

TECHNICAL MEMORANDUM

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2018 WESTBAY SYSTEM GROUNDWATER MONITORING INVESTIGATION

1.0 INTRODUCTION

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is developing the Whale Tail Pit Project that was approved by the Nunavut Impact Review Board (NIRB). The property is a 408 square kilometre (km²) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq Region of Nunavut.

As part of the Approved Project baseline studies, groundwater samples were collected from a Westbay monitoring well installed in borehole AMQ16-626, drilled in March and April 2016 targeting the area of the talik zone below Whale Tail Lake near future mine developments. Agnico Eagle retained Nuqsana Golder Engineering and Environmental Inc. (Nuqsana Golder) to complete a groundwater monitoring program in November 2018. The objective of the program was to obtain additional pre-development hydraulic head and groundwater quality data in support of the Whale Tail Pit Project Certificate No. 008, Term and Condition No. 15 (TC15) (NIRB 2018).

This technical memorandum provides an interpretation of the data collected from AMQ16-626 in November 2018 with respect to hydraulic gradients and groundwater quality. The collected data was reviewed in the context of conceptual and numerical model predictions for the Whale Tail Pit Project to evaluate if follow-up assessment is required (i.e., if significant differences in the model assumptions or predictions was indicated by the collected data).

2.0 BACKGROUND

2.1 Westbay Well Installation

A Westbay groundwater well system was installed on site between March and April in 2016 to obtain groundwater quality and verify the vertical hydraulic gradient within the talik zone of Whale Tail Lake, in the area of future mine development, to define future effects of the mine workings on the groundwater flow regime and overall site water quality from development to post-closure.

The well was installed in the purpose-specific borehole (AMQ16-626) which was drilled at an inclination of -69 degrees, an azimuth of 152.6 degrees and advanced to a depth of 499 m along the borehole, through massive diorite throughout the borehole. The Westbay well was designed to tap discrete zones of unfrozen bedrock and, if encountered, zones of higher hydraulic conductivity that were observed during drilling and well testing conducted prior to well installation. Six sampling ports were installed at and below the depth of anticipated ramp development (0 to 385 metres below ground surface [mbgs]), listed in Table 1. Borehole drilling, packer test results along the borehole and well installation details are documented in another report (Golder 2016b). A schematic of the Westbay well instrument that was installed in borehole AMQ160626 is included in Appendix A for reference.

Table 1: Borehole AMQ16-626 Westbay System Zones

Sampling Interval	Depth Along Borehole			Interval Depth Vertical Depth		
	From	To	Length	From	To	Thickness
	(mah)	(mah)	(m)	(mbgs)	(mbgs)	(m)
Zone 6	276	287.4	11.4	257.7	268.3	10.6
Zone 5	298.9	310.3	11.4	279.0	289.7	10.6
Zone 4	349.3	359.1	9.8	326.1	335.2	9.1
Zone 3	381.3	392.7	11.4	356.0	366.6	10.6
Zone 2	440.8	452.2	11.4	411.5	422.2	10.6
Zone 1	488.1	499.0	10.9	455.7	465.9	10.2

Notes: Depth values were provided by Westbay Instruments Completion Report.

m = metres; mah = metres along the hole, relative to ground surface; mbgs = metres below ground surface.

Upon completion of the installation in 2016, the well was used to collect groundwater samples from select intervals that were within and below the proposed development; Ports 3, 4, and 6 ranging in depths from 276 m to 392 m. Sampling methods, data interpretation and water quality results were presented in Golder 2016a. The total dissolved solids (TDS) content in the Formation groundwater was determined to range between 3,198 mg/L and 4,042 mg/L (Golder 2016a).

The groundwater quality were used to predict groundwater inflow quantity into future mine developments (Golder 2016d), which were used as input to operational and post-closure hydrogeological and permafrost models (Golder 2018a) and into the Whale Tail pit lake hydrodynamic model (Golder 2018b). These models were ultimately used to assess effects of hydrogeological processes on site contact water quality during development, operations and closure and on pit lake water quality during closure and post-closure.

The results of the compendium of these studies for the Whale Tail Pit Project indicated that mass transfer from the pit to the pit lake is very low, that groundwater seepage into and out of the pit lake are negligible in volume, particularly compared to surface water exchanged annually post-closure when flows are re-established based on average climate year watershed runoff. The combination of results corroborates to support that the hydrogeological regime around the pit lake is not critical to pit lake water quality post-closure.

