

Report Transmission Cover Page

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1164846**
Control Number: C0098832
Date Received: Oct 5, 2016
Date Reported: Oct 12, 2016
Report Number: 2137724

Contact & Affiliation	Address	Delivery Commitments
Rick Huff Alberta Energy Regulator	4999 98Ave NW Suite 402 Edmonton, Alberta T6B 2X3 Phone: (780) 422-1927 Fax: null Email: rick.huff@aer.ca	On [Lot Verification] send (COA, COC) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (COC, Invoice) by Email - Single Report

Notes To Clients:

Analytical Report

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		Reference Number	1164846-1	1164846-2	1164846-3	
		Sample Date	Sep 29, 2016	Sep 29, 2016	Sep 29, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/07-35-052-26W4 / 4.8°C	100/07-35-052- 26W4B / 4.8°C	102/14-35-052-26W4 / 4.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	4.0	2.5	8.4	0.002
Bromide		mg/L	609	610	545	0.02
Hydrogen Sulfide	Calculated	mg/L	4.3	2.7	8.9	
Metals Dissolved						
Silicon	Dissolved	mg/L	<10	<10	<10	0.05
Sulfur	Dissolved	mg/L	410	400	350	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.400	<0.400	<0.400	0.002
Antimony	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Arsenic	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Barium	Dissolved	mg/L	1.42	0.658	3.12	0.001
Beryllium	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Bismuth	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Boron	Dissolved	mg/L	71.6	72.0	71.7	0.002
Cadmium	Dissolved	mg/L	<0.002	<0.002	<0.002	0.00001
Chromium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Cobalt	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Copper	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Lead	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Lithium	Dissolved	mg/L	26.8	26.2	28.0	0.001
Molybdenum	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Nickel	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Selenium	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Silver	Dissolved	mg/L	<0.002	<0.002	<0.002	0.00001
Strontium	Dissolved	mg/L	490	494	545	0.001
Thallium	Dissolved	mg/L	<0.010	<0.010	<0.010	0.00005
Tin	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Titanium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Uranium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Vanadium	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Zinc	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	138000	137000	140000	7
Relative Density at 15/15 ° at 15 °C			1.099	1.099	1.098	

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		Reference Number	1164846-1	1164846-2	1164846-3	
		Sample Date	Sep 29, 2016	Sep 29, 2016	Sep 29, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/07-35-052-26W4 / 4.8°C	100/07-35-052- 26W4B / 4.8°C	102/14-35-052-26W4 / 4.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.097	1.097	1.096	
Routine Water						
pH			6.54	6.56	6.72	
Temperature of observed pH		°C	19.4	19.5	19.5	
Electrical Conductivity	at 25 °C	uS/cm	207000	206000	210000	1
Calcium	Dissolved	mg/L	14900	14200	12800	0.2
Magnesium	Dissolved	mg/L	2370	2280	2090	0.2
Sodium	Dissolved	mg/L	34300	31500	36600	0.4
Potassium	Dissolved	mg/L	1600	1500	1600	0.4
Iron	Dissolved	mg/L	<2	<2	<2	0.01
Manganese	Dissolved	mg/L	<1	<1	<1	0.005
Chloride	Dissolved	mg/L	78500	78600	78800	0.4
Nitrate - N		mg/L	<2	<2	<2	0.01
Nitrite - N		mg/L	<1	<1	<1	0.005
Nitrate and Nitrite - N		mg/L	<3	<3	<3	0.01
Sulfate (SO4)	Dissolved	mg/L	1200	1200	1000	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	223	226	252	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	183	185	207	5
Total Dissolved Solids	Calculated	mg/L	133000	129000	133000	1
Hardness	Dissolved as CaCO3	mg/L	46900	44900	40700	
Ionic Balance	Dissolved	%	110	103	109	

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Date Received: Oct 5, 2016
Date Reported: Oct 12, 2016
Report Number: 2137724

		Reference Number	1164846-4	1164846-5	1164846-6	
		Sample Date	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/11-27-064-13W5 / 4.8°C	100/02-17-071-18W5 / 4.8°C	100/02-30-017-18W5 / 4.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	4.3	0.010	0.011	0.002
Bromide		mg/L	46.6	271	191	0.02
Hydrogen Sulfide	Calculated	mg/L	4.6	0.011	0.012	
Metals Dissolved						
Silicon	Dissolved	mg/L	27.3	13	13	0.05
Sulfur	Dissolved	mg/L	550	290	360	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.200	<0.400	<0.400	0.002
Antimony	Dissolved	mg/L	<0.02	<0.04	<0.04	0.0002
Arsenic	Dissolved	mg/L	<0.02	<0.04	<0.04	0.0002
Barium	Dissolved	mg/L	0.549	3.33	1.61	0.001
Beryllium	Dissolved	mg/L	<0.01	<0.02	<0.02	0.0001
Bismuth	Dissolved	mg/L	<0.05	<0.1	<0.1	0.0005
Boron	Dissolved	mg/L	40.3	61.2	43.3	0.002
Cadmium	Dissolved	mg/L	<0.001	<0.002	<0.002	0.00001
Chromium	Dissolved	mg/L	<0.05	<0.1	<0.1	0.0005
Cobalt	Dissolved	mg/L	<0.01	<0.02	<0.02	0.0001
Copper	Dissolved	mg/L	<0.100	0.617	0.417	0.001
Lead	Dissolved	mg/L	<0.01	<0.02	<0.02	0.0001
Lithium	Dissolved	mg/L	8.71	26.1	17.7	0.001
Molybdenum	Dissolved	mg/L	<0.100	<0.200	<0.200	0.001
Nickel	Dissolved	mg/L	<0.05	<0.1	<0.1	0.0005
Selenium	Dissolved	mg/L	<0.02	<0.04	<0.04	0.0002
Silver	Dissolved	mg/L	<0.001	<0.002	<0.002	0.00001
Strontium	Dissolved	mg/L	73.0	456	302	0.001
Thallium	Dissolved	mg/L	<0.0050	0.0410	0.019	0.00005
Tin	Dissolved	mg/L	<0.100	<0.200	<0.200	0.001
Titanium	Dissolved	mg/L	<0.05	<0.1	<0.1	0.0005
Uranium	Dissolved	mg/L	<0.05	<0.1	<0.1	0.0005
Vanadium	Dissolved	mg/L	<0.01	<0.02	<0.02	0.0001
Zinc	Dissolved	mg/L	<0.100	<0.200	<0.200	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	60300	168000	125000	7
Relative Density at 15/15 ° at 15 °C			1.044	1.117	1.088	

