Groundwater Resources
Information Technologies Ltd.

March 16th, 2021

West-Can Seal Coating Inc.
Box 669
2317 – 16th Street
Didsbury, AB T0M 0W0

Attention: Mathew and Andrew Arnill

Sent via e-mail to: marnill@west-cansealcoating.com; aarnill@west-cansealcoating.com

RE: Updated Groundwater Chemistry and Field Verified Survey, Sundre Gravel Pit - South McDougal Flats S E – 35 – 32 – 06W5 Mountainview County, Alberta

Dear Mr. Arnill

Groundwater sampling from two wells in the gravel pit located in SE – 35 – 32 – 0 6W5 west of Sundre (South McDougal Flats), was undertaken to assess the concentrations of metal and salt constituents. The results show all salts and metals meet drinking water standards and no indications of groundwater contamination by these products are present.

An updated field verified survey was also undertaken which shows minimal changes of groundwater users in the area compared to the 2018 survey.

Background

A water sample was initially collected on February 26th, 2018 by personnel from GRIT Ltd. during the study to determine aquifer properties for the supply well. The water was analyzed by Exova/Element Labs for analysis of routine dissolved salts and the water was found to be generally acceptable for drinking water purposes.

Recent media coverage surrounding gravel pits has highlighted concern with respect to gravel pit operations and their affect on the groundwater quality. Open houses (via Zoom) were held on this gravel pit application with the community in February 2021 and some concerns were expressed with respect to the effect of gravel mining on groundwater quality, with selenium concentrations expressed as a parameter of concern.

Limited academic studies are available but have generally concluded that gravel operations conducted above the water table have little effect on groundwater quality. Mead. R. D., 1995 and Hatva. T., 1994 evaluated the affects of gravel pit operations on the near surface groundwater. Removal of the top surface soil layer in a gravel pit operation above the water table can affect groundwater quality; increased chloride, bicarbonate, and sulphate

concentrations were found in gravel extracted areas but these increases were minor and the groundwater quality still met Canadian drinking water standards.

Mead. R.D., 1995 concluded that "Excavating above the water table with no associated activities such as vehicle maintenance or asphalt batch plants, causes a relatively low risk to groundwater quantity and quality."

As the Sundre pit has seen some gravel extraction in part of the area, should gravel mining cause an increase in metals or salts these impacts would be expected to be shown in the recent sampling results.

Neighbouring Groundwater Users Field Verified Survey

An update to our 2018 Field Verified Survey was undertaken on March 4th, 2021 to determine if additional groundwater users are present. Due to Covid restrictions a door to door survey was not undertaken and the survey consisted of a field survey by road observation.

In 2017 fifty-five groundwater users were identified within a 1.6 km radius of the site. Only one new user was identified in 2021. This user was a residential unit in the newly developed subdivision on the north side of NE – 26.

GRIT is prepared to measure water levels in individual homeowners wells to update the water level measurements upon request.

Field Groundwater Sampling Program

Out of an abundance of caution and raised concerns from neighbors, groundwater samples were collected on March 4th, 2021 to measure the concentrations of the metals to determine if, and at what concentration, they are present.

Two wells were sampled – the on site water supply and an on site monitoring well. The location of the water supply and monitoring well are shown on the attached plate. The monitoring well is located between the planned gravel operations on the site and the majority of the residences in the area to serve as an "early warning" monitoring well for the operation.

The samples were collected with the aid of new disposable bailers for each well. Field parameters for electrical conductivity (EC), temperature and pH were recorded at the time of sample collection with the aid of an Oaktron EC/pH/Temperature meter. The samples were collected into appropriate containers as supplied by ALS Labs and appropriate preservatives were added. The samples collected for dissolved metals were field filtered through a 0.45 µm filter prior to the addition of the preservatives. The samples were kept at a temperature of approximately 4° C and immediately delivered to ALS Labs on the day of sample collection.

Results

The water chemistry results are summarised in the table below in comparison to Health Canada water quality guidelines.

