/kg	
86-73-7	Fluorene	56.7	11	4.0	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	11	8.4	ug/kg	
91-57-6	2-Methylnaphthalene	148	11	1.9	ug/kg	
91-20-3	Naphthalene	57.5	11	1.7	ug/kg	
85-01-8	Phenanthrene	22.6	11	1.6	ug/kg	
129-00-0	Pyrene	4.8	11	3.8	ug/kg	J

<b>CAS No.</b>	<b>Surrogate Recoveries</b>	<b>Run# 1</b>	<b>Run# 2</b>	<b>Limits</b>
4165-60-0	Nitrobenzene-d5	53%		10-127%
321-60-8	2-Fluorobiphenyl	105%		11-133%
1718-51-0	Terphenyl-d14	53%		15-187%

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**

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**Client Sample ID:** H27NW-CUTTINGS-012110  
**Lab Sample ID:** T46172-1  
**Matrix:** SO - Soil  
**Method:** SW846 8015  
**Project:** H27NW-CUTTINGS-012110

**Date Sampled:** 01/21/10  
**Date Received:** 01/22/10  
**Percent Solids:** 58.3

	<b>File ID</b>	<b>DF</b>	<b>Analyzed</b>	<b>By</b>	<b>Prep Date</b>	<b>Prep Batch</b>	<b>Analytical Batch</b>
Run #1	EE051382.D	1	01/26/10	FI	n/a	n/a	GEE2600
Run #2							

	<b>Initial Weight</b>	<b>Final Volume</b>	<b>Methanol Aliquot</b>
Run #1	5.16 g	5.0 ml	100 ul
Run #2			

<b>CAS No.</b>	<b>Compound</b>	<b>Result</b>	<b>RL</b>	<b>MDL</b>	<b>Units</b>	<b>Q</b>
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TPH-GRO (C6-C10)	66.1	12	0.71	mg/kg
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<b>CAS No.</b>	<b>Surrogate Recoveries</b>	<b>Run# 1</b>	<b>Run# 2</b>	<b>Limits</b>
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460-00-4	4-Bromofluorobenzene	113%		46-127%
98-08-8	aaa-Trifluorotoluene	106%		44-120%

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**

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**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1**Matrix:** SO - Soil**Method:** SW846 8015 M SW846 3550B**Project:** H27NW-CUTTINGS-012110**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3

	<b>File ID</b>	<b>DF</b>	<b>Analyzed</b>	<b>By</b>	<b>Prep Date</b>	<b>Prep Batch</b>	<b>Analytical Batch</b>
Run #1	CC217498.D	1	01/28/10	FO	01/26/10	OP13926	GCC1042
Run #2							

	<b>Initial Weight</b>	<b>Final Volume</b>
Run #1	30.4 g	1.0 ml
Run #2		

<b>CAS No.</b>	<b>Compound</b>	<b>Result</b>	<b>RL</b>	<b>MDL</b>	<b>Units</b>	<b>Q</b>
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TPH (C10-C28)	178	14	4.6	mg/kg	
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<b>CAS No.</b>	<b>Surrogate Recoveries</b>	<b>Run# 1</b>	<b>Run# 2</b>	<b>Limits</b>
----------------	-----------------------------	---------------	---------------	---------------

84-15-1	o-Terphenyl	69%		33-115%
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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**

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**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1**Matrix:** SO - Soil**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110**Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	4.6	0.93	0.19	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Barium	1470	19	0.056	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Cadmium	0.093 U	0.46	0.093	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Chromium	11.5	0.93	0.065	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Copper	9.1	2.3	0.12	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Lead	11.1	0.93	0.37	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Mercury	0.024 B	0.027	0.0011	mg/kg	1	01/27/10	01/27/10	TW	SW846 7471A <sup>1</sup>
Nickel	11.1	3.7	0.12	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Selenium	0.76 B	0.93	0.22	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Silver	0.17 B	0.93	0.074	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>
Zinc	53.2	1.9	0.37	mg/kg	1	02/02/10	02/03/10	NS	SW846 6010B <sup>2</sup>

(1) Instrument QC Batch: MA4509

(2) Instrument QC Batch: MA4519

(3) Prep QC Batch: MP11036

(4) Prep QC Batch: MP11060

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 B = Indicates a result > = MDL but < RL

**Report of Analysis**

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3.1

3

**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1**Matrix:** SO - Soil**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chromium, Hexavalent	1.9 B	2.0	mg/kg	1	02/04/10 12:00	KD	SW846 3060/7196A
Chromium, Trivalent <sup>a</sup>	9.6	2.9	mg/kg	1	02/04/10 12:00	KD	SW846 6010/7196A M
Ignitability (Flashpoint)	> 210		Deg. F	1	02/06/10 09:00	MC	SW846 1010
Solids, Percent	58.3		%	1	01/22/10	AA	SM 2540 G
Specific Conductivity	1340	1.0	umhos/cm	1	01/29/10 12:00	KD	EPA 120.1
pH	9.74		su	1	01/23/10 11:45	EV	SW846 9045C

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

**Report of Analysis**

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3**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1A**Matrix:** SO - Soil**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110**Hot Water Soluble Boron Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method	
Boron	1.90	0.19	0.0041	mg/l	1	02/01/10	02/03/10	NS	SW846 6010B <sup>1</sup>	LADNR 29B <sup>2</sup>

(1) Instrument QC Batch: MA4523

(2) Prep QC Batch: MP11052

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 B = Indicates a result > = MDL but < RL

