



**Encana Oil & Gas (USA) Inc.**  
370 17<sup>th</sup> Street, Suite 1700  
Denver, CO 80202  
Phone: (303) 623-2300  
Fax: (303) 623-2400  
[www.encana.com](http://www.encana.com)

January 27, 2012

Mr. Bob Chesson  
Department of Natural Resources  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203-2136

RE: **Quarterly Groundwater Monitoring Report**  
**Ione #4 Tank Battery**  
**API 05-123-07455**  
**NENE 2-T2N-R66W 6PM**  
**40.171844, -104.738473**  
**Weld County, Colorado**

Dear Mr. Chesson:

Attached is the Quarterly Groundwater Monitoring Report for the Ione #4 Tank Battery. This report details the remediation activities conducted at the site. Please contact the Encana Oil & Gas Environmental Department at (303) 774-3962 if you have any questions or require additional information.

Sincerely,

Matthew Harrison  
Environmental Coordinator  
Encana Oil & Gas (USA) Inc.

Attachments:

Quarterly Groundwater Monitoring Report – Ione #4 Tank Battery



## GROUNDWATER MONITORING REPORT JANUARY 2012

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### IONE #4 TANK BATTERY

On January 6, 2012, LT Environmental, Inc. (LTE), under the direction of Encana Oil & Gas (USA) Inc. (Encana), conducted groundwater monitoring at the Ione #4 (API 05-123-07455) Tank Battery (Site). The Site is located at 40.171844, -104.738473, and the legal description of the Site is NENE 2-T2N-R66W 6PM. This constitutes the second groundwater monitoring event at the Site. Site history has been described in preceding reports.

Monitoring wells SB01 through SB03 were installed on September 29, 2011, using a direct-push rig operated by High Plains Drilling of Denver, Colorado. The Site Map is presented as Figure 1. Groundwater level measurements were collected from the monitoring wells and are summarized in Table 1.

Depth to groundwater, which ranged from 10.81 feet below top of casing (btoc) in SB02 to 13.01 feet btoc in SB01, was used to calculate well-specific purge volumes. Calculated depth to groundwater below ground surface (bgs) ranged from 9.99 feet bgs in SB01 to 11.41 feet bgs in SB03. Following purging, samples were collected and then submitted to Summit Scientific of Golden, Colorado, for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency Method 8260B.

Groundwater analytical results, summarized in Table 1, indicate BTEX concentrations in monitoring well SB01 are in compliance with the Colorado Department of Public Health and Environment-Water Quality Control Commission Regulation 41 (WQCC Reg 41). Monitoring wells SB02 and SB03 exhibit BTEX concentrations that exceed WQCC Reg 41. Monitoring well SB02 exhibits a benzene concentration of 790 micrograms per liter ( $\mu\text{g/L}$ ). Monitoring well SB03 exhibits an ethylbenzene concentration of 1,600  $\mu\text{g/L}$ . The laboratory analytical report is attached.

The January 2012 groundwater monitoring event constitutes the second quarterly monitoring event at the Site. LTE recommends continued quarterly groundwater monitoring and natural attenuation at this Site until four consecutive quarters of groundwater samples exhibit concentrations in compliance with the WQCC Reg 41. The next scheduled sampling event is April 2012.

**FIGURE**



IMAGE COURTESY OF GOOGLE EARTH, 05/04/2011

## LEGEND

- SOIL BORING
- ↑ ESTIMATED GROUNDWATER FLOW DIRECTION
- ABOVEGROUND STORAGE TANK (AST)
- PRODUCED WATER TANK
- SEPARATOR
- BERM

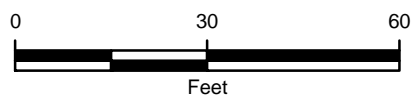


FIGURE 1  
GROUNDWATER ANALYTICAL MAP  
IONE #4 TANK BATTERY  
WELD COUNTY, COLORADO

ENCANA OIL & GAS (USA) INC.



## TABLE

TABLE 1

**GROUNDWATER ANALYTICAL RESULTS**  
**IONE #4 TANK BATTERY**  
**WELD COUNTY, COLORADO**  
**ENCANA OIL & GAS (USA) INC.**

Sample ID	Date	Depth to Water (feet btoc)	Well Stick-Up Height (feet)	Calculated Depth to Water	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
SB01	10/6/2011	12.60	NM	NM	<1.0	<1.0	<1.0	<1.0
	1/6/2012	13.01	3.02	9.99	<1.0	<1.0	<1.0	<1.0
SB02	10/6/2011	10.81	NM	NM	<b>980</b>	7.5	220	<b>16,000</b>
	1/6/2012	10.81	0.00	10.81	<b>790</b>	7.7	660	9,500
SB03	10/6/2011	11.69	NM	NM	<1.0	13	67	7,700
	1/6/2012	12.36	0.95	11.41	1.2	3.8	<b>1,600</b>	6,000
<b>CDPHE WQCC Reg 41</b>					<b>5</b>	<b>560</b>	<b>700</b>	<b>10,000</b>