Parameter	Units	2018 Supply Well	2021 Supply Well	2021 Monitoring well	Drinking water Limits
Field / Lab parameters					
Depth	M	17.7	17.7		
Field Temp	°C	5.8	5.6	3.4	
Field pH	pH	7.83	8.26	7.75	
Field EC	µS/cm	291	151.8	550	
Lab pH	pH	7.82	8.89	8.30	6.5 – 8.5
Lab EC	µS/cm	466	110	431	
Routine Salts					
Calcium	mg/L	64.2	2.13	62.5	
Magnesium	mg/L	19.3	8.21	20.1	
Sodium	mg/L	6.2	9.61	5.72	200 (AO)
Potassium	mg/L	1.2	2.18	1.05	
Iron	mg/L	0.02	12.2	0.093	<0.03 (AO)
Manganese	mg/L	0.193	0.174	0.00294	<0.05 (AO)
Chloride	mg/L	1.5	<0.5	2.51	250 (AO)
Fluoride	mg/L	0.11	<0.02	0.118	1.5 (MAC)
Nitrate-N	mg/L	0.024	<0.022	0.617	10 (MAC)
Sulfate	mg/L	49.3	0.55	48.2	500 (AO)
Bicarbonate	mg/L	238	64.1	228	
Total Alkalinity	mg/L	195	62.9	191	
TDS	mg/L	259	60.5	259	500 (MAC)
Total Metals					
Aluminum	mg/L		0.064	0.0353	<0.1 (OG)
Antimony	mg/L		0.00044	0.00022	0.006 (MAC)
Arsenic	mg/L		0.00125	<0.00010	0.01 (MAC)
Barium	mg/L		0.00303	0.0826	2.0 (MAC)
Boron	mg/L		<0.010	<0.010	5.0 (MAC)

Cadmium	mg/L		0.000194	0.0000089	0.007 (MAC)
Chromium	mg/L		0.0182	0.00024	0.05 (MAC)
Hexavalent Chromium	mg/L		<0.00050	<0.00050	0.05 (MAC)
Copper	mg/L		0.0506	0.00319	1.0 (AO)
Lead	mg/L		0.000175	0.000123	0.005
Nickel	mg/L		0.0175	0.00184	
Selenium	mg/L		0.000171	0.000580	0.05 (MAC)
Silver	mg/L		0.000023	<0.000010	
Uranium	mg/L		0.000143	0.000622	0.02 (MAC)
Zinc	mg/L		0.003	0.0049	5.0 (AO)
Dissolved Metals					
Aluminum	mg/L		< 0.0010	< 0.0010	<0.1 (OG)
Antimony	mg/L		< 0.00010	< 0.00010	0.006 (MAC)
Arsenic	mg/L		0.00010	0.0010	0.01 (MAC)
Barium	mg/L		0.00158	0.0914	2.0 (MAC)
Boron	mg/L		< 0.010	0.010	5.0 (MAC)
Cadmium	mg/L		0.000006	< 0.000005	0.007 (MAC)
Chromium	mg/L		< 0.00010	0.0010	0.05 (MAC)
Hexavalent Chromium	mg/L		< 0.00050	< 0.00050	0.05 (MAC)
Copper	mg/L		0.00119	0.00651	1.0 (AO)
Lead	mg/L		< 0.000050	0.000104	0.005
Nickel	mg/L		< 0.00050	< 0.00050	
Selenium	mg/L		< 0.00005	0.000639	0.05 (MAC)
Silver	mg/L		< 0.000010	< 0.00001	
Uranium	mg/L		< 0.000010	0.000657	0.02 (MAC)
Zinc	mg/L		< 0.0010	0.0029	5.0 (AO)

The results show that all parameters meet drinking water criteria and no indications of contamination due to gravel operations is present. Selenium concentrations are less than 0.0006 mg/L which is much less than the drinking water criteria of 0.05 mg/L.

Iron is high in the supply well which is likely related to oxidation of the steel casing.