**Report of Analysis**

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**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1B**Matrix:** SO - Soil**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110**Total True Barium Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method	
Barium	4090	81	0.24	mg/kg	5	02/01/10	02/04/10	NS	SW846 6010B <sup>1</sup>	LADNR 29B <sup>2</sup>

(1) Instrument QC Batch: MA4524

(2) Prep QC Batch: MP11051

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 B = Indicates a result > = MDL but < RL

**Report of Analysis**

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3**Client Sample ID:** H27NW-CUTTINGS-012110**Lab Sample ID:** T46172-1C**Matrix:** SO - Soil**Date Sampled:** 01/21/10**Date Received:** 01/22/10**Percent Solids:** 58.3**Project:** H27NW-CUTTINGS-012110**SAR Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Calcium	374	25	0.18	mg/l	5	02/03/10	02/03/10 NS	SW846 6010B <sup>1</sup>	LADNR 29B <sup>3</sup>
Magnesium	11.2 B	25	0.039	mg/l	5	02/03/10	02/03/10 NS	SW846 6010B <sup>1</sup>	LADNR 29B <sup>3</sup>
Sodium	2260	130	3.4	mg/l	25	02/03/10	02/04/10 NS	SW846 6010B <sup>2</sup>	LADNR 29B <sup>3</sup>

(1) Instrument QC Batch: MA4523

(2) Instrument QC Batch: MA4524

(3) Prep QC Batch: MP11062

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 B = Indicates a result > = MDL but < RL

**Report of Analysis**

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3

<b>Client Sample ID:</b>	H27NW-CUTTINGS-012110	<b>Date Sampled:</b>	01/21/10
<b>Lab Sample ID:</b>	T46172-1C	<b>Date Received:</b>	01/22/10
<b>Matrix:</b>	SO - Soil	<b>Percent Solids:</b>	58.3
<b>Project:</b>	H27NW-CUTTINGS-012110		

**General Chemistry**

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio <sup>a</sup>	31.4		ratio	1	02/04/10 14:28	NS	LADNR29B

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

---

RL = Reporting Limit



## Misc. Forms

### Custody Documents and Other Forms

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Includes the following where applicable:

- Chain of Custody



## **CHAIN OF CUSTODY**

PAGE / OF /

10165 Harwin Dr, Ste 150 Houston, TX 77036  
TEL. 713-271-4700 FAX: 713-271-4770  
[www.accutest.com](http://www.accutest.com)

## T46172: Chain of Custody

## **SAMPLE INSPECTION FORM**

Accutest Job Number: T46172 Client: ENCLANA Date/Time Received: 1/22/10 09:15

# of Coolers Received: \_\_\_\_\_ | Thermometer #: \_\_\_\_\_ 12-1 Temperature Adjustment Factor: \_\_\_\_\_ +0.4

Cooler Temps: #1: 3.0 #2: \_\_\_\_\_ #3: \_\_\_\_\_ #4: \_\_\_\_\_ #5: \_\_\_\_\_ #6: \_\_\_\_\_ #7: \_\_\_\_\_ #8: \_\_\_\_\_

**Method of Delivery:**  FedEx  UPS  Accutest Courier  Greyhound  Delivery  Other

Airbill Numbers: \_\_\_\_\_

### COOLER INFORMATION

- Custody seal missing or not intact  
 Temperature criteria not met  
 Wet ice received in cooler

CHAIN OF CUSTODY

- Chain of Custody not received
  - Sample D/T unclear or missing
  - Analyses unclear or missing
  - COC not properly executed

#### **Summary of Discrepancies:**

**SAMPLE INFORMATION**

- Sample containers received broken
  - VOC vials have headspace
  - Sample labels missing or illegible
  - ID on COC does not match label(s)
  - D/T on COC does not match label(s)
  - Sample/Bottles rcvd but no analysis on COC
  - Sample listed on COC, but not received
  - Bottles missing for requested analysis
  - Insufficient volume for analysis
  - Sample received improperly preserved

**TRIP BLANK INFORMATION**

- Trip Blank on COC but not received
  - Trip Blank received but not on COC
  - Trip Blank not intact
  - Received Water Trip Blank
  - Received Soil TB

Number of Encores? \_\_\_\_\_  
Number of 5035 kits? \_\_\_\_\_  
Number of lab-filtered metals?

TECHNICIAN SIGNATURE / DATE

## CORRECTIVE ACTIONS

**Client Representative Notified:** \_\_\_\_\_ **Date:** \_\_\_\_\_

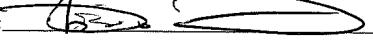
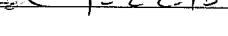
**By Accutest Representative:** \_\_\_\_\_ **Via:** \_\_\_\_\_ **Phone:** \_\_\_\_\_ **Email:** \_\_\_\_\_