The data collected as part of the 2018 monitoring program aim to add to the pre-operational database of results and to verify model inputs and model outcomes obtained to date.

2.2 The Groundwater Monitoring Program

The 2018 groundwater monitoring program was completed to support the requirements of the Groundwater Monitoring Program stated in TC15 (NIRB 2018). TC15 requirements were as follows:

Subject to the additional direction and requirements of the Nunavut Water Board, the Proponent shall prepare and implement a Groundwater Monitoring Plan that, at a minimum includes:

- *The collection of additional site-specific hydraulic data (e.g., from new monitoring wells) in key areas during the pre-development, construction and operation phases;*

- *Definition of vertical and horizontal groundwater flows in the project development areas;*
- *Delineates monitoring plans for both vertical and horizontal ground water; and*
- *Thresholds that will trigger the implementation of adaptive management strategies that reflect site-specific conditions encountered at the project site.*

The groundwater monitoring program documented in this technical memorandum consisted of measurements of hydraulic head (vertical gradients) and sampling of the formation groundwater to evaluate groundwater quality with depth.

2.3 Thresholds for Additional Assessment or Adaptive Management

Groundwater monitoring data being collected in the pre-development phase is being compiled into a Project-specific data and will be used in combination with future data collected during operational and closure phases of the Project to evaluate trends in groundwater data with respect to pit inflow quantity and quality.

Measured groundwater inflow rates and groundwater quality will be compared to model predictions on an annual basis. If significant variations from model predictions are observed, the assumptions behind the data will be reviewed and the analysis updated if required. In addition, updates to the groundwater model will be made if operational changes occur as the open pit advances which could significantly alter groundwater inflow or quality.

Variations that would be considered significant include:

- Groundwater inflows to the mine, based on rolling monthly average of inflow over six consecutive months, is 20% higher than predicted groundwater inflow.
- Collected water samples that indicate that the concentration of total dissolved solids (TDS) is more than 25% higher than the estimated water quality.

If the above variations are observed, the groundwater data (quantity and quality) would be assessed to evaluate trends, the potential causes of the greater than expected groundwater inflow quantity or quality, and the potential for long-term effect associated with the groundwater flow or quality. If the greater than predicted flows were correlated to a short-term effect such as freezing in the pit walls, changes in mining rate, freshet or transient drainage of a high storage feature, then further reassessment of groundwater inflows may not be required, and the adaptive management of these short-term effects would be evaluated under the Water Management Plan.

If the greater than predicted flows or quality would be considered as potentially long term, consideration will be given to reviewing the model calibration. The six-month averaging period of observation is based on observed seasonal variations in inflow quantities in mines situated in permafrost regions.

If model re-calibration is deemed necessary, future groundwater inflow quantity and quality would be predicted using this re-calibrated model and new results will be considered as part of the adaptive management of the groundwater quantity contribution to the Water Management Plan.

Modification of groundwater management strategies: the ponds, sumps and water conveyance strategies around the pit can be modified to mitigate the effect of additional groundwater volume or salinity prior to treatment and discharge. The water conveyance strategy will be evaluated and optimized during operations and closure to maintain post-closure commitment.

Groundwater monitoring data collected at this stage is representative of the pre-development condition of the project, and therefore an evaluation of trends in flow quantity and quality is not possible for the operational and closure phases. Results of the monitoring has been compared to assumptions adopted in the initial conditions for groundwater conceptual and numerical models and has been used to assess if the post-closure predictions are likely reasonable in consideration of the observed vertical hydraulic gradients and flow directions in the November 2018 monitoring program.

3.0 2018 GROUNDWATER MONITORING PROGRAM

3.1 Objectives

The objectives of the program are as follows:

- To collect site specific hydraulic head data during Project pre-development through the measurement of the hydrostatic pressure profile from the existing Westbay well.
- Assess the vertical hydraulic gradient and groundwater flow direction in that location of the Whale Tail Lake talik.
- Collect groundwater samples from the Westbay Well for chemical analysis, adding to the database of groundwater quality results.
- Compared water quality results to the threshold adopted for additional assessment and adaptive management.

3.2 Monitoring Methods

3.2.1 Hydraulic Head Measurements and Assessment of Vertical Hydraulic Gradients

Hydraulic heads were derived from the formation pressures measured at each monitoring port installed along the Westbay system. The formation pressure for each monitoring port was measured on November 9, 2018 using the Mosdax sampler manufactured and supplied by Westbay Instruments (refer to Appendix B for instrument calibration record).