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		Reference Number	1164846-4	1164846-5	1164846-6	
		Sample Date	Oct 04, 2016	Oct 04, 2016	Oct 04, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/11-27-064-13W5 / 4.8°C	100/02-17-071-18W5 / 4.8°C	100/02-30-017-18W5 / 4.8°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.042	1.115	1.086	
Routine Water						
pH			7.31	6.68	7.14	
Temperature of observed pH		°C	19.4	19.9	19.7	
Electrical Conductivity	at 25 °C	uS/cm	86000	249000	197000	1
Calcium	Dissolved	mg/L	1480	8950	6060	0.2
Magnesium	Dissolved	mg/L	230	1200	890	0.2
Sodium	Dissolved	mg/L	22800	50400	42100	0.4
Potassium	Dissolved	mg/L	430	990	670	0.4
Iron	Dissolved	mg/L	<1	<2	<2	0.01
Manganese	Dissolved	mg/L	<0.5	<1	<1	0.005
Chloride	Dissolved	mg/L	34200	95600	71200	0.4
Nitrate - N		mg/L	<1	<2	<2	0.01
Nitrite - N		mg/L	<0.5	<1	<1	0.005
Nitrate and Nitrite - N		mg/L	<1	<3	<3	0.01
Sulfate (SO4)	Dissolved	mg/L	1700	870	1100	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	313	152	234	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	256	124	192	5
Total Dissolved Solids	Calculated	mg/L	61000	160000	122000	1
Hardness	Dissolved as CaCO3	mg/L	4630	27200	18800	
Ionic Balance	Dissolved	%	109	102	109	

Approved by:



Darlene Lintott, MSc
Consulting Scientist

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

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Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	07-Oct-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	07-Oct-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	07-Oct-16	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	11-Oct-16	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	07-Oct-16	Exova Edmonton
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	07-Oct-16	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	07-Oct-16	Exova Edmonton
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	07-Oct-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	07-Oct-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	07-Oct-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-09	11-Oct-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-11	11-Oct-16	Exova Edmonton
Solids Dissolved (Total, Fixed and Volatile)	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	07-Oct-16	Exova Edmonton
Sulfide in water	APHA	* Gas Dialysis, Automated Methylene Blue Method, 4500-S2- E	07-Oct-16	Exova Edmonton

** Reference Method Modified*

References

APHA Standard Methods for the Examination of Water and Wastewater
APHA/USEPA Standard Methods For Water/ Environmental Protection Agency
ASTM Annual Book of ASTM Standards
US EPA US Environmental Protection Agency Test Methods

Comments:

Methodology and Notes

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Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Project Information

Project ID: _____
 Project Name: _____
 Project Location: _____
 Legal Location: _____
 PO/AFE#: _____
 Proj. Acct. Code: _____
 Quote # **21851**

Invoice to:

Company: **AGS/AER**
 Address: _____
 Attention: _____
 Phone: _____
 Cell: _____
 Fax: _____
 E-mail: **Rick.Huff@agr.ca**
 Agreement ID: **110455**
 Copy of report: _____

Report To:

Company: **Same as invoice**
 Address: _____
 Attention: _____
 Phone: _____
 Cell: _____
 Fax: _____
 E-mail 1: _____
 E-mail 2: _____
 Copy of invoice: _____

Report
ResultsRegulatory
Requirement

E-Mail	HCDWQG
Mail	Ab Tier 1
Online	SPIGEC
Fax	BCCSR
PDF	Other (list below)
Excel	
QA/QC	

Sample Custody (please print)

Sampled by: _____

Company: _____

This section for Lab use only

Date/Time stamp: _____

13Indicate in the space allotted any
detected in the corresponding
number.

1. Indicate any samples that were not packaged well
2. Indicate any samples not received in Exova supplies
3. Indicate any samples that were not clearly labeled
4. Indicate any samples not received within the required hold time or temp.
5. Indicate any missing or extra samples
6. Indicate any samples that were received broken
7. Indicate any samples where sufficient volume was not received
8. Indicate any samples received in an inappropriate container

RUSH Priority

Emergency (contact lab for turnaround and pricing)

Priority 1-2 working days (100% surcharge)

Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Date Required: _____

Signature: _____

Special Instructions/Comments (please include contact information including ph. # if different from above)

OCUPFIELD BRINE SAMPLES. ALL SAMPLES POSE A POTENTIAL H2S HAZARD.

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time Sampled	Matrix	Sampling Method
1		100/07-35-052-26W4		Sep. 29, 2016	W	
2		100/07-35-052-26W4B		Sep. 29, 2016	W	
3		102/14-35-052-26W4/C		Sep. 29, 2016	W	
4		100/11-27-064-13W5/0		Oct. 4, 2016	W	
5		100/02-17-071-18W5/0		Oct. 4, 2016	W	
6		100/02-30-07-18W5/0		Oct. 4, 2016	W	
7						
8						
9						
10						
11						
12						
13						
14						
15						

Number of Containers

TDS
ICBR
SUL
SPGR
TW33Enter tests above
(✓ relevant samples below)

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (<http://www.exova.com/about/terms-and-conditions/>)

Please indicate any potentially hazardous samples

Page _____ of _____

Control # **C 0098832**Lot: **1164846** COC

Shipping: COD Y/ N

and size of coolers

Temp. received: **4.8**Delivery Method: **H.D**

Waybill:

Received by: **SM**

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Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

Contact & Affiliation	Address	Delivery Commitments
Rick Huff Alberta Energy Regulator	4999 98Ave NW Suite 402 Edmonton, Alberta T6B 2X3 Phone: (780) 641-9759 Fax: null Email: rick.huff@aer.ca	On [Lot Verification] send (COA, COC) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (COC, Invoice) by Email - Single Report

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Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

		Reference Number	1162804-1	1162804-2	1162804-3	
		Sample Date	Sep 20, 2016	Sep 20, 2016	Sep 22, 2016	
		Sample Time	08:30	10:00	08:37	
		Sample Location				
		Sample Description	102/02-23-077- 21W5/0 / 8.7°C	100/10-32-076- 01W6/0 / 8.7°C	100/03-34-063- 10W5/2 / 8.7°C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	0.017	6.4	0.012	0.002
Bromide		mg/L	490	528	109	0.02
Hydrogen Sulfide	Calculated	mg/L	0.018	6.8	0.013	
Metals Dissolved						
Silicon	Dissolved	mg/L	<10	<10	24.5	0.05
Sulfur	Dissolved	mg/L	230	240	510	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.400	0.599	<0.200	0.002
Antimony	Dissolved	mg/L	<0.04	<0.04	<0.02	0.0002
Arsenic	Dissolved	mg/L	<0.04	<0.04	<0.02	0.0002
Barium	Dissolved	mg/L	7.31	5.66	0.664	0.001
Beryllium	Dissolved	mg/L	<0.02	<0.02	<0.01	0.0001
Bismuth	Dissolved	mg/L	<0.1	<0.1	<0.05	0.0005
Boron	Dissolved	mg/L	21.3	53.7	38.6	0.002
Cadmium	Dissolved	mg/L	<0.002	<0.002	<0.001	0.00001
Chromium	Dissolved	mg/L	<0.1	<0.1	<0.05	0.0005
Cobalt	Dissolved	mg/L	<0.02	<0.02	<0.01	0.0001
Copper	Dissolved	mg/L	0.371	<0.200	<0.100	0.001
Lead	Dissolved	mg/L	0.04	<0.02	<0.01	0.0001
Lithium	Dissolved	mg/L	19.9	57.3	10.1	0.001
Molybdenum	Dissolved	mg/L	<0.200	<0.200	<0.100	0.001
Nickel	Dissolved	mg/L	0.1	<0.1	<0.05	0.0005
Selenium	Dissolved	mg/L	<0.04	<0.04	<0.02	0.0002
Silver	Dissolved	mg/L	0.0064	0.0049	0.0013	0.00001
Strontium	Dissolved	mg/L	678	932	99.9	0.001
Thallium	Dissolved	mg/L	0.0554	<0.010	<0.0050	0.00005
Tin	Dissolved	mg/L	<0.200	<0.200	<0.100	0.001
Titanium	Dissolved	mg/L	<0.1	<0.1	<0.05	0.0005
Uranium	Dissolved	mg/L	<0.1	<0.1	<0.05	0.0005
Vanadium	Dissolved	mg/L	<0.02	<0.02	<0.01	0.0001
Zinc	Dissolved	mg/L	0.712	<0.200	<0.100	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	248000	277000	70700	7
Relative Density at 15/15 ° at 15 °C			1.169	1.178	1.049	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