**Client Instructions:**

**Date:**

Via: Phone Email

151182

Accutest Job Number:	T46172	Client:	EnCana	Date/Time Received:	1/22/10 0915			
# of Coolers Received:	1	Thermometer #:	12-1	Temperature Adjustment Factor:	+0.4			
Cooler Temps:	#1: 3.0	#2:	#3:	#4:	#5:	#6:	#7:	#8:
Method of Delivery:	<input checked="" type="checkbox"/> FEDEX	UPS	Accutest Courier	Greyhound	Delivery	Other		
Airbill Numbers:								
<b><u>COOLER INFORMATION</u></b>			<b><u>SAMPLE INFORMATION</u></b>			<b><u>TRIP BLANK INFORMATION</u></b>		
<input type="checkbox"/>	Custody seal missing or not intact		<input type="checkbox"/>	Sample containers received broken		<input type="checkbox"/>	Trip Blank on COC but not received	
<input type="checkbox"/>	Temperature criteria not met		<input type="checkbox"/>	VOC vials have headspace		<input type="checkbox"/>	Trip Blank received but not on COC	
<input type="checkbox"/>	Wet ice received in cooler		<input type="checkbox"/>	Sample labels missing or illegible		<input type="checkbox"/>	Trip Blank not intact	
<b><u>CHAIN OF CUSTODY</u></b>			<input type="checkbox"/>	ID on COC does not match label(s)		<input type="checkbox"/>	Received Water Trip Blank	
<input type="checkbox"/>	Chain of Custody not received		<input type="checkbox"/>	D/T on COC does not match label(s)		<input type="checkbox"/>	Received Soil TB	
<input type="checkbox"/>	Sample D/T unclear or missing		<input type="checkbox"/>	Sample/Bottles revd but no analysis on COC		Number of Encores? _____		
<input type="checkbox"/>	Analyses unclear or missing		<input type="checkbox"/>	Sample listed on COC, but not received		Number of 5035 kits? _____		
<input type="checkbox"/>	COC not properly executed		<input type="checkbox"/>	Bottles missing for requested analysis		Number of lab-filtered metals? _____		
<input type="checkbox"/>			<input type="checkbox"/>	Insufficient volume for analysis				
<input type="checkbox"/>			<input type="checkbox"/>	Sample received improperly preserved				
Summary of Discrepancies:								
TECHNICIAN SIGNATURE/DATE:  1/22/10								
INFORMATION AND SAMPLE LABELING VERIFIED BY:  1/22/10								
<b><u>CORRECTIVE ACTIONS</u></b>								
Client Representative Notified:					Date:			
By Accutest Representative:					Via:	Phone	Email	
Client Instructions:								

## T46172: Chain of Custody

Page 2 of 3

## SAMPLE RECEIPT LOG

JOB #: T46172 DATE/TIME RECEIVED: 1/22/10 2915

CLIENT: EnCana INITIALS: PF

PRESERVATIVES: 1: None 2: HCl 3: HNO<sub>3</sub> 4: H<sub>2</sub>SO<sub>4</sub> 5: NaOH 6: DI 7: MeOH 8: Other

**LOCATION:** 1: Walk-In #1 (Waters) 2: Walk-In #2 (Soils) VR: Volatile Fridge M: Metals SU: Subcontract EE: Enviro Experts

Rev 8/13/01 ewp

## T46172: Chain of Custody

Page 3 of 3



## GC/MS Volatiles

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### QC Data Summaries

Includes the following where applicable:

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

## Method Blank Summary

Page 1 of 1

Job Number: T46172  
Account: ENCACOP ENCANA  
Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM955-MB	M0023677.D 1		02/01/10	JL	n/a	n/a	VM955

The QC reported here applies to the following samples:

Method: SW846 8260B

T46172-1

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	5.0	0.70	ug/kg	
100-41-4	Ethylbenzene	ND	5.0	0.90	ug/kg	
108-88-3	Toluene	ND	5.0	0.95	ug/kg	
1330-20-7	Xylene (total)	ND	15	2.1	ug/kg	

CAS No.	Surrogate Recoveries	Limits
1868-53-7	Dibromofluoromethane	92%
2037-26-5	Toluene-D8	104%
460-00-4	4-Bromofluorobenzene	117%
17060-07-0	1,2-Dichloroethane-D4	79%

## Blank Spike Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM955-BS	M0023675.D 1		02/01/10	JL	n/a	n/a	VM955

The QC reported here applies to the following samples:

Method: SW846 8260B

T46172-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	50	43.6	87	70-114
100-41-4	Ethylbenzene	50	45.1	90	60-119
108-88-3	Toluene	50	47.4	95	68-115
1330-20-7	Xylene (total)	150	134	89	61-115

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	92%	70-121%
2037-26-5	Toluene-D8	106%	76-132%
460-00-4	4-Bromofluorobenzene	124%	73-165%
17060-07-0	1,2-Dichloroethane-D4	77%	57-122%

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
T46540-4MS	M0023683.D 1		02/01/10	JL	n/a	n/a	VM955
T46540-4MSD	M0023684.D 1		02/01/10	JL	n/a	n/a	VM955
T46540-4	M0023682.D 1		02/01/10	JL	n/a	n/a	VM955

The QC reported here applies to the following samples:

Method: SW846 8260B

T46172-1

CAS No.	Compound	T46540-4		Spike	MS	MS	MSD	MSD	Limits	
		ug/kg	Q	ug/kg	ug/kg	%	ug/kg	%	RPD	Rec/RPD
71-43-2	Benzene	ND		3140	2470	79	2490	79	1	70-114/38
100-41-4	Ethylbenzene	2880		3140	5450	82	5470	82	0	60-119/40
108-88-3	Toluene	ND		3140	2930	93	3010	96	3	68-115/38
1330-20-7	Xylene (total)	3150		9420	10800	81	10900	82	1	61-115/39

CAS No.	Surrogate Recoveries	MS	MSD	T46540-4	Limits
1868-53-7	Dibromofluoromethane	81%	79%	79%	70-121%
2037-26-5	Toluene-D8	117%	118%	118%	76-132%
460-00-4	4-Bromofluorobenzene	134%	132%	138%	73-165%
17060-07-0	1,2-Dichloroethane-D4	71%	69%	69%	57-122%