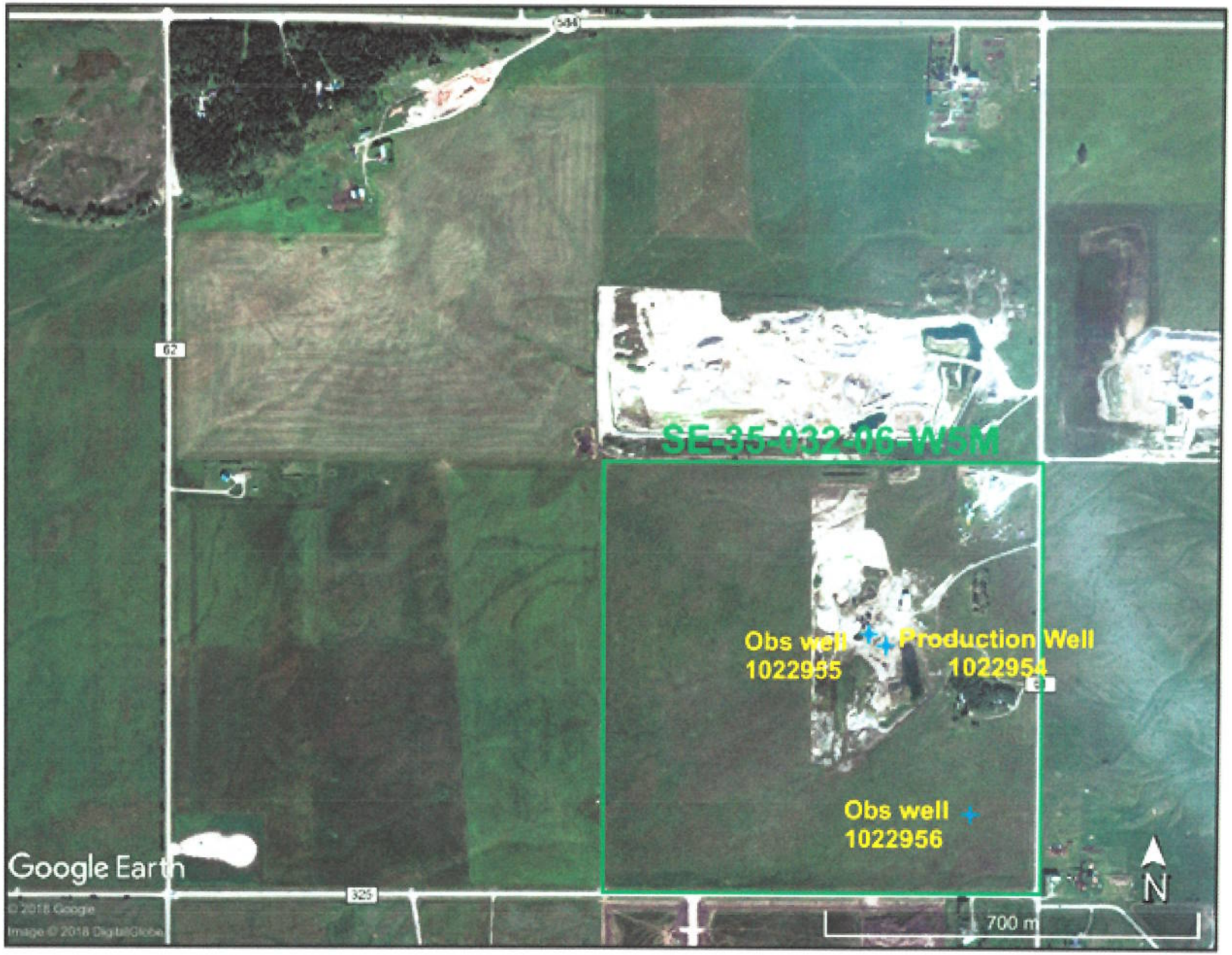
The rock type making up the gravel deposit consists largely of limestone, dolomite and quartzite boulders. These minerals do not contain large amounts of metals (unlike volcanic rocks) which likely in part accounts for the low concentration of metals compared to volcanic rock type aquifers.

Should you have any questions please do not hesitate to contact the undersigned.

Yours truly

Ken Hugo, P.Geol.
APEGA P15289

/att – Site map showing well locations, ALS laboratory analysis report



Groundwater Resources
Information Technologies Ltd.

West - Can Seal Coatings

Well Locations - Sundre Gravel Pit

Date: Mar 16 2021	File: 17-1436	Plate No: 1

Groundwater Information Technologies
(GRIT) LTD.
ATTN: Ken Hugo
#44, 2110 - 41 Avenue NE
Calgary AB T2E 8Z7

Date Received: 04-MAR-21
Report Date: 12-MAR-21 16:35 (MT)
Version: FINAL

Client Phone: 403-250-3518

Certificate of Analysis

Lab Work Order #: L2563867

Project P.O. #:	NOT SUBMITTED
Job Reference:	17-1436
C of C Numbers:	17-703925
Legal Site Desc:	