**NOTES:**

btoc - below top of casing

bgs - below ground surface

µg/L - micrograms per liter

NM - not measured

&lt; - indicates result is less than stated laboratory reporting limit

**BOLD** - indicates result exceeds the applicable standard

Benzene, toluene, ethylbenzene, and total xylenes analyzed by EPA Method 8260B

CDPHE WQCC Reg 41 - Colorado Department of Public Health and Environment - Water Quality

Control Commission Regulation 41 covering Basic Standards for Ground Water

**ATTACHMENT**

**LABORATORY ANALYTICAL REPORT**

# Summit Scientific

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741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

January 10, 2012

Daniel Burns  
LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada, CO 80003  
RE: ENC - Ione #4

Enclosed are the results of analyses for samples received by Summit Scientific on 01/06/12 17:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

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

Paul Shrewsbury For Ben Shrewsbury  
President / Laboratory Director





LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4

Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
IONE 4 SB01	R201029-01	Water	01/06/12 13:15	01/06/12 17:00
IONE 4 SB02	R201029-02	Water	01/06/12 13:00	01/06/12 17:00
IONE 4 SB03	R201029-03	Water	01/06/12 13:25	01/06/12 17:00

Summit Scientific

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





LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

**IONE 4 SB01**  
**R201029-01 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **01/06/12 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	1.0	ug/l	1	2010708	01/07/12	01/09/12	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	1.0	"	"	"	"	"	"	

Date Sampled: **01/06/12 13:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		97.3 %	57.9-139		"	"	"	"	
Surrogate: Toluene-d8		101 %	83.1-115		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.6 %	80.8-120		"	"	"	"	

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

**IONE 4 SB02**  
**R201029-02 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **01/06/12 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>790</b>	100		ug/l	100	2010708	01/07/12	01/10/12	EPA 8260B	
<b>Toluene</b>	<b>7.7</b>	1.0		"	1	"	"	"	"	
<b>Ethylbenzene</b>	<b>660</b>	100		"	100	"	"	"	"	
<b>Xylenes (total)</b>	<b>9500</b>	100		"	"	"	"	"	"	

Date Sampled: **01/06/12 13:00**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: 1,2-Dichloroethane-d4</i>		99.6 %		57.9-139		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		101 %		83.1-115		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		96.4 %		80.8-120		"	"	"	"	

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

**IONE 4 SB03**  
**R201029-03 (Water)**

**Summit Scientific**

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **01/06/12 13:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>Benzene</b>	<b>1.2</b>	1.0	ug/l	1	2010708	01/07/12	01/10/12	EPA 8260B	
<b>Toluene</b>	<b>3.8</b>	1.0	"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>1600</b>	100	"	100	"	"	01/10/12	"	
<b>Xylenes (total)</b>	<b>6000</b>	100	"	"	"	"	01/10/12	"	

Date Sampled: **01/06/12 13:25**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<i>Surrogate: 1,2-Dichloroethane-d4</i>		97.2 %	57.9-139		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		101 %	83.1-115		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		94.7 %	80.8-120		"	"	"	"	

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

## Volatile Organic Compounds by EPA Method 8260B - Quality Control

### Summit Scientific

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

#### Batch 2010708 - EPA 5030 Water MS

##### Blank (2010708-BLK1)

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	12.5		"	13.2	94.7	57.9-139				
Surrogate: Toluene-d8	13.5		"	13.3	101	83.1-115				
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3	94.4	80.8-120				

##### Blank (2010708-BLK2)

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	12.3		"	13.2	92.8	57.9-139				
Surrogate: Toluene-d8	13.6		"	13.3	102	83.1-115				
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3	94.7	80.8-120				

##### LCS (2010708-BS1)

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	30.2	1.0	ug/l	33.3	90.7	60.1-131			10.9	
Toluene	31.6	1.0	"	33.3	94.9	65.9-127			11.3	
Ethylbenzene	30.7	1.0	"	33.3	92.1	65.1-129			20	
m,p-Xylene	58.4	2.0	"	66.7	87.6	66.8-127			20	
o-Xylene	29.8	1.0	"	33.3	89.3	61.2-120			20	
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.2	99.3	57.9-139				
Surrogate: Toluene-d8	13.8		"	13.3	103	83.1-115				
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3	96.0	80.8-120				

##### LCS (2010708-BS2)

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	30.1	1.0	ug/l	33.3	90.3	60.1-131			10.9	
Toluene	31.7	1.0	"	33.3	95.0	65.9-127			11.3	
Ethylbenzene	30.7	1.0	"	33.3	92.1	65.1-129			20	
m,p-Xylene	58.4	2.0	"	66.7	87.6	66.8-127			20	
o-Xylene	29.6	1.0	"	33.3	89.0	61.2-120			20	
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.2	98.2	57.9-139				
Surrogate: Toluene-d8	13.8		"	13.3	104	83.1-115				
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3	95.1	80.8-120				

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Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