## GC/MS Semi-volatiles

### QC Data Summaries

Includes the following where applicable:

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



## Method Blank Summary

Page 1 of 1

Job Number: T46172  
Account: ENCACOP ENCANA  
Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13925-MB	P08332.D	1	01/27/10	GJ	01/26/10	OP13925	EP397

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

T46172-1

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	6.7	1.1	ug/kg	
208-96-8	Acenaphthylene	ND	6.7	2.3	ug/kg	
120-12-7	Anthracene	ND	6.7	1.3	ug/kg	
56-55-3	Benzo(a)anthracene	ND	6.7	1.1	ug/kg	
50-32-8	Benzo(a)pyrene	ND	6.7	3.6	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	6.7	3.5	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	6.7	6.7	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	6.7	4.3	ug/kg	
218-01-9	Chrysene	ND	6.7	1.6	ug/kg	
53-70-3	Dibenz(a,h)anthracene	ND	6.7	6.4	ug/kg	
206-44-0	Fluoranthene	ND	6.7	1.5	ug/kg	
86-73-7	Fluorene	ND	6.7	2.4	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	6.7	5.0	ug/kg	
91-57-6	2-Methylnaphthalene	ND	6.7	1.2	ug/kg	
91-20-3	Naphthalene	ND	6.7	1.0	ug/kg	
85-01-8	Phenanthrene	ND	6.7	0.93	ug/kg	
129-00-0	Pyrene	ND	6.7	2.3	ug/kg	

CAS No.	Surrogate Recoveries	Limits
4165-60-0	Nitrobenzene-d5	56% 10-127%
321-60-8	2-Fluorobiphenyl	62% 11-133%
1718-51-0	Terphenyl-d14	52% 15-187%

## Blank Spike Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13925-BS	P08334.D	1	01/27/10	GJ	01/26/10	OP13925	EP397

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

T46172-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	167	122	73	18-118
208-96-8	Acenaphthylene	167	120	72	35-125
120-12-7	Anthracene	167	115	69	24-116
56-55-3	Benzo(a)anthracene	167	108	65	32-132
50-32-8	Benzo(a)pyrene	167	105	63	36-130
205-99-2	Benzo(b)fluoranthene	167	111	67	35-134
191-24-2	Benzo(g,h,i)perylene	167	113	68	18-149
207-08-9	Benzo(k)fluoranthene	167	129	77	30-131
218-01-9	Chrysene	167	104	62	37-124
53-70-3	Dibenz(a,h)anthracene	167	119	71	23-150
206-44-0	Fluoranthene	167	118	71	28-118
86-73-7	Fluorene	167	116	70	32-106
193-39-5	Indeno(1,2,3-cd)pyrene	167	118	71	18-150
91-57-6	2-Methylnaphthalene	167	124	74	28-113
91-20-3	Naphthalene	167	101	61	31-106
85-01-8	Phenanthrene	167	103	62	37-112
129-00-0	Pyrene	167	106	64	24-132

CAS No.	Surrogate Recoveries	BSP	Limits
4165-60-0	Nitrobenzene-d5	68%	10-127%
321-60-8	2-Fluorobiphenyl	77%	11-133%
1718-51-0	Terphenyl-d14	50%	15-187%

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13925-MS	P08340.D	1	01/27/10	GJ	01/26/10	OP13925	EP397
OP13925-MSD	P08341.D	1	01/27/10	GJ	01/26/10	OP13925	EP397
T46169-3	P08339.D	1	01/27/10	GJ	01/26/10	OP13925	EP397
T46169-3	P08342.D	20	01/27/10	GJ	01/26/10	OP13925	EP397

The QC reported here applies to the following samples:

Method: SW846 8270C BY SIM

T46172-1

CAS No.	Compound	T46169-3		Spike	MS	MS	MSD	MSD	Limits	
		ug/kg	Q	ug/kg	ug/kg	%	ug/kg	%	RPD	Rec/RPD
83-32-9	Acenaphthene	ND		214	176	82	113	53	44	10-153/80
208-96-8	Acenaphthylene	ND		214	232	108	221	104	5	10-144/71
120-12-7	Anthracene	19.0		214	162	67	136	55	17	10-176/57
56-55-3	Benzo(a)anthracene	ND		214	140	65	131	62	7	10-174/73
50-32-8	Benzo(a)pyrene	ND		214	130	61	121	57	7	10-182/74
205-99-2	Benzo(b)fluoranthene	ND		214	143	67	132	62	8	10-188/86
191-24-2	Benzo(g,h,i)perylene	ND		214	123	57	122	58	1	10-150/62
207-08-9	Benzo(k)fluoranthene	ND		214	125	58	113	53	10	10-170/94
218-01-9	Chrysene	11.5		214	127	54	116	49	9	10-165/73
53-70-3	Dibenz(a,h)anthracene	ND		214	137	64	136	64	1	10-192/74
206-44-0	Fluoranthene	ND		214	193	90	177	83	9	10-141/73
86-73-7	Fluorene	48.7		214	254	96	318	127	22	10-164/72
193-39-5	Indeno(1,2,3-cd)pyrene	ND		214	135	63	135	64	0	10-150/73
91-57-6	2-Methylnaphthalene	1500 <sup>b</sup>		214	1990	187* <sup>a</sup>	1740	71	13	10-171/75
91-20-3	Naphthalene	701 <sup>b</sup>		214	874	81	563	-65* <sup>a</sup>	43	10-138/82
85-01-8	Phenanthrene	239		214	426	87	281	20	41	10-191/77
129-00-0	Pyrene	73.5		214	222	69	175	48	24	10-150/66

CAS No.	Surrogate Recoveries	MS	MSD	T46169-3	T46169-3	Limits
4165-60-0	Nitrobenzene-d5	91%	75%	77%	33%	10-127%
321-60-8	2-Fluorobiphenyl	94%	106%	73%	70%	11-133%
1718-51-0	Terphenyl-d14	54%	47%	46%	46%	15-187%

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

(b) Result is from Run #2.