3.2.2 Groundwater Sampling

Groundwater samples were collected from fixed ports in the Westbay well system that are positioned at different intervals along the hole to assess baseline groundwater chemistry with depth. Ports 6, 4 and 3, which are located within the anticipated ramp development zone (0 to 385 m), were targeted for sampling because these intervals had been previously developed (drill water had been largely removed from the interval) in 2016. Port 2 was also sampled although it was less developed than the other sample intervals in 2016 in order to verify if the aquifer was naturally flushed of the drilling water. Information on each of the Ports that were purged is presented in Table 2.

Fluorescein tracer was added to the 2016 drilling water to differentiate between the drilling fluid and the formation water. It is assumed that the only source of fluorescein was introduced during the 2016 drilling activities of borehole AMQ16-626 such that it is a reliable tracer of introduced water into the Formation.

Table 2: 2018 AMQ16-626 Westbay Well Development and Groundwater Sampling Information

Sample Port	Sampling Interval (mah)		Volume of Water Removed in 2018 (L)	Sample Date	Groundwater Parameters at Sampling Period (field measured)			
	From	To			Residual Fluorescein (ppb)	Conductivity (mS/cm)	TDS (ppm)	pH
6	276.0	287.4	8.25	13-Nov-18	83.54	9.02	4543	6.37
4	349.3	359.1	13.25	11-Nov-18	66.21	14.56	7275	7.50
3	381.3	392.7	12.5	12-Nov-18	100.05	7.50	3765	8.33
2	440.8	452.2	6.25	10-Nov-18	73.30	17.52	8825	8.90
1	488.1	499.0	0.25	not sampled	-	-	-	-

m = metres, mah = metres along hole, relative to ground surface; L = litres, TDS = total dissolved solids

Throughout the development and upon water sample collection, field chemical parameters (pH, conductivity, TDS, fluorescein content and temperature) were measured in order to track the fluid introduced into the Formation by drilling and to follow the removal of this fluid from the Formation during development and sampling of groundwater. Fluorescein content was measured using the AquaFluor handheld Fluorometer manufactured by Turner Designs. Temperature, pH, TDS and electrical conductivity values were measured with a Hanna Combo tester (HI 98130). A drilling water content of less than 5% (estimated using fluorescein content) is targeted in order to provide a reliable estimate of formation groundwater quality. Higher residual drilling fluid content can be used for this purpose but decreases the precision of the calculation of groundwater quality.

Groundwater sampling was preformed using the Westbay Mosdax sampler in a similar fashion as the initial development and sampling program completed in 2016. The Mosdax sampler collects 1 Litre of groundwater at a time (per sampling instrument descent into the well); multiple sampler runs were carried out to collect one complete groundwater sample set from each interval. Calibration reports of the Mosdax sampler probe are included in Appendix B.

Groundwater samples were collected from Intervals 6, 4, 3, and 2 in triplicate. Groundwater samples were filtered and preserved in the field, as required, and collected in laboratory-supplied bottles which were packed and shipped to the analytical laboratory following the collection of each sample. Duplicate samples collected from Ports 6, 4, 3, and 2 were submitted for analysis, while the third sample set was kept on site as backup and disposed of upon receipt of the samples by the analytical laboratory. An equipment and field blank were also collected for quality assurance/quality control (QA/QC) purposes. Analysis of general chemistry was completed at ALS Environmental (ALS) in Vancouver for the following parameters:

- Physical tests, including hardness, pH, conductivity, total suspended solids and total dissolved solids
- Anions and nutrients, including alkalinity, ammonia, bicarbonate, bromide, carbonate, chloride, fluoride, nitrate, nitrite, phosphorus (total and dissolved) and sulphate
- Metals (dissolved and total), including aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, selenium, silicon, silver, sodium, strontium, sulfur, tellurium, thallium, tin, titanium, uranium, vanadium and zinc. Additional metals were also analyzed by the analytical laboratory as part of the metals package, however they are not of interest to the project and will not be discussed herein out: cesium, rhenium, rubidium, sulfur, thorium, tungsten, yttrium and zirconium

Certificates of analysis from ALS are included in Appendix C.