Dhaliwal

Inayat Dhaliwal
Account Manager

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2563867-1 1022954							
Sampled By: CLIENT on 04-MAR-21 @ 10:30							
Matrix: WATER							
Total Metals (ABT1)							
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0640		0.0030	mg/L		10-MAR-21	R5398105
Antimony (Sb)-Total	0.00044		0.00010	mg/L		10-MAR-21	R5398105
Arsenic (As)-Total	0.00125		0.00010	mg/L		10-MAR-21	R5398105
Barium (Ba)-Total	0.00303		0.00010	mg/L		10-MAR-21	R5398105
Boron (B)-Total	<0.010		0.010	mg/L		10-MAR-21	R5398105
Cadmium (Cd)-Total	0.000194		0.0000050	mg/L		10-MAR-21	R5398105
Calcium (Ca)-Total	2.13		0.050	mg/L		10-MAR-21	R5398105
Chromium (Cr)-Total	0.0182		0.00010	mg/L		10-MAR-21	R5398105
Copper (Cu)-Total	0.0506		0.00050	mg/L		10-MAR-21	R5398105
Iron (Fe)-Total	12.2		0.010	mg/L		10-MAR-21	R5398105
Lead (Pb)-Total	0.000175		0.000050	mg/L		10-MAR-21	R5398105
Magnesium (Mg)-Total	8.21		0.0050	mg/L		10-MAR-21	R5398105
Manganese (Mn)-Total	0.174		0.00010	mg/L		10-MAR-21	R5398105
Nickel (Ni)-Total	0.0175		0.00050	mg/L		10-MAR-21	R5398105
Potassium (K)-Total	2.18		0.050	mg/L		10-MAR-21	R5398105
Selenium (Se)-Total	0.000171		0.000050	mg/L		10-MAR-21	R5398105
Silver (Ag)-Total	0.000023		0.000010	mg/L		10-MAR-21	R5398105
Sodium (Na)-Total	9.61		0.050	mg/L		10-MAR-21	R5398105
Uranium (U)-Total	0.000143		0.000010	mg/L		10-MAR-21	R5398105
Zinc (Zn)-Total	0.0030		0.0030	mg/L		10-MAR-21	R5398105
Miscellaneous Parameters							
Hexavalent Chromium	<0.00050		0.00050	mg/L		09-MAR-21	R5399070
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	<0.50		0.50	mg/L		09-MAR-21	R5398534
Dissolved Mercury in Water by CVAAS							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		10-MAR-21	R5399290
Dissolved Mercury Filtration Location	FIELD					10-MAR-21	R5398976
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					08-MAR-21	R5398233
Aluminum (Al)-Dissolved	<0.0010		0.0010	mg/L		08-MAR-21	R5398105
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		08-MAR-21	R5398105
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L		08-MAR-21	R5398105
Barium (Ba)-Dissolved	0.00158		0.00010	mg/L		08-MAR-21	R5398105
Boron (B)-Dissolved	<0.010		0.010	mg/L		08-MAR-21	R5398105
Cadmium (Cd)-Dissolved	0.0000060		0.0000050	mg/L		08-MAR-21	R5398105
Calcium (Ca)-Dissolved	1.83		0.050	mg/L		08-MAR-21	R5398105
Chromium (Cr)-Dissolved	<0.00010		0.00010	mg/L		08-MAR-21	R5398105
Copper (Cu)-Dissolved	0.00119		0.00020	mg/L		08-MAR-21	R5398105
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		08-MAR-21	R5398105
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L		08-MAR-21	R5398105
Magnesium (Mg)-Dissolved	8.04		0.0050	mg/L		08-MAR-21	R5398105
Manganese (Mn)-Dissolved	0.00269		0.00010	mg/L		08-MAR-21	R5398105
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L		08-MAR-21	R5398105
Potassium (K)-Dissolved	2.26		0.050	mg/L		08-MAR-21	R5398105
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L		08-MAR-21	R5398105
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		08-MAR-21	R5398105
Sodium (Na)-Dissolved	10.1		0.050	mg/L		08-MAR-21	R5398105
Uranium (U)-Dissolved	<0.000010		0.000010	mg/L		08-MAR-21	R5398105
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L		08-MAR-21	R5398105
Fluoride in Water by IC							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2563867-1 1022954							
Sampled By: CLIENT on 04-MAR-21 @ 10:30							
Matrix: WATER							
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		09-MAR-21	R5398534
Ion Balance Calculation							
Ion Balance	98.5			%		12-MAR-21	
TDS (Calculated)	60.5			mg/L		12-MAR-21	
Hardness (as CaCO3)	37.7			mg/L		12-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	<0.020	HTD	0.020	mg/L		09-MAR-21	R5398534
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	<0.022		0.022	mg/L		09-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010	HTD	0.010	mg/L		09-MAR-21	R5398534
Sulfate in Water by IC							
Sulfate (SO4)	0.55		0.30	mg/L		09-MAR-21	R5398534
pH, Conductivity and Total Alkalinity							
pH	8.89		0.10	pH		11-MAR-21	R5400402
Conductivity (EC)	110		2.0	uS/cm		11-MAR-21	R5400402
Bicarbonate (HCO3)	64.1		5.0	mg/L		11-MAR-21	R5400402
Carbonate (CO3)	6.2		5.0	mg/L		11-MAR-21	R5400402
Hydroxide (OH)	<5.0		5.0	mg/L		11-MAR-21	R5400402
Alkalinity, Total (as CaCO3)	62.9		2.0	mg/L		11-MAR-21	R5400402