## GC Volatiles

### QC Data Summaries

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Includes the following where applicable:

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

## Method Blank Summary

Page 1 of 1

Job Number: T46172  
Account: ENCACOP ENCANA  
Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GEE2600-MB	EE051361.D	1	01/26/10	FI	n/a	n/a	GEE2600

The QC reported here applies to the following samples:

Method: SW846 8015

T46172-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	5.0	0.30	mg/kg	

CAS No.	Surrogate Recoveries	Limits
460-00-4	4-Bromofluorobenzene	98%
98-08-8	aaa-Trifluorotoluene	104% 46-127% 44-120%

## Blank Spike/Blank Spike Duplicate Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GEE2600-BS	EE051357.D	1	01/26/10	FI	n/a	n/a	GEE2600
GEE2600-BSD	EE051358.D	1	01/26/10	FI	n/a	n/a	GEE2600

The QC reported here applies to the following samples:

Method: SW846 8015

T46172-1

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	0.4	0.373	93	0.352	88	6	78-115/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
460-00-4	4-Bromofluorobenzene	99%	98%	46-127%
98-08-8	aaa-Trifluorotoluene	108%	106%	44-120%

7.2.1

7



## 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

Page 1 of 1

Job Number: T46172  
Account: ENCACOP ENCANA  
Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13926-MB	CC217471.D 1		01/27/10	EM	01/26/10	OP13926	GCC1041

The QC reported here applies to the following samples:

Method: SW846 8015 M

T46172-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C10-C28)	ND	8.3	2.7	mg/kg	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	72% 33-115%

8.1.1

8

## Blank Spike Summary

Page 1 of 1

Job Number: T46172  
Account: ENCACOP ENCANA  
Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13926-BS	CC217472.D 1		01/27/10	EM	01/26/10	OP13926	GCC1041

The QC reported here applies to the following samples:

Method: SW846 8015 M

T46172-1

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH (C10-C28)	33.3	22.8	68	45-107

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	61%	33-115%

8.2.1

8

# Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: T46172

Account: ENCACOP ENCANA

Project: H27NW-CUTTINGS-012110

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13926-MS	CC217473.D 1		01/27/10	EM	01/26/10	OP13926	GCC1041
OP13926-MSD	CC217474.D 1		01/27/10	EM	01/26/10	OP13926	GCC1041
T46007-1	CC217476.D 100		01/27/10	EM	01/26/10	OP13926	GCC1041

The QC reported here applies to the following samples:

Method: SW846 8015 M

T46172-1

CAS No.	Compound	T46007-1		Spike	MS	MS	MSD	MSD	RPD	Limits Rec/RPD
		mg/kg	Q	mg/kg	mg/kg	%	mg/kg	%		
	TPH (C10-C28)	2540		35.1	4770	6361* <sup>a</sup>	3850	3776* <sup>a</sup> 21		45-107/34

CAS No.	Surrogate Recoveries	MS	MSD	T46007-1	Limits
84-15-1	o-Terphenyl	6638% *	5849% *	0% * <sup>b</sup>	33-115%

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

(b) Outside control limits due to dilution.



## Metals Analysis

### QC Data Summaries

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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: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11036  
Matrix Type: SOLID

Methods: SW846 7471A  
Units: mg/kg

Prep Date:

01/27/10

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.017	.0041	.00066	-0.0035	<0.017

Associated samples MP11036: T46172-1

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

9.1.1  
9

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11036  
Matrix Type: SOLID

Methods: SW846 7471A  
Units: mg/kg

Prep Date:

01/27/10

01/27/10

Metal	T46199-2 Original	DUP	RPD	QC Limits	T46199-2 Original	MS	Spikelot HGTXWS1	% Rec	QC Limits
Mercury	0.0	0.0	NC	0-20	0.0	0.38	0.301	126.5N	75-125

Associated samples MP11036: T46172-1

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11036  
Matrix Type: SOLID

Methods: SW846 7471A  
Units: mg/kg

Prep Date:

01/27/10

Metal	T46199-2 Original	Spikelot HGTXWS1	MSD % Rec	QC RPD	QC Limit
Mercury	0.0	0.37	0.282	131.2N	2.7

Associated samples MP11036: T46172-1

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

9.1.2  
9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11036  
Matrix Type: SOLID

Methods: SW846 7471A  
Units: mg/kg

Prep Date: 01/27/10

Metal	LCS Result	Spikelot HGLCD054	QC % Rec	QC Limits
Mercury	8.7	7.34	118.5	72-128

Associated samples MP11036: T46172-1

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

9.1.3  
9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11051  
Matrix Type: SOLID

Methods: SW846 6010B  
Units: mg/kg

Prep Date:

02/01/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	.82	2.2		
Antimony	0.50	.11	.14		
Arsenic	0.50	.089	.1		
Barium	10	.007	.03	0.22	<10
Beryllium	0.25	.0055	.01		
Boron	5.0	.054	.11		
Cadmium	0.25	.013	.05		
Calcium	250	.27	.86		
Chromium	0.50	.055	.035		
Cobalt	2.5	.025	.09		
Copper	1.3	.029	.065		
Iron	5.0	.65	1.1		
Lead	0.50	.079	.2		
Magnesium	250	.34	.58		
Manganese	0.75	.01	.035		
Molybdenum	0.50	.048	.075		
Nickel	2.0	.048	.065		
Potassium	250	2.7	16		
Selenium	0.50	.16	.12		
Silver	0.50	.043	.04		
Sodium	250	6.5	13		
Strontium	1.0	.0085	.025		
Thallium	0.50	.16	.25		
Tin	1.0	.09	.12		
Titanium	1.0	.015	.045		
Vanadium	2.5	.03	.06		
Zinc	1.0	.025	.2		

Associated samples MP11051: T46172-1B

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

9.2.1  
9

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11051  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date:

02/01/10

02/01/10

Metal	T46169-4B Original DUP	RPD	QC Limits	T46169-4B Original MS	Spikelot MPTW4	% Rec	QC Limits
Aluminum							
Antimony							
Arsenic							
Barium	7710	8100	4.9	0-20	7710	6960	19.6
Beryllium							
Boron							
Cadmium							
Calcium							
Chromium							
Cobalt							
Copper							
Iron							
Lead							
Magnesium							
Manganese							
Molybdenum							
Nickel							
Potassium							
Selenium							
Silver							
Sodium							
Strontium							
Thallium							
Tin							
Titanium							
Vanadium							
Zinc							

Associated samples MP11051: T46172-1B

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

(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.

9.2.2  
9

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11051  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date:

02/01/10

Metal	T46169-4B Original MSD	Spikelot MPTW4	MSD % Rec	RPD	QC Limit
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Aluminum

Antimony

Arsenic

Barium	7710	7990	20.5	1366.4(a)	13.8	20
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Beryllium

Boron

Cadmium

Calcium

Chromium

Cobalt

Copper

Iron

Lead

Magnesium

Manganese

Molybdenum

Nickel

Potassium

Selenium

Silver

Sodium

Strontium

Thallium

Tin

Titanium

Vanadium

Zinc

Associated samples MP11051: T46172-1B

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

(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.

9.2.2  
9

## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11051  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date: 02/01/10

Metal	BSP Result	Spikelot MPTW4	% Rec	QC Limits
-------	------------	----------------	-------	-----------

Aluminum  
 Antimony  
 Arsenic  
 Barium 20.2 20 101.0 80-120  
 Beryllium  
 Boron  
 Cadmium  
 Calcium  
 Chromium  
 Cobalt  
 Copper  
 Iron  
 Lead  
 Magnesium  
 Manganese  
 Molybdenum  
 Nickel  
 Potassium  
 Selenium  
 Silver  
 Sodium  
 Strontium  
 Thallium  
 Tin  
 Titanium  
 Vanadium  
 Zinc

Associated samples MP11051: T46172-1B

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

9.2.3  
 9

## SERIAL DILUTION RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11051  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: ug/l

Prep Date: 02/01/10

Metal	T46169-4B Original SDL 10:50%DIF	QC Limits
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Aluminum  
 Antimony  
 Arsenic  
 Barium 151000 165000 9.3 0-10  
 Beryllium  
 Boron  
 Cadmium  
 Calcium  
 Chromium  
 Cobalt  
 Copper  
 Iron  
 Lead  
 Magnesium  
 Manganese  
 Molybdenum  
 Nickel  
 Potassium  
 Selenium  
 Silver  
 Sodium  
 Strontium  
 Thallium  
 Tin  
 Titanium  
 Vanadium  
 Zinc

Associated samples MP11051: T46172-1B

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

9.2.4  
 9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11052  
Matrix Type: AQUEOUS

Methods: SW846 6010B  
Units: ug/l

Prep Date:

02/01/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	400	33	34		
Antimony	10	4.5	6		
Arsenic	10	3.5	4		
Barium	400	.28	5.4		
Beryllium	10	.22	.4		
Boron	200	2.2	4.2	-19	<200
Cadmium	8.0	.5	.6		
Calcium	10000	11	70		
Chromium	20	2.2	3.8		
Cobalt	100	1	1.6		
Copper	50	1.2	12		
Iron	200	26	26		
Lead	6.0	3.2	3.4		
Magnesium	10000	13	16		
Manganese	30	.4	15		
Molybdenum	20	1.9	2.6		
Nickel	80	1.9	6.4		
Potassium	10000	110	110		
Selenium	10	6.5	6.4		
Silver	20	1.7	1.6		
Sodium	10000	260	270		
Strontium	40	.34	.8		
Thallium	20	6.5	5.2		
Tin	40	3.6	5.8		
Titanium	40	.6	.6		
Vanadium	100	1.2	1.2		
Zinc	40	.98	8.2		

Associated samples MP11052: T46172-1A

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

9.3.1  
9

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11052  
 Matrix Type: AQUEOUS

Methods: SW846 6010B  
 Units: ug/l

Prep Date: 02/01/10

Metal	T46169-3A Original DUP	RPD	QC Limits
Aluminum			
Antimony			
Arsenic			
Barium			
Beryllium			
Boron	1570	1620	3.1      0-20
Cadmium			
Calcium			
Chromium			
Cobalt			
Copper			
Iron			
Lead			
Magnesium			
Manganese			
Molybdenum			
Nickel			
Potassium			
Selenium			
Silver			
Sodium			
Strontium			
Thallium			
Tin			
Titanium			
Vanadium			
Zinc			