3.3 Evaluation of Formation Water Quality

To properly assess the quality and salinity of true rock formation groundwater, the drilling fluid present in the sampling interval must be removed as much as possible by purging. The amount of drilling fluid present in the Formation is estimated from the concentration of fluorescein in the raw groundwater sample at each interval, compared to the fluorescein content of the drilling fluid used during drilling of the borehole. In 2016 upon well installation, the sampling intervals were purged to remove as much of the drilling fluid as possible within the task schedule, prior to collecting a sample for chemical analysis.

In 2018, the fluorescein, electrical conductivity and TDS of groundwater was monitored during sampling and compared to data from the end of development in 2016 to assess whether the interval remained purged and still reflected true Formation groundwater quality. Fluorescein and conductivity were within the range of values recorded in 2016 and groundwater samples were collected and submitted for chemical analysis.

The following summarizes the calculations made to estimate true Formation water quality and TDS from field measurements of electrical conductivity and laboratory analytical results of raw groundwater samples in 2018 and drilling water fluid in 2016.

- 1) **Estimation of the chemistry of the drilling fluid introduced in the Formation during the 2016 well borehole drilling and installation activities.** The drilling fluid consisted of very low TDS lake water to which was added a concentrated brine. The range of composition of the drill fluid (the dilute brine) was estimated by comparing both the initial and maximum conductivity values measured in samples from the Formation (for each port 6, 4, 3, and 2; conductivity varied between sampling ports) against the conductivity of the concentrated brine¹. This Dilute Brine Factor was used to calculate composition of the drilling fluid introduced into the sampling interval during the 2016 drilling and well installation activities as per equation (1) below.

$$(1) \quad \text{Dilute Brine Factor}_{\text{port } i} = \frac{\text{Field Conductivity}_{\text{port } i}}{\text{Brine Conductivity}_{\text{calculated}}}$$

This calculation assumes an insignificant proportion of formation water is present immediately after drilling, which is a fair assumption given that a high volume of drilling water was lost to the Formation (Golder, 2016a).

The drilling brine composition for each parameter was calculated from the product of the dilution brine factors and the chemistry of the drilling brine fluid for each port per equation (2).

$$(2) \quad \text{Dilute Brine}_{\text{port } i} = \text{Laboratory Result}_{\text{Brine}} \times \text{Dilution Brine Factor}_{\text{port } i}$$

- 2) **Calculation of the proportion of drill brine remaining in the Formation upon sampling.** This was calculated based on the amount of residual fluorescein measured upon sample collection at each port in 2018 compared to the initial fluorescein content of the drilling fluid measured in 2016 (i.e. 512.7 ppb).
- 3) **Removal of the drilling fluid chemistry from the raw groundwater sample analysis.** The concentration of constituents from the drilling fluid are removed from the reported analytical results for each chemical constituent per the below equation (3). The November 2018 laboratory results are provided in Appendix C.

$$(3) \quad \text{Groundwater Quality}_{\text{calculated}} = \text{Laboratory Result} - \frac{\text{Proportion of Drill Brine} \times \text{Dilute Brine Chemistry}}{\text{Proportion of Formation Water}}$$

¹ Brine conductivity was estimated from the calculated TDS of the drilling brine fluid using a conversion factor of 0.75 which is appropriate for brine solutions (Rusydi, 2017). Brine TDS was calculated based on constituent concentrations (refer to Table 3 and Appendix C). Laboratory-reported TDS and conductivity were not reliable as they exceeded instrument calibration.

The estimated drilling brine chemistry, proportion of residual drilling brine and Formation water for each sampling port are summarized in Table 4. The calculated groundwater quality for Ports 6, 4, 3 and 2 are summarized in Table 5.

4.0 RESULTS AND DISCUSSION

4.1 Hydraulic Head Profile and Groundwater Flow Direction Below Whale Tail Lake

The planned Whale Tail Pit sits within the closed talik below the North Basin of Whale Tail Lake. The closed talik is inferred to transition to open talik below the South Basin due to the increased width and depth of the lake towards the south. The water table below both basins will be equivalent to the lake surface elevation.

Permafrost underlies the land surrounding the lake, which restricts the lateral flow of groundwater to the talik and restricts the recharge of the sub-permafrost groundwater flow system by precipitation. Groundwater flow is controlled by surface water elevations in lakes with open talik; water moves vertically through the open talik to the underlying sub-permafrost groundwater flow system. In effect, lakes with open taliks in continuous permafrost regions are equivalent to large monitoring wells.