		Reference Number	1162804-1	1162804-2	1162804-3	
		Sample Date	Sep 20, 2016	Sep 20, 2016	Sep 22, 2016	
		Sample Time	08:30	10:00	08:37	
		Sample Location				
		Sample Description	102/02-23-077- 21W5/0 / 8.7°C	100/10-32-076- 01W6/0 / 8.7°C	100/03-34-063- 10W5/2 / 8.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.167	1.176	1.047	
Routine Water						
pH			6.17	6.28	7.60	
Temperature of observed pH		°C	21.0	21.3	20.8	
Electrical Conductivity	at 25 °C	uS/cm	379000	401000	129000	1
Calcium	Dissolved	mg/L	18800	25300	1910	0.2
Magnesium	Dissolved	mg/L	2000	3740	310	0.2
Sodium	Dissolved	mg/L	75800	77300	25800	0.4
Potassium	Dissolved	mg/L	930	2660	430	0.4
Iron	Dissolved	mg/L	68.9	<2	<1	0.01
Manganese	Dissolved	mg/L	4.4	2	<0.5	0.005
Chloride	Dissolved	mg/L	158000	164000	40000	0.4
Nitrate - N		mg/L	<2	<2	<1	0.01
Nitrite - N		mg/L	<1	<1	<0.5	0.005
Nitrate and Nitrite - N		mg/L	<3	<3	<1	0.01
Sulfate (SO4)	Dissolved	mg/L	700	710	1500	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	58	105	284	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	47.6	86.4	233	5
Total Dissolved Solids	Calculated	mg/L	256000	274000	70100	1
Hardness	Dissolved as CaCO3	mg/L	55100	78500	6000	
Ionic Balance	Dissolved	%	99	108	108	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

		Reference Number	1162804-4	1162804-5	
		Sample Date	Sep 22, 2016	Sep 22, 2016	
		Sample Time	09:03	10:34	
		Sample Location			
		Sample Description	100/12-18-063-10W5/0 / 8.7°C	100/08-33-066-08W5/2 / 8.7°C	
		Matrix	Water	Water	
Analyte		Units	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters					
Sulfide	Total	mg/L	0.082	0.015	0.002
Bromide		mg/L	108	308	0.02
Hydrogen Sulfide	Calculated	mg/L	0.087	0.016	
Metals Dissolved					
Silicon	Dissolved	mg/L	27.0	<10	0.05
Sulfur	Dissolved	mg/L	590	290	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.200	<0.400	0.002
Antimony	Dissolved	mg/L	<0.02	<0.04	0.0002
Arsenic	Dissolved	mg/L	<0.02	<0.04	0.0002
Barium	Dissolved	mg/L	0.590	0.422	0.001
Beryllium	Dissolved	mg/L	<0.01	<0.02	0.0001
Bismuth	Dissolved	mg/L	<0.05	<0.1	0.0005
Boron	Dissolved	mg/L	41.3	35.4	0.002
Cadmium	Dissolved	mg/L	<0.001	<0.002	0.00001
Chromium	Dissolved	mg/L	<0.05	<0.1	0.0005
Cobalt	Dissolved	mg/L	<0.01	<0.02	0.0001
Copper	Dissolved	mg/L	<0.100	0.499	0.001
Lead	Dissolved	mg/L	<0.01	<0.02	0.0001
Lithium	Dissolved	mg/L	10.9	21.5	0.001
Molybdenum	Dissolved	mg/L	<0.100	<0.200	0.001
Nickel	Dissolved	mg/L	<0.05	<0.1	0.0005
Selenium	Dissolved	mg/L	<0.02	<0.04	0.0002
Silver	Dissolved	mg/L	0.0014	0.0031	0.00001
Strontium	Dissolved	mg/L	106	467	0.001
Thallium	Dissolved	mg/L	<0.0050	<0.010	0.00005
Tin	Dissolved	mg/L	<0.100	<0.200	0.001
Titanium	Dissolved	mg/L	<0.05	<0.1	0.0005
Uranium	Dissolved	mg/L	<0.05	<0.1	0.0005
Vanadium	Dissolved	mg/L	<0.01	<0.02	0.0001
Zinc	Dissolved	mg/L	<0.100	<0.200	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	
Physical and Aggregate Properties					
Solids	Total Dissolved	mg/L dried at 180 °C	70800	225000	7
Relative Density at 15/15 °	at 15 °C		1.049	1.143	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

		Reference Number	1162804-4	1162804-5	
		Sample Date	Sep 22, 2016	Sep 22, 2016	
		Sample Time	09:03	10:34	
		Sample Location			
		Sample Description	100/12-18-063-10W5/0 / 8.7°C	100/08-33-066-08W5/2 / 8.7°C	
		Matrix	Water	Water	
Analyte		Units	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued					
C					
Relative Density at 25/25 °C	at 25 °C		1.047	1.141	
Routine Water					
pH			7.52	6.54	
Temperature of observed pH		°C	21.1	20.9	
Electrical Conductivity	at 25 °C	uS/cm	123000	331000	1
Calcium	Dissolved	mg/L	2050	15100	0.2
Magnesium	Dissolved	mg/L	310	2680	0.2
Sodium	Dissolved	mg/L	26800	67700	0.4
Potassium	Dissolved	mg/L	450	830	0.4
Iron	Dissolved	mg/L	<1	5.2	0.01
Manganese	Dissolved	mg/L	<0.5	<1	0.005
Chloride	Dissolved	mg/L	40500	131000	0.4
Nitrate - N		mg/L	<1	<2	0.01
Nitrite - N		mg/L	<0.5	<1	0.005
Nitrate and Nitrite - N		mg/L	<1	<3	0.01
Sulfate (SO4)	Dissolved	mg/L	1800	860	0.9
Hydroxide		mg/L	<5	<5	
Carbonate		mg/L	<6	<6	
Bicarbonate		mg/L	363	69	
P-Alkalinity	as CaCO3	mg/L	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	298	56.4	5
Total Dissolved Solids	Calculated	mg/L	72000	218000	1
Hardness	Dissolved as CaCO3	mg/L	6400	48700	
Ionic Balance	Dissolved	%	110	106	

Approved by: 

Anthony Neumann, MSc
Laboratory Operations Manager

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Alberta Energy Regulator	Project:	Lot ID: 1162804
Report To: Alberta Energy Regulator	ID:	Control Number: C0051273
4999 98Ave NW Suite 402	Name:	Date Received: Sep 27, 2016
Edmonton, AB, Canada	Location:	Date Reported: Oct 3, 2016
T6B 2X3	LSD:	Report Number: 2134919
Attn: Rick Huff	P.O.:	
Sampled By:	Acct code:	
Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	27-Sep-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	27-Sep-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	27-Sep-16	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	27-Sep-16	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	27-Sep-16	Exova Edmonton
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	28-Sep-16	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	27-Sep-16	Exova Edmonton
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	28-Sep-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	28-Sep-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	28-Sep-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-09	29-Sep-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-11	29-Sep-16	Exova Edmonton
Solids Dissolved (Total, Fixed and Volatile)	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	28-Sep-16	Exova Edmonton
Sulfide in water	APHA	* Gas Dialysis, Automated Methylene Blue Method, 4500-S2- E	30-Sep-16	Exova Edmonton