L2563867-2 1022956 OBS							
Sampled By: CLIENT on 04-MAR-21 @ 11:00							
Matrix: WATER							
Total Metals (ABT1)							
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.0353		0.0030	mg/L		10-MAR-21	R5398105
Antimony (Sb)-Total	0.00022		0.00010	mg/L		10-MAR-21	R5398105
Arsenic (As)-Total	<0.00010		0.00010	mg/L		10-MAR-21	R5398105
Barium (Ba)-Total	0.0826		0.00010	mg/L		10-MAR-21	R5398105
Boron (B)-Total	<0.010		0.010	mg/L		10-MAR-21	R5398105
Cadmium (Cd)-Total	0.0000089		0.0000050	mg/L		10-MAR-21	R5398105
Calcium (Ca)-Total	62.5		0.050	mg/L		10-MAR-21	R5398105
Chromium (Cr)-Total	0.00024		0.00010	mg/L		10-MAR-21	R5398105
Copper (Cu)-Total	0.00319		0.00050	mg/L		10-MAR-21	R5398105
Iron (Fe)-Total	0.093		0.010	mg/L		10-MAR-21	R5398105
Lead (Pb)-Total	0.000123		0.000050	mg/L		10-MAR-21	R5398105
Magnesium (Mg)-Total	20.1		0.0050	mg/L		10-MAR-21	R5398105
Manganese (Mn)-Total	0.00294		0.00010	mg/L		10-MAR-21	R5398105
Nickel (Ni)-Total	0.00184		0.00050	mg/L		10-MAR-21	R5398105
Potassium (K)-Total	1.05		0.050	mg/L		10-MAR-21	R5398105
Selenium (Se)-Total	0.000580		0.000050	mg/L		10-MAR-21	R5398105
Silver (Ag)-Total	<0.000010		0.000010	mg/L		10-MAR-21	R5398105
Sodium (Na)-Total	5.72		0.050	mg/L		10-MAR-21	R5398105
Uranium (U)-Total	0.000622		0.000010	mg/L		10-MAR-21	R5398105
Zinc (Zn)-Total	0.0049		0.0030	mg/L		10-MAR-21	R5398105
Miscellaneous Parameters							
Hexavalent Chromium	<0.00050		0.00050	mg/L		09-MAR-21	R5399070
Major Ions & Trace Dissolved Metals							
Chloride in Water by IC							
Chloride (Cl)	2.51		0.50	mg/L		06-MAR-21	R5398534
Dissolved Mercury in Water by CVAAS							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2563867-2 1022956 OBS							
Sampled By: CLIENT on 04-MAR-21 @ 11:00							
Matrix: WATER							
Dissolved Mercury in Water by CVAAS							
Mercury (Hg)-Dissolved	<0.0000050		0.0000050	mg/L		10-MAR-21	R5399290
Dissolved Mercury Filtration Location	FIELD					10-MAR-21	R5398976
Dissolved Metals in Water by CRC ICPMS							
Dissolved Metals Filtration Location	FIELD					08-MAR-21	R5398233
Aluminum (Al)-Dissolved	<0.0010		0.0010	mg/L		08-MAR-21	R5398105
Antimony (Sb)-Dissolved	<0.00010		0.00010	mg/L		08-MAR-21	R5398105
Arsenic (As)-Dissolved	0.00010		0.00010	mg/L		08-MAR-21	R5398105
Barium (Ba)-Dissolved	0.0914		0.00010	mg/L		08-MAR-21	R5398105
Boron (B)-Dissolved	0.010		0.010	mg/L		08-MAR-21	R5398105
Cadmium (Cd)-Dissolved	<0.0000050		0.0000050	mg/L		08-MAR-21	R5398105
Calcium (Ca)-Dissolved	63.0		0.050	mg/L		08-MAR-21	R5398105
Chromium (Cr)-Dissolved	0.00016		0.00010	mg/L		08-MAR-21	R5398105
Copper (Cu)-Dissolved	0.00651		0.00020	mg/L		08-MAR-21	R5398105
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		08-MAR-21	R5398105
Lead (Pb)-Dissolved	0.000104		0.000050	mg/L		08-MAR-21	R5398105
Magnesium (Mg)-Dissolved	20.9		0.0050	mg/L		08-MAR-21	R5398105
Manganese (Mn)-Dissolved	0.00011		0.00010	mg/L		08-MAR-21	R5398105
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L		08-MAR-21	R5398105
Potassium (K)-Dissolved	1.04		0.050	mg/L		08-MAR-21	R5398105
Selenium (Se)-Dissolved	0.000639		0.000050	mg/L		08-MAR-21	R5398105
Silver (Ag)-Dissolved	<0.000010		0.000010	mg/L		08-MAR-21	R5398105
Sodium (Na)-Dissolved	6.08		0.050	mg/L		08-MAR-21	R5398105
Uranium (U)-Dissolved	0.000657		0.000010	mg/L		08-MAR-21	R5398105
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L		08-MAR-21	R5398105
Fluoride In Water by IC							
Fluoride (F)	0.118		0.020	mg/L		06-MAR-21	R5398534
Ion Balance Calculation							
Ion Balance	106			%		12-MAR-21	
TDS (Calculated)	259			mg/L		12-MAR-21	
Hardness (as CaCO3)	243			mg/L		12-MAR-21	
Nitrate in Water by IC							
Nitrate (as N)	0.617		0.020	mg/L		06-MAR-21	R5398534
Nitrate+Nitrite							
Nitrate and Nitrite (as N)	0.617		0.022	mg/L		09-MAR-21	
Nitrite in Water by IC							
Nitrite (as N)	<0.010		0.010	mg/L		06-MAR-21	R5398534
Sulfate in Water by IC							
Sulfate (SO4)	48.2		0.30	mg/L		06-MAR-21	R5398534
pH, Conductivity and Total Alkalinity							
pH	8.30		0.10	pH		11-MAR-21	R5400402
Conductivity (EC)	431		2.0	uS/cm		11-MAR-21	R5400402
Bicarbonate (HCO3)	228		5.0	mg/L		11-MAR-21	R5400402
Carbonate (CO3)	<5.0		5.0	mg/L		11-MAR-21	R5400402
Hydroxide (OH)	<5.0		5.0	mg/L		11-MAR-21	R5400402
Alkalinity, Total (as CaCO3)	191		2.0	mg/L		11-MAR-21	R5400402