AMQ16-626 was installed to evaluate groundwater quality in the unfrozen bedrock and to verify the hydraulic gradient that exists below Whale Tail Lake. The hydraulic gradient, in combination with the bedrock hydraulic conductivity, will control the potential flux to or from Whale Tail Lake, and the flooded Whale Tail Pit post-closure.

Table 3 summarizes the calculated hydraulic heads based on the measured pressure in each of the ports. Although Zone 6 (shallowest port) is included in Table 3, it is suspected that this port may be in permafrost or near the permafrost contact, which could affect the measured hydraulic head. This inference is supported by the measured formation temperature, which is less than zero. Although the measured hydraulic head in the shallowest port is consistent with the overall trend, data from the deeper ports, which are confirmed to be in unfrozen rock by the formation temperature, were used to assess the vertical gradient.

Table 3: AMQ16-626 Westbay Well Hydraulic Heads and Formation Temperatures (November 9, 2018)

Port/ Zone	Measurement Interval (mah)		Measurement Interval (mbgs)		Port Depth (mah)	Port Depth (mbgs)	Calculated Depth to Water (mbgs)	Calculated Hydraulic Head (masl)	Formation Temperature (°C)
	From	To	From	To					
6	276.0	287.4	257.7	268.3	276.2	257.9	1.9	154.0	-0.17
4	349.3	359.1	326.1	335.2	349.5	326.3	1.6	153.6	0.24
3	381.3	392.7	356.0	366.6	381.5	356.2	1.1	153.4	0.36
2	440.8	452.2	411.5	422.2	441.0	411.7	0.9	152.9	0.87
1	488.1	499.0	455.7	465.9	488.3	455.9	0.5	152.6	1.29

Source: Golder (2016a).

m = metres; mah = metres along hole relative to ground surface (borehole angled to surface); mbgs = metres below ground surface (vertical down from surface); masl = metres above sea level (elevation)

The data collected at AMQ16-626, indicates the presence of a downward hydraulic gradient. Assuming the measured hydraulic head is representative of the midpoint of the measurement interval, the downward gradient between Port 1 and Port 4 is 0.008 m/m. This gradient is consistent with the estimated gradient derived from looking at the relative elevation of Whale Tail Lake and DS1 (0.008 m/m), as reported in Agnico Eagles response to TC15 (Agnico Eagle 2018). DS1 is the predicted receptor from water in the area of Whale Tail Pit and Underground (Golder 2016c).

For the depth interval over which the hydraulic head was measured (326 to 456 mbgs), the estimated hydraulic conductivity of the bedrock for the FEIS for the Whale Tail Pit Project was 1×10^{-8} to 3×10^{-8} m/s (Golder 2016c). In support of TC15 and the development of the Project, additional packer testing was conducted subsequent to the FEIS and the data indicate the hydraulic conductivity of bedrock over this depth interval is likely lower (1×10^{-9} m/s based on the geometric average of the test data) (Golder 2018a). Considering the measured gradient (0.008), the historical range of bedrock hydraulic conductivity adopted in the FEIS (1×10^{-8} to 3×10^{-8}) and the now refined hydraulic conductivity (1×10^{-9} m/s) and an assumed effective porosity of 0.001 (Maidment 1992; Stober and Bucher 2007), the estimated downward groundwater flow velocity is between approximately 0.25 m/yr and 8 m/yr. The lower bound of this range is considered more reasonable, as it uses the refined hydraulic conductivity data discussed above, which is based on the geometric mean of all the packer test measurements (pre- and post-FEIS).

Gradients measured during this monitoring program are considered a reasonable interpretation of what long-term gradients could be post-closure following the formation of the pit lake. Recharge and discharge from the base of Whale Tail Lake or a flooded pit lake will be controlled by the vertical hydraulic gradients and the bedrock hydraulic conductivity near the base of the permafrost. Considering the approximate area of the Whale Tail Pit (0.5 km^2), the range in bedrock hydraulic conductivity (1×10^{-9} to 3×10^{-8} m/s), and the measured downward gradient (0.008), the data would indicate long-term groundwater flux would be approximately $0.3 \text{ m}^3/\text{day}$ to $11 \text{ m}^3/\text{day}$. Similar to the estimated groundwater velocity, the lower bound of this range is considered more reasonable, as it uses the refined estimate of hydraulic conductivity. Overall, the estimated flux is similar to the long-term predicted discharge from the pit lake at post-closure ($1.7 \text{ m}^3/\text{day}$; Golder 2016c) and supports the conclusion in the FEIS that long-term predicted flows from the pit lake to the groundwater flow system will be negligible relative to the surface water exchange into the pit lake (Golder 2018c).