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
APHA/USEPA	Standard Methods For Water/ Environmental Protection Agency
ASTM	Annual Book of ASTM Standards
US EPA	US Environmental Protection Agency Test Methods

Comments:

Methodology and Notes

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1162804**
Control Number: C0051273
Date Received: Sep 27, 2016
Date Reported: Oct 3, 2016
Report Number: 2134919

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Project Information

Project ID: _____
Project Name: _____
Project Location: _____
Legal Location: _____
PO/AFE#: _____
Proj. Acct. Code: _____
Quote # 21851

Invoice to:

Company: AER/AGS
Address: 4999-98 Ave
Edmonton, AB
Attention: _____
Phone: 780 427 2893
Cell: _____
Fax: _____
E-mail: Rick.Huff@aer.ca
Agreement ID: 110455
Copy of report: _____

Report To:

Company: Same as invoice
Address: _____
Attention: _____
Phone: _____
Cell: _____
Fax: _____
E-mail 1: _____
E-mail 2: _____
Copy of invoice: _____

Report Results

E-Mail	HCDWQG
Mail	Ab Tier 1
Online	SPIGEC
Fax	BCCSR
PDF	Other (list below)
Excel	
QA/QC	

Regulatory Requirement

Sample Custody (please print)

Sampled by: _____
Company: _____

This section for Lab use only

Date/Time stamp: SEP 26 PM 4:05

RUSH Priority

Emergency (contact lab for turnaround and pricing)
Priority 1-2 working days (100% surcharge)
Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Date Required: _____ Signature: [Signature]

Special Instructions/Comments (please include contact information including ph. # if different from above).

OILFIELD BRINE SAMPLES. ALL TESTED SAMPLES NOSE A POTENTIAL H2S HAZARD.

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time Sampled	Matrix	Sampling Method	Enter tests above (√ relevant samples below)	Indicate in the space allotted any deficiencies by the corresponding number.
1		102/62-23-077-21W	5/0	Sep 20, '16; 08:30	W		4 ✓ ✓ ✓ ✓ ✓	1. Indicate any samples that were not packaged well
2		100/10-32-076-01W	6/0	Sep 20, '16; 10:00	W		4 ✓ ✓ ✓ ✓ ✓	2. Indicate any samples not received in Exova supplies
3		100/03-34-063-10W	5/2	Sep 22, '16; 08:37	W		4 ✓ ✓ ✓ ✓ ✓	3. Indicate any samples that were not clearly labeled
4		100/12-18-063-10W	5/0	Sep 22, '16; 9:03	W		4 ✓ ✓ ✓ ✓ ✓	4. Indicate any samples not received within the required hold time or temp.
5		100/08-33-066-08W	5/2	Sep 22, '16; 10:34	W		4 ✓ ✓ ✓ ✓ ✓	5. Indicate any missing or extra samples
6								6. Indicate any samples that were received broken
7								7. Indicate any samples where sufficient volume was not received
8								8. Indicate any samples received in an inappropriate container
9								
10								
11								
12								
13								
14								
15								

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (<http://www.exova.com/about/terms-and-conditions/>)

Please indicate any potentially hazardous samples

Lot: 1162804^{COC}



Shipping: COD Y/ N
and size of coolers
Temp. received: 8.7°C
Delivery Method: Hand
Waybill:
Received by: A Neumann

Report Transmission Cover Page

Bill To:	Alberta Energy Regulator	Project:	Lot ID:	1152021
Report To:	Alberta Energy Regulator	ID:	Control Number:	C0051274
	4999 98Ave NW Suite 402	Name:	Date Received:	Jul 29, 2016
	Edmonton, AB, Canada	Location:	Date Reported:	Aug 16, 2016
	T6B 2X3	LSD:	Report Number:	2125525
Attn:	Rick Huff	P.O.:	21851	
Sampled By:		Acct code:		
Company:				

Contact & Affiliation	Address	Delivery Commitments
Rick Huff	4999 98Ave NW Suite 402	On [Lot Verification] send
Alberta Energy Regulator	Edmonton, Alberta T6B 2X3	(COA, COC) by Email - Merge Reports
	Phone: (780) 641-9759	On [Report Approval] send
	Fax: null	(Test Report, COC) by Email - Merge Reports
	Email: rick.huff@aer.ca	On [Report Approval] send
		(Test Report) by Email - Merge Reports
		On [Lot Approval and Final Test Report Approval] send
		(COC, Invoice) by Email - Single Report

Notes To Clients:

- Report was issued to include retest result for analysis on sample #2 as requested by Rick Huff on Aug 15, 2016. Previous Report #2121403.

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.: 21851
Acct code:

Lot ID: **1152021**
Control Number: C0051274
Date Received: Jul 29, 2016
Date Reported: Aug 16, 2016
Report Number: 2125525

		Reference Number	1152021-1	1152021-2	1152021-3	
		Sample Date	Jul 26, 2016	Jul 26, 2016	Jul 27, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/09-30-086- 23W5/0 / 12.0°C	100/14-16-079- 22W5/0 / 12.0°C	103/05-05-072- 23W5/2 / 12.0°C	
		Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit	
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	22.0	35.4	680	0.002
Bromide		mg/L	474	526	394	0.02
Hydrogen Sulfide	Calculated	mg/L	23.4	37.6	720	
Metals Dissolved						
Silicon	Dissolved	mg/L	<10	<10	13	0.05
Sulfur	Dissolved	mg/L	280	350	4340	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.400	<0.400	<0.400	0.002
Antimony	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Arsenic	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Barium	Dissolved	mg/L	3.83	6.16	13.5	0.001
Beryllium	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Bismuth	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Boron	Dissolved	mg/L	53.3	52.4	134	0.002
Cadmium	Dissolved	mg/L	<0.002	<0.002	<0.002	0.00001
Chromium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Cobalt	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Copper	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Lead	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Lithium	Dissolved	mg/L	41.8	40.5	75.4	0.001
Molybdenum	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Nickel	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Selenium	Dissolved	mg/L	<0.04	<0.04	<0.04	0.0002
Silver	Dissolved	mg/L	<0.002	<0.002	<0.002	0.00001
Strontium	Dissolved	mg/L	924	1050	1210	0.001
Thallium	Dissolved	mg/L	<0.010	<0.010	<0.010	0.00005
Tin	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Titanium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Uranium	Dissolved	mg/L	<0.1	<0.1	<0.1	0.0005
Vanadium	Dissolved	mg/L	<0.02	<0.02	<0.02	0.0001
Zinc	Dissolved	mg/L	<0.200	<0.200	<0.200	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	243000	268000	261000	7
Relative Density at 15/15 ° at 15 °C			1.159	1.170	1.168	