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

**Batch 2010708 - EPA 5030 Water MS**

**LCS Dup (2010708-BSD1)**

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	31.4	1.0	ug/l	33.3		94.1	60.1-131	3.73	10.9	
Toluene	33.4	1.0	"	33.3		100	65.9-127	5.41	11.3	
Ethylbenzene	33.0	1.0	"	33.3		98.9	65.1-129	7.16	20	
m,p-Xylene	61.9	2.0	"	66.7		92.9	66.8-127	5.92	20	
o-Xylene	31.9	1.0	"	33.3		95.7	61.2-120	6.97	20	
Surrogate: 1,2-Dichloroethane-d4	13.2		"	13.2		99.7	57.9-139			
Surrogate: Toluene-d8	13.7		"	13.3		103	83.1-115			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.3	80.8-120			

**LCS Dup (2010708-BSD2)**

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	31.0	1.0	ug/l	33.3		93.0	60.1-131	2.95	10.9	
Toluene	33.0	1.0	"	33.3		98.9	65.9-127	4.05	11.3	
Ethylbenzene	32.2	1.0	"	33.3		96.8	65.1-129	4.89	20	
m,p-Xylene	61.3	2.0	"	66.7		92.0	66.8-127	4.95	20	
o-Xylene	31.5	1.0	"	33.3		94.4	61.2-120	5.96	20	
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.2		98.6	57.9-139			
Surrogate: Toluene-d8	13.5		"	13.3		101	83.1-115			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.2	80.8-120			

**Matrix Spike (2010708-MS1)**

Source: R201028-01

Prepared: 01/07/12 Analyzed: 01/09/12

Benzene	31.4	1.0	ug/l	33.3	ND	94.3	52.7-130		19.3	
Toluene	33.6	1.0	"	33.3	ND	101	57-127		18.7	
Ethylbenzene	32.5	1.0	"	33.3	ND	97.5	59.2-127		20	
m,p-Xylene	61.9	2.0	"	66.7	ND	92.9	53.2-132		20	
o-Xylene	31.3	1.0	"	33.3	ND	94.0	56.3-117		20	
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.2		102	57.9-139			
Surrogate: Toluene-d8	13.8		"	13.3		104	83.1-115			
Surrogate: 4-Bromofluorobenzene	13.0		"	13.3		97.2	80.8-120			

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Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

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

**Batch 2010708 - EPA 5030 Water MS**

<b>Matrix Spike (2010708-MS2)</b>		<b>Source: R201029-01</b>			<b>Prepared: 01/07/12</b>		<b>Analyzed: 01/09/12</b>			
Benzene	29.1	1.0	ug/l	33.3	ND	87.4	52.7-130		19.3	
Toluene	30.8	1.0	"	33.3	ND	92.4	57-127		18.7	
Ethylbenzene	31.5	1.0	"	33.3	ND	94.4	59.2-127		20	
m,p-Xylene	60.6	2.0	"	66.7	ND	90.9	53.2-132		20	
o-Xylene	30.8	1.0	"	33.3	ND	92.4	56.3-117		20	
Surrogate: 1,2-Dichloroethane-d4	13.4		"	13.2		102	57.9-139			
Surrogate: Toluene-d8	13.5		"	13.3		101	83.1-115			
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		96.5	80.8-120			

<b>Matrix Spike Dup (2010708-MSD1)</b>		<b>Source: R201028-01</b>			<b>Prepared: 01/07/12</b>		<b>Analyzed: 01/09/12</b>			
Benzene	29.9	1.0	ug/l	33.3	ND	89.6	52.7-130	5.09	19.3	
Toluene	31.9	1.0	"	33.3	ND	95.7	57-127	5.31	18.7	
Ethylbenzene	31.4	1.0	"	33.3	ND	94.1	59.2-127	3.57	20	
m,p-Xylene	60.0	2.0	"	66.7	ND	90.0	53.2-132	3.10	20	
o-Xylene	30.7	1.0	"	33.3	ND	92.2	56.3-117	1.93	20	
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.2		102	57.9-139			
Surrogate: Toluene-d8	13.8		"	13.3		103	83.1-115			
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.3	80.8-120			

<b>Matrix Spike Dup (2010708-MSD2)</b>		<b>Source: R201029-01</b>			<b>Prepared: 01/07/12</b>		<b>Analyzed: 01/09/12</b>			
Benzene	29.6	1.0	ug/l	33.3	ND	88.8	52.7-130	1.60	19.3	
Toluene	31.2	1.0	"	33.3	ND	93.5	57-127	1.19	18.7	
Ethylbenzene	31.7	1.0	"	33.3	ND	95.2	59.2-127	0.759	20	
m,p-Xylene	60.9	2.0	"	66.7	ND	91.4	53.2-132	0.593	20	
o-Xylene	31.2	1.0	"	33.3	ND	93.6	56.3-117	1.26	20	
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.2		102	57.9-139			
Surrogate: Toluene-d8	13.6		"	13.3		102	83.1-115			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		96.1	80.8-120			

Summit Scientific

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO, 80003

Project: ENC - Ione #4  
Project Number: 0334-11049  
Project Manager: Daniel Burns

**Reported:**  
01/10/12 18:47

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

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Summit Scientific

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

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