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CR-CR6-ED	Water	Chromium, Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)

This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.
Results are based on an un-filtered, field-preserved sample.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-D-CVAA-CL	Water	Dissolved Mercury in Water by CVAAS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

IONBALANCE-CL	Water	Ion Balance Calculation	APHA 1030E
MET-D-CCMS-CL	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-CL	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

N2N3-CALC-CL	Water	Nitrate+Nitrite	CALCULATION
NO2-IC-N-CL	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-N-CL	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH/EC/ALK-CL	Water	pH, Conductivity and Total Alkalinity	APHA 4500H,2510,2320

All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)
pH measurement is determined from the activity of the hydrogen ions using a hydrogen electrode and a reference electrode.
Alkalinity measurement is based on the sample's capacity to neutralize acid
Conductivity measurement is based on the sample's capacity to convey an electric current

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
17-703925			

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2563867 Report Date: 12-MAR-21

Client: Groundwater Information Technologies (GRIT) LTD.
#44, 2110 - 41 Avenue NE
Calgary AB T2E 8Z7

Contact: Ken Hugo

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-N-CL	**Water**							
Batch R5398534								
WG3499229-2 LCS								
Chloride (Cl)			101.8		%		90-110	06-MAR-21
WG3499229-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	06-MAR-21
CR-CR6-ED	**Water**							
Batch R5399070								
WG3499510-2 LCS								
Hexavalent Chromium			101.0		%		70-130	09-MAR-21
WG3499510-1 MB								
Hexavalent Chromium			<0.00050		mg/L		0.0005	09-MAR-21
F-IC-N-CL	**Water**							
Batch R5398534								
WG3499229-2 LCS								
Fluoride (F)			109.1		%		90-110	06-MAR-21
WG3499229-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	06-MAR-21
HG-D-CVAA-CL	**Water**							
Batch R5399290								
WG3499802-6 LCS								
Mercury (Hg)-Dissolved			95.1		%		80-120	11-MAR-21
WG3499802-5 MB								
Mercury (Hg)-Dissolved			<0.000005		mg/L		0.000005	11-MAR-21
MET-D-CCMS-CL	**Water**							
Batch R5398105								
WG3498891-2 LCS		**TMRM**						
Aluminum (Al)-Dissolved			98.1		%		80-120	08-MAR-21
Antimony (Sb)-Dissolved			103.8		%		80-120	08-MAR-21
Arsenic (As)-Dissolved			102.2		%		80-120	08-MAR-21
Barium (Ba)-Dissolved			101.2		%		80-120	08-MAR-21
Boron (B)-Dissolved			99.8		%		80-120	08-MAR-21
Cadmium (Cd)-Dissolved			96.6		%		80-120	08-MAR-21
Calcium (Ca)-Dissolved			95.6		%		80-120	08-MAR-21
Chromium (Cr)-Dissolved			100.5		%		80-120	08-MAR-21
Copper (Cu)-Dissolved			95.5		%		80-120	08-MAR-21
Iron (Fe)-Dissolved			94.9		%		80-120	08-MAR-21
Lead (Pb)-Dissolved			98.5		%		80-120	08-MAR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5398105								
WG3498891-2 LCS		**TMRM**						
Magnesium (Mg)-Dissolved			100.9		%		80-120	08-MAR-21
Manganese (Mn)-Dissolved			98.5		%		80-120	08-MAR-21
Nickel (Ni)-Dissolved			97.2		%		80-120	08-MAR-21
Potassium (K)-Dissolved			99.8		%		80-120	08-MAR-21
Selenium (Se)-Dissolved			103.4		%		80-120	08-MAR-21
Silver (Ag)-Dissolved			96.4		%		80-120	08-MAR-21
Sodium (Na)-Dissolved			101.2		%		80-120	08-MAR-21
Uranium (U)-Dissolved			100.2		%		80-120	08-MAR-21
Zinc (Zn)-Dissolved			98.6		%		80-120	08-MAR-21
WG3498891-6 LCS		**TMRM**						
Aluminum (Al)-Dissolved			102.5		%		80-120	08-MAR-21
Antimony (Sb)-Dissolved			111.6		%		80-120	08-MAR-21
Arsenic (As)-Dissolved			108.7		%		80-120	08-MAR-21
Barium (Ba)-Dissolved			106.5		%		80-120	08-MAR-21
Boron (B)-Dissolved			105.6		%		80-120	08-MAR-21
Cadmium (Cd)-Dissolved			102.6		%		80-120	08-MAR-21
Calcium (Ca)-Dissolved			99.5		%		80-120	08-MAR-21
Chromium (Cr)-Dissolved			102.9		%		80-120	08-MAR-21
Copper (Cu)-Dissolved			101.8		%		80-120	08-MAR-21
Iron (Fe)-Dissolved			99.1		%		80-120	08-MAR-21
Lead (Pb)-Dissolved			102.2		%		80-120	08-MAR-21
Magnesium (Mg)-Dissolved			113.6		%		80-120	08-MAR-21
Manganese (Mn)-Dissolved			102.6		%		80-120	08-MAR-21
Nickel (Ni)-Dissolved			99.9		%		80-120	08-MAR-21
Potassium (K)-Dissolved			106.0		%		80-120	08-MAR-21
Selenium (Se)-Dissolved			106.6		%		80-120	08-MAR-21
Silver (Ag)-Dissolved			102.7		%		80-120	08-MAR-21
Sodium (Na)-Dissolved			106.3		%		80-120	08-MAR-21
Uranium (U)-Dissolved			105.6		%		80-120	08-MAR-21
Zinc (Zn)-Dissolved			102.4		%		80-120	08-MAR-21
WG3498891-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-MAR-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5398105								