Analytical Report

Bill To: Alberta Energy Regulator	Project:	Lot ID: 1152021
Report To: Alberta Energy Regulator	ID:	Control Number: C0051274
4999 98Ave NW Suite 402	Name:	Date Received: Jul 29, 2016
Edmonton, AB, Canada	Location:	Date Reported: Aug 16, 2016
T6B 2X3	LSD:	Report Number: 2125525
Attn: Rick Huff	P.O.: 21851	
Sampled By:	Acct code:	
Company:		

		Reference Number	1152021-1	1152021-2	1152021-3	
		Sample Date	Jul 26, 2016	Jul 26, 2016	Jul 27, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/09-30-086-23W5/0 / 12.0°C	100/14-16-079-22W5/0 / 12.0°C	103/05-05-072-23W5/2 / 12.0°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.157	1.168	1.166	
Routine Water						
pH			6.52	6.46	6.86	
Temperature of observed pH		°C	21.6	21.7	21.7	
Electrical Conductivity	at 25 °C	uS/cm	371000	397000	377000	1
Calcium	Dissolved	mg/L	21800	25000	27300	0.2
Magnesium	Dissolved	mg/L	3710	3820	3170	0.2
Sodium	Dissolved	mg/L	69500	73700	61600	0.4
Potassium	Dissolved	mg/L	2000	2140	4990	0.4
Iron	Dissolved	mg/L	<2	<2	<2	0.01
Manganese	Dissolved	mg/L	1	1	<1	0.005
Chloride	Dissolved	mg/L	149000	162000	159000	0.4
Nitrate - N		mg/L	<2	<2	<2	0.01
Nitrite - N		mg/L	<1	<1	<1	0.005
Nitrate and Nitrite - N		mg/L	<3	<3	<3	0.01
Sulfate (SO4)	Dissolved	mg/L	850	1000	13000	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	111	103	404	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	90.7	84.2	331	5
Total Dissolved Solids	Calculated	mg/L	247000	268000	269000	1
Hardness	Dissolved as CaCO3	mg/L	69600	78200	81100	
Ionic Balance	Dissolved	%	106	105	93	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.: 21851
Acct code:

Lot ID: **1152021**
Control Number: C0051274
Date Received: Jul 29, 2016
Date Reported: Aug 16, 2016
Report Number: 2125525

		Reference Number	1152021-4	1152021-5	1152021-6	
		Sample Date	Jul 27, 2016	Jul 27, 2016	Jul 28, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	102/16-29-071- 23W5/2 / 12.0°C	100/07-26-069- 23W5/0 / 12.0°C	102/10-32-064- 23W5/0 / 12.0°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	344	460	0.41	0.002
Bromide		mg/L	427	419	47.5	0.02
Hydrogen Sulfide	Calculated	mg/L	366	490	0.44	
Metals Dissolved						
Silicon	Dissolved	mg/L	13	14	37.8	0.05
Sulfur	Dissolved	mg/L	2510	2640	100	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	0.000007	0.000005
Aluminum	Dissolved	mg/L	<0.400	<0.400	<0.100	0.002
Antimony	Dissolved	mg/L	<0.04	<0.04	<0.01	0.0002
Arsenic	Dissolved	mg/L	<0.04	<0.04	<0.01	0.0002
Barium	Dissolved	mg/L	14.6	12.6	1.41	0.001
Beryllium	Dissolved	mg/L	<0.02	<0.02	<0.005	0.0001
Bismuth	Dissolved	mg/L	<0.1	<0.1	<0.02	0.0005
Boron	Dissolved	mg/L	148	158	37.8	0.002
Cadmium	Dissolved	mg/L	<0.002	<0.002	<0.0005	0.00001
Chromium	Dissolved	mg/L	<0.1	<0.1	<0.02	0.0005
Cobalt	Dissolved	mg/L	<0.02	<0.02	<0.005	0.0001
Copper	Dissolved	mg/L	<0.200	<0.200	<0.050	0.001
Lead	Dissolved	mg/L	<0.02	<0.02	<0.005	0.0001
Lithium	Dissolved	mg/L	82.7	88.8	7.79	0.001
Molybdenum	Dissolved	mg/L	<0.200	<0.200	<0.050	0.001
Nickel	Dissolved	mg/L	<0.1	<0.1	<0.02	0.0005
Selenium	Dissolved	mg/L	<0.04	<0.04	<0.01	0.0002
Silver	Dissolved	mg/L	<0.002	<0.002	<0.0005	0.00001
Strontium	Dissolved	mg/L	1350	1390	30.0	0.001
Thallium	Dissolved	mg/L	<0.010	<0.010	<0.0025	0.00005
Tin	Dissolved	mg/L	0.205	<0.200	<0.050	0.001
Titanium	Dissolved	mg/L	<0.1	<0.1	<0.02	0.0005
Uranium	Dissolved	mg/L	<0.1	<0.1	<0.02	0.0005
Vanadium	Dissolved	mg/L	<0.02	<0.02	<0.005	0.0001
Zinc	Dissolved	mg/L	0.658	<0.200	<0.050	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	264000	264000	41400	7
Relative Density at 15/15 °	at 15 °C		1.167	1.166	1.028	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By:
Company:

Project:
ID:
Name:
Location:
LSD:
P.O.: 21851
Acct code:

Lot ID: **1152021**
Control Number: C0051274
Date Received: Jul 29, 2016
Date Reported: Aug 16, 2016
Report Number: 2125525

		Reference Number	1152021-4	1152021-5	1152021-6	
		Sample Date	Jul 27, 2016	Jul 27, 2016	Jul 28, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	102/16-29-071-23W5/2 / 12.0°C	100/07-26-069-23W5/0 / 12.0°C	102/10-32-064-23W5/0 / 12.0°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.165	1.164	1.026	
Routine Water						
pH			6.88	7.01	7.90	
Temperature of observed pH		°C	21.7	21.6	21.5	
Electrical Conductivity	at 25 °C	uS/cm	383000	367000	56700	1
Calcium	Dissolved	mg/L	28400	28000	563	0.2
Magnesium	Dissolved	mg/L	3310	3570	72	0.2
Sodium	Dissolved	mg/L	64900	65300	15000	0.4
Potassium	Dissolved	mg/L	5110	5450	592	0.4
Iron	Dissolved	mg/L	<2	<2	<0.5	0.01
Manganese	Dissolved	mg/L	<1	<1	<0.2	0.005
Chloride	Dissolved	mg/L	158000	156000	22900	0.4
Nitrate - N		mg/L	<2	<2	<0.5	0.01
Nitrite - N		mg/L	<1	<1	<0.2	0.005
Nitrate and Nitrite - N		mg/L	<3	<3	<0.7	0.01
Sulfate (SO4)	Dissolved	mg/L	7520	7910	300	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	357	468	472	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	293	384	387	5
Total Dissolved Solids	Calculated	mg/L	268000	266000	39600	1
Hardness	Dissolved as CaCO3	mg/L	84500	84600	1700	
Ionic Balance	Dissolved	%	100	102	106	

Approved by:



Randy Neumann, BSc
Vice President

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

Bill To: Alberta Energy Regulator	Project:	Lot ID: 1152021
Report To: Alberta Energy Regulator	ID:	Control Number: C0051274
4999 98Ave NW Suite 402	Name:	Date Received: Jul 29, 2016
Edmonton, AB, Canada	Location:	Date Reported: Aug 16, 2016
T6B 2X3	LSD:	Report Number: 2125525
Attn: Rick Huff	P.O.: 21851	
Sampled By:	Acct code:	
Company:		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	29-Jul-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	29-Jul-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	29-Jul-16	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	02-Aug-16	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	29-Jul-16	Exova Edmonton
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	02-Aug-16	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	02-Aug-16	Exova Edmonton
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	02-Aug-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	02-Aug-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	02-Aug-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-09	02-Aug-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-09	16-Aug-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-11	02-Aug-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-11	16-Aug-16	Exova Edmonton
Solids Dissolved (Total, Fixed and Volatile)	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	02-Aug-16	Exova Edmonton
Sulfide in water	APHA	* Gas Dialysis, Automated Methylene Blue Method, 4500-S2- E	03-Aug-16	Exova Edmonton

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
APHA/USEPA	Standard Methods For Water/ Environmental Protection Agency
ASTM	Annual Book of ASTM Standards
US EPA	US Environmental Protection Agency Test Methods

Methodology and Notes

Bill To:	Alberta Energy Regulator	Project:	Lot ID:	1152021
Report To:	Alberta Energy Regulator	ID:	Control Number:	C0051274
	4999 98Ave NW Suite 402	Name:	Date Received:	Jul 29, 2016
	Edmonton, AB, Canada	Location:	Date Reported:	Aug 16, 2016
	T6B 2X3	LSD:	Report Number:	2125525
Attn:	Rick Huff	P.O.:	21851	
Sampled By:		Acct code:		
Company:				

Comments:

- Report was issued to include retest result for analysis on sample #2 as requested by Rick Huff on Aug 15, 2016. Previous Report #2121403.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Report Transmission Cover Page

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By: Rick Huff
Company: AER

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

Contact & Affiliation	Address	Delivery Commitments
Rick Huff Alberta Energy Regulator	4999 98Ave NW Suite 402 Edmonton, Alberta T6B 2X3 Phone: (780) 641-9759 Fax: null Email: rick.huff@aer.ca	On [Lot Verification] send (COA, COC) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (COC, Invoice) by Email - Single Report

Notes To Clients:

- The ion balance was outside the range 90 - 110% for sample 1149783-1 and 2. The ion balance can be variable in samples with TDS less than 100 mg/L.

Analytical Report

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Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By: Rick Huff
Company: AER

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Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

		Reference Number	1149783-1	1149783-2	1149783-3	
		Sample Date	Jul 07, 2016	Jul 07, 2016	Jul 12, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	2016 Brine BLK / 6.7°C	2016 EQUZ BLK / 6.7°C	100/12-19-070-11W5/0 / 6.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	<0.002	<0.002	4.0	0.002
Bromide		mg/L	<0.02	<0.02	33.7	0.02
Hydrogen Sulfide	Calculated	mg/L	<0.002	<0.002	4.3	
Metals Dissolved						
Silicon	Dissolved	mg/L	<0.05	<0.05	24.2	0.05
Sulfur	Dissolved	mg/L	<0.3	<0.3	411	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	0.000026	0.000005
Aluminum	Dissolved	mg/L	<0.002	<0.002	<0.040	0.002
Antimony	Dissolved	mg/L	<0.0002	<0.0002	<0.004	0.0002
Arsenic	Dissolved	mg/L	<0.0002	<0.0002	<0.004	0.0002
Barium	Dissolved	mg/L	<0.001	<0.001	0.191	0.001
Beryllium	Dissolved	mg/L	<0.0001	<0.0001	<0.002	0.0001
Bismuth	Dissolved	mg/L	<0.0005	<0.0005	<0.01	0.0005
Boron	Dissolved	mg/L	<0.002	<0.002	6.64	0.002
Cadmium	Dissolved	mg/L	<0.00001	<0.00001	<0.0002	0.00001
Chromium	Dissolved	mg/L	<0.0005	<0.0005	<0.01	0.0005
Cobalt	Dissolved	mg/L	<0.0001	<0.0001	<0.002	0.0001
Copper	Dissolved	mg/L	<0.001	<0.001	<0.020	0.001
Lead	Dissolved	mg/L	<0.0001	<0.0001	<0.002	0.0001
Lithium	Dissolved	mg/L	<0.001	<0.001	1.97	0.001
Molybdenum	Dissolved	mg/L	<0.001	<0.001	<0.020	0.001
Nickel	Dissolved	mg/L	<0.0005	<0.0005	<0.01	0.0005
Selenium	Dissolved	mg/L	<0.0002	<0.0002	<0.004	0.0002
Silver	Dissolved	mg/L	<0.00001	<0.00001	<0.0002	0.00001
Strontium	Dissolved	mg/L	<0.001	<0.001	54.8	0.001
Thallium	Dissolved	mg/L	<0.00005	<0.00005	<0.0010	0.00005
Tin	Dissolved	mg/L	<0.001	<0.001	<0.020	0.001
Titanium	Dissolved	mg/L	<0.0005	<0.0005	<0.01	0.0005
Uranium	Dissolved	mg/L	<0.0005	<0.0005	<0.01	0.0005
Vanadium	Dissolved	mg/L	<0.0001	<0.0001	<0.002	0.0001
Zinc	Dissolved	mg/L	<0.001	<0.001	<0.020	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	<7	<7	25100	7
Relative Density at 15/15 ° at 15 °C			1.000	0.999	1.018	

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By: Rick Huff
Company: AER

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

		Reference Number	1149783-1	1149783-2	1149783-3
		Sample Date	Jul 07, 2016	Jul 07, 2016	Jul 12, 2016
		Sample Time	NA	NA	NA
		Sample Location			
		Sample Description	2016 Brine BLK / 6.7°C	2016 EQUZ BLK / 6.7°C	100/12-19-070-11W5/0 / 6.7°C
		Matrix	Water	Water	Water
Analyte	Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued					
C					
Relative Density at 25/25 °C	at 25 °C	0.998	0.997	1.016	
Routine Water					
pH		7.51	5.72	7.50	
Temperature of observed pH	°C	22.1	22.1	22.2	
Electrical Conductivity	at 25 °C	uS/cm	2	17	31300
Calcium	Dissolved	mg/L	<0.2	<0.2	1290
Magnesium	Dissolved	mg/L	<0.2	<0.2	233
Sodium	Dissolved	mg/L	<0.4	<0.4	7560
Potassium	Dissolved	mg/L	<0.4	<0.4	79
Iron	Dissolved	mg/L	<0.01	<0.01	<0.2
Manganese	Dissolved	mg/L	<0.005	<0.005	<0.1
Chloride	Dissolved	mg/L	<0.4	<0.4	14000
Nitrate - N		mg/L	0.03	0.03	<0.2
Nitrite - N		mg/L	<0.005	<0.005	<0.1
Nitrate and Nitrite - N		mg/L	0.03	0.03	<0.3
Sulfate (SO4)	Dissolved	mg/L	<0.9	<0.9	1230
Hydroxide		mg/L	<5	<5	<5
Carbonate		mg/L	7	<6	<6
Bicarbonate		mg/L	<5	<5	298
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5
T-Alkalinity	as CaCO3	mg/L	6.0	<5	244
Total Dissolved Solids	Calculated	mg/L	4	<1	24600
Hardness	Dissolved as CaCO3	mg/L	<1	<1	4170
Ionic Balance	Dissolved	%	<1	<1	97