Associated samples MP11052: T46172-1A

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

9.3.2  
9

## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11052  
 Matrix Type: AQUEOUS

Methods: SW846 6010B  
 Units: ug/l

Prep Date:

02/01/10

02/01/10

Metal	BSP Result	Spikelot MPTW4	QC % Rec	BSD Limits	BSD Result	Spikelot MPTW4	BSD % Rec	QC RPD	QC Limit
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Boron	2220	1000	111.2	80-120	2240	1000	112.1	0.9	
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Molybdenum									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Strontium									
Thallium									
Tin									
Titanium									
Vanadium									
Zinc									

Associated samples MP11052: T46172-1A

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

9.3.3

9

## SERIAL DILUTION RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11052  
 Matrix Type: AQUEOUS

Methods: SW846 6010B  
 Units: ug/l

Prep Date: 02/01/10

Metal	T46169-3A	Original	SDL 1:5	%DIF	QC Limits
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Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron	792	766	3.3	0-10	
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP11052: T46172-1A

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

9.3.4  
9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11060  
Matrix Type: SOLID

Methods: SW846 6010B  
Units: mg/kg

Prep Date:

02/02/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	.82	2.2		
Antimony	0.50	.11	.14		
Arsenic	0.50	.089	.1	-0.052	<0.50
Barium	10	.007	.03	0.0010	<10
Beryllium	0.25	.0055	.01		
Boron	5.0	.054	.11		
Cadmium	0.25	.013	.05	-0.0010	<0.25
Calcium	250	.27	.86		
Chromium	0.50	.055	.035	-0.0015	<0.50
Cobalt	2.5	.025	.09		
Copper	1.3	.029	.065	-0.052	<1.3
Iron	5.0	.65	1.1		
Lead	0.50	.079	.2	0.017	<0.50
Magnesium	250	.34	.58		
Manganese	0.75	.01	.035		
Molybdenum	0.50	.048	.075		
Nickel	2.0	.048	.065	-0.080	<2.0
Potassium	250	2.7	16		
Selenium	0.50	.16	.12	-0.0090	<0.50
Silver	0.50	.043	.04	0.011	<0.50
Sodium	250	6.5	13		
Strontium	1.0	.0085	.025		
Thallium	0.50	.16	.25		
Tin	1.0	.09	.12		
Titanium	1.0	.015	.045		
Vanadium	2.5	.03	.06		
Zinc	1.0	.025	.2	0.0010	<1.0

Associated samples MP11060: T46172-1

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

9.4.1  
6

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11060  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date: 02/02/10      Analyzed Date: 02/02/10

Metal	T46077-1 Original	DUP	RPD	QC Limits	T46077-1 Original	MS	Spikelot MPTW4	% Rec	QC Limits
Aluminum									
Antimony									
Arsenic	1.6	2.1	27.0 (a)	0-20	1.6	24.9	25.8	90.4	80-120
Barium	394	266	38.8*(b)	0-20	394	240	25.8	-597.6(c)	80-120
Beryllium									
Boron									
Cadmium	0.079	0.085	7.3	0-20	0.079	22.1	25.8	85.4	80-120
Calcium									
Chromium	14.5	16.4	12.3	0-20	14.5	39.1	25.8	95.5	80-120
Cobalt									
Copper	10.4	12.0	14.3	0-20	10.4	38.7	25.8	109.8	80-120
Iron									
Lead	3.8	4.8	23.3*(b)	0-20	3.8	27.8	25.8	93.1	80-120
Magnesium									
Manganese									
Molybdenum									
Nickel	6.6	7.6	14.1	0-20	6.6	28.2	25.8	83.8	80-120
Potassium									
Selenium	0.79	0.86	8.5	0-20	0.79	22.0	25.8	82.3	80-120
Silver	0.13	0.12	8.0	0-20	0.13	26.3	25.8	101.5	80-120
Sodium									
Strontium									
Thallium									
Tin									
Titanium									
Vanadium									
Zinc	18.7	21.4	13.5	0-20	18.7	48.2	25.8	114.5	80-120

Associated samples MP11060: T46172-1

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

(a) RPD acceptable due to low duplicate and sample concentrations.

(b) High RPD due to possible sample nonhomogeneity.

(c) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11060  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date:

02/02/10

Metal	T46077-1 Original	MSD	Spikelot MPTW4	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	1.6	25.6	27	88.8	2.8	20
Barium	394	304	27	-333.0(a)	23.5 (b)	20
Beryllium						
Boron						
Cadmium	0.079	22.5	27	83.0	1.8	20
Calcium						
Chromium	14.5	37.7	27	85.8	3.6	20
Cobalt						
Copper	10.4	38.7	27	104.7	0.0	20
Iron						
Lead	3.8	26.6	27	84.4	4.4	20
Magnesium						
Manganese						
Molybdenum						
Nickel	6.6	29.0	27	82.9	2.8	20
Potassium						
Selenium	0.79	22.8	27	81.4	3.6	20
Silver	0.13	26.6	27	97.9	1.1	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc	18.7	48.6	27	110.6	0.8	20

Associated samples MP11060: T46172-1

Results &lt; IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

(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.

(b) High RPD due to possible matrix interference.