WG3498891-1 MB								
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-MAR-21
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	08-MAR-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-MAR-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-MAR-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-MAR-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	08-MAR-21
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-MAR-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-MAR-21
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-MAR-21
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-MAR-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-MAR-21
WG3498891-5 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-MAR-21
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-MAR-21
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	08-MAR-21
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-MAR-21
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-MAR-21
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-MAR-21
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	08-MAR-21
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-MAR-21
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-MAR-21
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-MAR-21
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-MAR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5398105								
WG3498891-5 MB								
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-MAR-21
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-MAR-21
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-MAR-21
MET-T-CCMS-CL	**Water**							
Batch R5397285								
WG3497631-2 LCS		**TMRM**						
Aluminum (Al)-Total			99.4		%		80-120	05-MAR-21
Antimony (Sb)-Total			117.0		%		80-120	05-MAR-21
Arsenic (As)-Total			102.4		%		80-120	05-MAR-21
Barium (Ba)-Total			96.4		%		80-120	05-MAR-21
Boron (B)-Total			104.4		%		80-120	05-MAR-21
Cadmium (Cd)-Total			95.9		%		80-120	05-MAR-21
Calcium (Ca)-Total			100.4		%		80-120	05-MAR-21
Chromium (Cr)-Total			95.7		%		80-120	05-MAR-21
Copper (Cu)-Total			95.1		%		80-120	05-MAR-21
Iron (Fe)-Total			88.5		%		80-120	05-MAR-21
Lead (Pb)-Total			99.1		%		80-120	05-MAR-21
Magnesium (Mg)-Total			109.7		%		80-120	05-MAR-21
Manganese (Mn)-Total			97.4		%		80-120	05-MAR-21
Nickel (Ni)-Total			95.4		%		80-120	05-MAR-21
Potassium (K)-Total			100.8		%		80-120	05-MAR-21
Selenium (Se)-Total			104.3		%		80-120	05-MAR-21
Silver (Ag)-Total			93.4		%		80-120	05-MAR-21
Sodium (Na)-Total			99.6		%		80-120	05-MAR-21
Uranium (U)-Total			88.2		%		80-120	05-MAR-21
Zinc (Zn)-Total			90.7		%		80-120	05-MAR-21
WG3497631-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	05-MAR-21
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	05-MAR-21
Arsenic (As)-Total			<0.00010		mg/L		0.0001	05-MAR-21
Barium (Ba)-Total			<0.00010		mg/L		0.0001	05-MAR-21
Boron (B)-Total			<0.010		mg/L		0.01	05-MAR-21
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	05-MAR-21
Calcium (Ca)-Total			<0.050		mg/L		0.05	05-MAR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-CL	**Water**							
Batch R5397285								
WG3497631-1 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	05-MAR-21
Copper (Cu)-Total			<0.00050		mg/L		0.0005	05-MAR-21
Iron (Fe)-Total			<0.010		mg/L		0.01	05-MAR-21
Lead (Pb)-Total			<0.000050		mg/L		0.00005	05-MAR-21
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	05-MAR-21
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	05-MAR-21
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	05-MAR-21
Potassium (K)-Total			<0.050		mg/L		0.05	05-MAR-21
Selenium (Se)-Total			<0.000050		mg/L		0.00005	05-MAR-21
Silver (Ag)-Total			<0.000010		mg/L		0.00001	05-MAR-21
Sodium (Na)-Total			<0.050		mg/L		0.05	05-MAR-21
Uranium (U)-Total			<0.000010		mg/L		0.00001	05-MAR-21
Zinc (Zn)-Total			<0.0030		mg/L		0.003	05-MAR-21
NO2-IC-N-CL	**Water**							
Batch R5398534								
WG3499229-2 LCS								
Nitrite (as N)			102.8		%		90-110	06-MAR-21
WG3499229-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	06-MAR-21
NO3-IC-N-CL	**Water**							
Batch R5398534								
WG3499229-2 LCS								
Nitrate (as N)			102.7		%		90-110	06-MAR-21
WG3499229-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	06-MAR-21
PH/EC/ALK-CL	**Water**							
Batch R5400402								
WG3501418-14 LCS								
Conductivity (EC)			103.3		%		90-110	11-MAR-21
Alkalinity, Total (as CaCO3)			105.4		%		85-115	11-MAR-21
WG3501418-13 MB								
Conductivity (EC)			<2.0		uS/cm		2	11-MAR-21
Bicarbonate (HCO3)			<5.0		mg/L		5	11-MAR-21
Carbonate (CO3)			<5.0		mg/L		5	11-MAR-21
Hydroxide (OH)			<5.0		mg/L		5	11-MAR-21