Analytical Report

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4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
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Sampled By: Rick Huff
Company: AER

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

		Reference Number	1149783-4	1149783-5	1149783-6	
		Sample Date	Jul 12, 2016	Jul 13, 2016	Jul 14, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/12-19-070- 11W5/0B / 6.7°C	100/09-11-061- 12W5/0 / 6.7°C	100/12-21-067- 18W5/3 / 6.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	3.7	0.012	0.007	0.002
Bromide		mg/L	33.9	345	133	0.02
Hydrogen Sulfide	Calculated	mg/L	3.9	0.013	0.007	
Metals Dissolved						
Silicon	Dissolved	mg/L	24.8	<10	26.5	0.05
Sulfur	Dissolved	mg/L	410	200	370	0.3
Mercury	Dissolved	mg/L	<0.000005	<0.000005	<0.000005	0.000005
Aluminum	Dissolved	mg/L	<0.040	<0.400	<0.200	0.002
Antimony	Dissolved	mg/L	<0.004	<0.04	<0.02	0.0002
Arsenic	Dissolved	mg/L	<0.004	<0.04	<0.02	0.0002
Barium	Dissolved	mg/L	0.190	3.29	1.05	0.001
Beryllium	Dissolved	mg/L	<0.002	<0.02	<0.01	0.0001
Bismuth	Dissolved	mg/L	<0.01	<0.1	<0.05	0.0005
Boron	Dissolved	mg/L	6.71	141	52.6	0.002
Cadmium	Dissolved	mg/L	<0.0002	<0.002	<0.001	0.00001
Chromium	Dissolved	mg/L	<0.01	<0.1	<0.05	0.0005
Cobalt	Dissolved	mg/L	<0.002	<0.02	<0.01	0.0001
Copper	Dissolved	mg/L	<0.020	2.60	1.94	0.001
Lead	Dissolved	mg/L	<0.002	<0.02	<0.01	0.0001
Lithium	Dissolved	mg/L	1.93	32.2	13.2	0.001
Molybdenum	Dissolved	mg/L	<0.020	<0.200	<0.100	0.001
Nickel	Dissolved	mg/L	<0.01	<0.1	<0.05	0.0005
Selenium	Dissolved	mg/L	<0.004	<0.04	<0.02	0.0002
Silver	Dissolved	mg/L	<0.0002	<0.002	<0.001	0.00001
Strontium	Dissolved	mg/L	53.9	268	145	0.001
Thallium	Dissolved	mg/L	<0.0010	0.018	<0.0050	0.00005
Tin	Dissolved	mg/L	<0.020	<0.200	<0.100	0.001
Titanium	Dissolved	mg/L	<0.01	<0.1	<0.05	0.0005
Uranium	Dissolved	mg/L	<0.01	<0.1	<0.05	0.0005
Vanadium	Dissolved	mg/L	<0.002	<0.02	<0.01	0.0001
Zinc	Dissolved	mg/L	<0.020	<0.200	<0.100	0.001
Subsample	Field Filtered		Lab Filtered	Lab Filtered	Lab Filtered	
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	24900	185000	81800	7
Relative Density at 15/15 °	at 15 °C		1.018	1.119	1.056	

Analytical Report

Bill To: Alberta Energy Regulator
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4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By: Rick Huff
Company: AER

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

		Reference Number	1149783-4	1149783-5	1149783-6	
		Sample Date	Jul 12, 2016	Jul 13, 2016	Jul 14, 2016	
		Sample Time	NA	NA	NA	
		Sample Location				
		Sample Description	100/12-19-070-11W5/0B / 6.7°C	100/09-11-061-12W5/0 / 6.7°C	100/12-21-067-18W5/3 / 6.7°C	
		Matrix	Water	Water	Water	
Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued						
C						
Relative Density at 25/25 °C	at 25 °C		1.016	1.117	1.054	
Routine Water						
pH			7.53	6.33	7.28	
Temperature of observed pH		°C	22.2	22.2	21.9	
Electrical Conductivity	at 25 °C	uS/cm	30600	216000	81200	1
Calcium	Dissolved	mg/L	1320	3480	2300	0.2
Magnesium	Dissolved	mg/L	238	550	320	0.2
Sodium	Dissolved	mg/L	7770	66200	27700	0.4
Potassium	Dissolved	mg/L	82	1700	670	0.4
Iron	Dissolved	mg/L	<0.2	<2	<1	0.01
Manganese	Dissolved	mg/L	<0.1	<1	<0.5	0.005
Chloride	Dissolved	mg/L	13500	110000	45300	0.4
Nitrate - N		mg/L	<0.2	<2	<1	0.01
Nitrite - N		mg/L	<0.1	<1	<0.5	0.005
Nitrate and Nitrite - N		mg/L	<0.3	<3	<1	0.01
Sulfate (SO4)	Dissolved	mg/L	1230	500	1100	0.9
Hydroxide		mg/L	<5	<5	<5	
Carbonate		mg/L	<6	<6	<6	
Bicarbonate		mg/L	295	142	274	
P-Alkalinity	as CaCO3	mg/L	<5	<5	<5	5
T-Alkalinity	as CaCO3	mg/L	242	117	225	5
Total Dissolved Solids	Calculated	mg/L	24300	183000	77500	1
Hardness	Dissolved as CaCO3	mg/L	4270	11000	7100	
Ionic Balance	Dissolved	%	103	101	104	

Analytical Report

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Sampled By: Rick Huff
Company: AER

Project:
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Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

Reference Number 1149783-7
Sample Date Jul 14, 2016
Sample Time NA
Sample Location
Sample Description 100/12-17-067-
18W5/0 / 6.7°C

Matrix Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Inorganic Nonmetallic Parameters						
Sulfide	Total	mg/L	2.1			0.002
Bromide		mg/L	120			0.02
Hydrogen Sulfide	Calculated	mg/L	2.2			
Metals Dissolved						
Silicon	Dissolved	mg/L	24.6			0.05
Sulfur	Dissolved	mg/L	350			0.3
Mercury	Dissolved	mg/L	<0.000005			0.000005
Aluminum	Dissolved	mg/L	<0.200			0.002
Antimony	Dissolved	mg/L	<0.02			0.0002
Arsenic	Dissolved	mg/L	<0.02			0.0002
Barium	Dissolved	mg/L	0.927			0.001
Beryllium	Dissolved	mg/L	<0.01			0.0001
Bismuth	Dissolved	mg/L	<0.05			0.0005
Boron	Dissolved	mg/L	53.1			0.002
Cadmium	Dissolved	mg/L	<0.001			0.00001
Chromium	Dissolved	mg/L	<0.05			0.0005
Cobalt	Dissolved	mg/L	<0.01			0.0001
Copper	Dissolved	mg/L	<0.100			0.001
Lead	Dissolved	mg/L	<0.01			0.0001
Lithium	Dissolved	mg/L	13.3			0.001
Molybdenum	Dissolved	mg/L	<0.100			0.001
Nickel	Dissolved	mg/L	<0.05			0.0005
Selenium	Dissolved	mg/L	<0.02			0.0002
Silver	Dissolved	mg/L	<0.001			0.00001
Strontium	Dissolved	mg/L	140			0.001
Thallium	Dissolved	mg/L	<0.0050			0.00005
Tin	Dissolved	mg/L	<0.100			0.001
Titanium	Dissolved	mg/L	<0.05			0.0005
Uranium	Dissolved	mg/L	<0.05			0.0005
Vanadium	Dissolved	mg/L	<0.01			0.0001
Zinc	Dissolved	mg/L	<0.100			0.001
Subsample	Field Filtered		Lab Filtered			
Physical and Aggregate Properties						
Solids	Total Dissolved	mg/L dried at 180 °C	79200			7
Relative Density at 15/15 °	at 15 °C		1.055			