9.4.2  
9

## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11060  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: mg/kg

Prep Date: 02/02/10

Metal	LCS Result	Spikelot MPLCD054	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	143	158	90.5	82-118
Barium	339	348	97.4	81-119
Beryllium				
Boron				
Cadmium	176	187	94.1	82-118
Calcium				
Chromium	93.7	89.5	104.7	79-121
Cobalt				
Copper	132	129	102.3	84-117
Iron				
Lead	152	172	88.4	79-120
Magnesium				
Manganese				
Molybdenum				
Nickel	94.7	99	95.7	81-119
Potassium				
Selenium	135	148	91.2	78-121
Silver	59.4	66	90.0	66-134
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc	370	394	93.9	80-119

Associated samples MP11060: T46172-1

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

9.4.3  
9

## SERIAL DILUTION RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11060  
 Matrix Type: SOLID

Methods: SW846 6010B  
 Units: ug/l

Prep Date: 02/02/10

Metal	T46077-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	22.4	21.6	3.8	0-10
Barium	5430	5770	6.2	0-10
Beryllium				
Boron				
Cadmium	1.09	0.00	100.0(a)	0-10
Calcium				
Chromium	200	215	7.6	0-10
Cobalt				
Copper	143	134	6.0	0-10
Iron				
Lead	53.1	60.0	13.2 (a)	0-10
Magnesium				
Manganese				
Molybdenum				
Nickel	91.4	94.4	3.3	0-10
Potassium				
Selenium	10.9	0.00	100.0(a)	0-10
Silver	1.74	0.00	100.0(a)	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc	258	285	10.4*(b)	0-10

Associated samples MP11060: T46172-1

Results < IDL are shown as zero for calculation purposes

(\*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

(b) Serial dilution indicates possible matrix interference.

9.4.4  
9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11062  
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B  
Units: ug/l

Prep Date:

02/03/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	200	16	17		
Antimony	5.0	2.3	3		
Arsenic	5.0	1.8	2		
Barium	200	.14	2.7		
Beryllium	5.0	.11	.2		
Boron	100	1.1	2.1		
Cadmium	4.0	.25	.3		
Calcium	5000	5.4	35	97.6	<5000
Chromium	10	1.1	1.9		
Cobalt	50	.5	.8		
Copper	25	.58	5.9		
Iron	100	13	13		
Lead	3.0	1.6	1.7		
Magnesium	5000	6.7	7.8	18.5	<5000
Manganese	15	.2	7.6		
Molybdenum	10	.96	1.3		
Nickel	40	.95	3.2		
Potassium	5000	53	53		
Selenium	5.0	3.2	3.2		
Silver	10	.85	.8		
Sodium	5000	130	130	96.8	<5000
Strontium	20	.17	.4		
Thallium	10	3.2	2.6		
Tin	20	1.8	2.9		
Titanium	20	.3	.3		
Vanadium	50	.6	.6		
Zinc	20	.49	4.1		

Associated samples MP11062: T46172-1C

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

9.5.1

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## MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11062  
 Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B  
 Units: ug/l

Prep Date: 02/03/10

Metal	T46169-3C Original DUP	RPD	QC Limits
Aluminum			
Antimony			
Arsenic			
Barium			
Beryllium			
Boron			
Cadmium			
Calcium	200000	1020000	2.6
Chromium			
Cobalt			
Copper			
Iron			
Lead			
Magnesium	34000	189000	11.8
Manganese			
Molybdenum			
Nickel			
Potassium			
Selenium			
Silver			
Sodium	437000	2400000	8.2
Strontium			
Thallium			
Tin			
Titanium			
Vanadium			
Zinc			

Associated samples MP11062: T46172-1C

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

9.5.2  
9

## SERIAL DILUTION RESULTS SUMMARY

Login Number: T46172  
 Account: ENCACOP - ENCANA  
 Project: H27NW-CUTTINGS-012110

QC Batch ID: MP11062  
 Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B  
 Units: ug/l

Prep Date: 02/03/10

Metal	T46169-3C	Original	SDL 1:5	%DIF	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	200000	940000	5.5		0-10
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium	34000	167000	0.1		0-10
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver					
Sodium	437000	2070000	6.4		0-10
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP11062: T46172-1C

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



## 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: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GN20579	2.0	<2.0	mg/kg	40	39.9	99.7	80-120%
Specific Conductivity	GN20474	1.0	<1.0	umhos/cm				

Associated Samples:

Batch GN20474: T46172-1

Batch GN20579: T46172-1

(\*) Outside of QC limits

DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GN20579	T46169-3	mg/kg	1.3	<2.0	13.2	0-20%
Ignitability (Flashpoint)	GN20628	T46170-1	Deg. F	>210	>210	0.0	0-20%
Solids, Percent	GN20337	T46165-1	%	82.8	82.7	0.1	0-5%
Specific Conductivity	GN20474	T46322-1	umhos/cm	1090	1090	0.3	0-20%
pH	GN20353	T46172-1	su	9.74	9.74	0.0	0-20%

Associated Samples:

Batch GN20337: T46172-1

Batch GN20353: T46172-1

Batch GN20474: T46172-1

Batch GN20579: T46172-1

Batch GN20628: T46172-1

(\*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: T46172  
Account: ENCACOP - ENCANA  
Project: H27NW-CUTTINGS-012110

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GN20579	T46169-3	mg/kg	1.3	40	37.8	91.2	75-125%

Associated Samples:

Batch GN20579: T46172-1

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

10.3

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