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH/EC/ALK-CL	**Water**							
Batch R5400402								
WG3501418-13 MB								
Alkalinity, Total (as CaCO3)			<2.0		mg/L		2	11-MAR-21
SO4-IC-N-CL	**Water**							
Batch R5398534								
WG3499229-2 LCS								
Sulfate (SO4)			103.1		%		90-110	06-MAR-21
WG3499229-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	06-MAR-21

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate in Water by IC							
	1	04-MAR-21 10:30	09-MAR-21 11:56	3	5	days	EHT
Nitrite in Water by IC							
	1	04-MAR-21 10:30	09-MAR-21 11:56	3	5	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2563867 were received on 04-MAR-21 13:42.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

(ALS) Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L2563867-COFC

COC Number: 17 - 703925

Page of

Report To	Contact and company name below will appear on the final report
Company:	GRIT Ltd
Contact:	Ken Hugo
Phone:	403 650 8511
	Company address below will appear on the final report
Street:	#44 2110 41st Ave NE
City/Province:	Calgary
Postal Code:	T2E 8Z7

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	khugo@GRITLtd.com
Email 2	equardero@gritltd.com
Email 3	

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)			
Regular [R]	☑ Standard TAT if received by 3 pm - business days - no surcharges apply		
PRIORITY (Business Days)	4 day [P4-20%] ☐	EMERGENCY	1 Business day [E-100%] ☐
	3 day [P3-25%] ☐		Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] ☐
	2 day [P2-50%] ☐		
Date and Time Required for all E&P TATs:			dd-mmm-yy hh:mm
For tests that can not be performed according to the service level selected, you will be contacted.			

Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	GRIT Ltd
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	khugo@gritltd.com
Email 2	equardero@gritltd.com

Project Information	
ALS Account # / Quote #:	
Job #:	17-1436
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only):	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Routine	Total metals	Dissolved Metals	Hg	Hexavalent chromium	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	10 22954	04-Mar-21	10:30	H_2O	✓	✓	✓	✓	✓			
	10 22956 Obs	04-Mar-21	11:00	H_2O	✓	✓	✓	✓	✓			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)			
Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice Packs ☐	Ice Cubes ☑	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☐		
INITIAL COOLER TEMPERATURES °C	6	FINAL COOLER TEMPERATURES °C	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Erik Quardero	Date: March 4/2021	Time: 1:40 pm	Received by:	Date: 3/4	Time: 1:42 pm	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.