Analytical Report

Bill To: Alberta Energy Regulator
Report To: Alberta Energy Regulator
4999 98Ave NW Suite 402
Edmonton, AB, Canada
T6B 2X3
Attn: Rick Huff
Sampled By: Rick Huff
Company: AER

Project:
ID:
Name:
Location:
LSD:
P.O.:
Acct code:

Lot ID: **1149783**
Control Number: C0051273
Date Received: Jul 18, 2016
Date Reported: Jul 21, 2016
Report Number: 2118669

Reference Number 1149783-7
Sample Date Jul 14, 2016
Sample Time NA
Sample Location
Sample Description 100/12-17-067-
18W5/0 / 6.7°C

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties - Continued					
C					
Relative Density at 25/25 °C		1.053			
Routine Water					
pH		7.13			
Temperature of observed pH	°C	22.1			
Electrical Conductivity	at 25 °C uS/cm	79700			1
Calcium	Dissolved mg/L	2240			0.2
Magnesium	Dissolved mg/L	310			0.2
Sodium	Dissolved mg/L	27400			0.4
Potassium	Dissolved mg/L	660			0.4
Iron	Dissolved mg/L	<1			0.01
Manganese	Dissolved mg/L	<0.5			0.005
Chloride	Dissolved mg/L	44300			0.4
Nitrate - N	mg/L	<1			0.01
Nitrite - N	mg/L	<0.5			0.005
Nitrate and Nitrite - N	mg/L	<1			0.01
Sulfate (SO ₄)	Dissolved mg/L	1100			0.9
Hydroxide	mg/L	<5			
Carbonate	mg/L	<6			
Bicarbonate	mg/L	235			
P-Alkalinity	as CaCO ₃ mg/L	<5			5
T-Alkalinity	as CaCO ₃ mg/L	193			5
Total Dissolved Solids	Calculated mg/L	76100			1
Hardness	Dissolved as CaCO ₃ mg/L	6900			
Ionic Balance	Dissolved %	106			

Approved by: 

Anthony Neumann, MSc
Laboratory Operations Manager

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).

Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Methodology and Notes

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Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	20-Jul-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	20-Jul-16	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	20-Jul-16	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	20-Jul-16	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	20-Jul-16	Exova Edmonton
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	20-Jul-16	Exova Edmonton
Mercury (Dissolved) in water	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	20-Jul-16	Exova Edmonton
Metals ICP-MS (Dissolved) in water	US EPA	* Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	20-Jul-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	Hardness by Calculation, 2340 B	20-Jul-16	Exova Edmonton
Metals Trace (Dissolved) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	20-Jul-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-09	20-Jul-16	Exova Edmonton
Relative Density - water	ASTM	* Standard Test Method for Density, Relative Density and API Gravity of Liquids by Digital Density Method, D 4052-11	20-Jul-16	Exova Edmonton
Solids Dissolved (Total, Fixed and Volatile)	APHA	* Total Dissolved Solids Dried at 180 C, 2540 C	20-Jul-16	Exova Edmonton
Sulfide in water	APHA	* Gas Dialysis, Automated Methylene Blue Method, 4500-S2- E	20-Jul-16	Exova Edmonton

* Reference Method Modified

References

APHA Standard Methods for the Examination of Water and Wastewater
APHA/USEPA Standard Methods For Water/ Environmental Protection Agency
ASTM Annual Book of ASTM Standards
US EPA US Environmental Protection Agency Test Methods

Comments:

Methodology and Notes

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-
- The ion balance was outside the range 90 - 110% for sample 1149783-1 and 2. The ion balance can be variable in samples with TDS less than 100 mg/L.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



Project Information

Project ID: 110455
 Project Name: Agreement
 Project Location: _____
 Legal Location: _____
 PO/AFE#: _____
 Proj. Acct. Code: _____
 Quote # 21851

Invoice to:

Company: AER/AGS
 Address: 4999 -98 Ave
Edmonton, AB
 Attention: _____
 Phone: 780 427 2893
 Cell: _____
 Fax: _____
 E-mail: Rick.Huffe aer.ca
 Agreement ID: 110455
 Copy of report: _____

Report To:

Company: Same as invoice
 Address: _____
 Attention: _____
 Phone: _____
 Cell: _____
 Fax: _____
 E-mail 1: _____
 E-mail 2: _____
 Copy of invoice: _____

Report Results

E-Mail ☒ HCDWQG
 Mail ☐ Ab Tier 1
 Online ☐ SPIGEC
 Fax ☐ BCCSR
 PDF ☐ Other (list below)
 Excel ☐
 QA/QC ☐

Regulatory Requirement

Sample Custody (please print)

Sampled by: Rick Huff

Company: AER

This section for Lab use only

Date/Time stamp:
JUL 18 PM 1:52

RUSH Priority

Emergency (contact lab for turnaround and pricing)
 Priority 1-2 working days (100% surcharge)
 Urgent 2-3 working days (50% surcharge)

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Date Required: _____ Signature: [Signature]

Special Instructions/Comments (please include contact information including ph. # if different from above).

ALL SAMPLES COLLECTED ON JULY 12 AND LATER ARE COLLECTED
 BRINES AND POSE A POTENTIAL H2S HAZARD.

	Site I.D.	Sample Description	Depth start end in cm m	Date/Time Sampled	Matrix	Sampling Method
1		2016 Brine BLK		July 7, 2016	W	
2		2016 EPUZP BLK		July 7, 2016	W	
3		100/12-19-070-11W5/0		July 12, 2016	W	
4		100/12-19-070-11W5/0B		July 12, 2016	W	
5		100/09-11-061-12W5/0		July 13, 2016	W	
6		100/12-21-067-18W5/3		July 14, 2016	W	
7		100/12-17-067-18W5/0		July 14, 2016	W	
8						
9						
10						
11						
12						
13						
14						
15						

Number of Containers

TDS
ICBR
SUL
SPGR
TW33

Enter tests above
 (✓ relevant samples below)

Indicate in the space allotted any deficiencies by the corresponding number.

1. Indicate any samples that were not packaged well
2. Indicate any samples not received in Exova supplies
3. Indicate any samples that were not clearly labeled
4. Indicate any samples not received within the required hold time or temp.
5. Indicate any missing or extra samples
6. Indicate any samples that were received broken
7. Indicate any samples where sufficient volume was not received
8. Indicate any samples received in an inappropriate container

Submission of this form acknowledges acceptance of Exova's Standard Terms and Conditions (<http://www.exova.com/about/terms-and-conditions/>)

Please indicate any potentially hazardous samples

Lot: 1149783 ^{COC}



Shipping: COD Y/ N

and size of coolers

Temp. received: 6.7

Delivery Method: Hand

Waybill:

Received by: [Signature]