4.2 Groundwater Quality

Field measurements of electrical conductivity and fluorescein concentration serve, in part, to evaluate whether the groundwater accessed via the Westbay well sampling ports continues to be representative of Formation groundwater quality.

The 2016 and 2018 electrical conductivity and fluorescein trends measured throughout the sampling program in Ports 6, 4, 3, 2, and 1 are summarized in Figures 1 and 2, respectively. Groundwater samples were collected from Ports 6, 4, 3, and 2. Port 1 groundwater quality was deemed not representative of Formation groundwater and was not sampled. The field measurements of electrical conductivity, TDS and fluorescein recorded at the time of sampling are summarized in Table 3. The values are averages from the subsamples collected to obtain the required volume of water for analysis.

Port 6

The temperature measured by the Mosdax sampler during the pressure profile and sampling at Port 6 was below zero ($-0.17 \text{ }^{\circ}\text{C}$, refer to Table 3) and slush was present in the sampling canister from this Port. The cryopeg zone (temperature below 0 degrees, but not frozen) is interpreted to extend to at least 258 m depth (top interval of Port 6) within the vicinity of the Westbay well. Groundwater from the cryopeg (Port 6) could have a heterogeneous composition (non-saline ice and slightly saline groundwater) where free water is primarily transmitted through the more permeable unfrozen zones. Groundwater collected from Port 6 is interpreted to be located within the cryopeg have the potential to yield variable water quality even following periods of sufficient development.

Notwithstanding this, the estimation of true Formation groundwater quality was still completed per the method described in Section 2.3. Table 5 presents the minimum and maximum range of calculated concentrations of formation water at each port sampled in 2018 and 2016 for comparison.

The 2018 field-measured groundwater fluorescein content and electrical conductivity at the port remained within the same range albeit slightly higher than values recorded at the end of the well development period in 2016. This suggests that groundwater quality at that location remained representative of true Formation water since it was last sampled in 2016. The results of the 2018 groundwater quality estimation (Table 5) are also within the same order of magnitude but slightly higher than those reported in 2016 suggesting that residual drilling brine fluid is still present in Formation water at a proportion slightly higher than at the end of development in 2016. This can occur where drilling fluid that is still present in undeveloped zones in the aquifer (for example, in zones between sampling Ports) migrates back into the developed zones tapped by the sampling Ports following the normal movement of groundwater along the downward vertical gradient.

The estimated Formation groundwater minimum and maximum TDS concentrations in 2018 are 25% and 38% higher than the minimum and maximum TDS values estimated in 2016. The difference is higher than the TDS variability threshold of 25%. This is attributed to the higher proportion of drilling brine fluid in the Formation at Port 6 collected in 2018.

Arsenic concentration in groundwater at Port 6 is estimated to be low based on 2018 calculations, within the range of 2016 estimation.

The 2016 data is considered potentially more accurate, but 2018 data is still valid. The initial model input is still considered accurate and the new data does not warrant revising the conceptual model of groundwater TDS.

Ports 3 and 4

The 2018 field-measured groundwater fluorescein content and electrical conductivity at these sampling ports were similar (slightly higher) to measured values recorded at the end of the well development period in 2016, suggesting that groundwater quality remained representative of true Formation water at these zones. These slightly higher 2018 readings suggest that a small influx of drilling fluid that was still present in undeveloped zones migrated back into the developed zones as for Port 6. The higher proportion of drilling brine fluid in the Formation and in the samples collected may result in a lower accuracy of calculated groundwater quality from samples collected in 2018 compared to those collected in 2016 after a more complete purge; nonetheless, the data is still considered valid.

Figure 2 illustrates how electrical conductivity and fluorescein concentrations evolved in parallel during the short development period at Ports 3 and 4, inferring that groundwater in the vicinity of the Westbay well has not been affected by an outside brine source that could have originated from salt water used in exploration drilling nearby, approximately 26 metres from the Westbay well.

Estimated true Formation groundwater quality is shown in Table 5 presenting the minimum and maximum range of calculated concentrations of Formation water at each port sampled in 2018 and 2016. The results of the 2018 groundwater quality data are within the same order of magnitude to those reported in 2016 albeit slightly higher than in 2016. Port 3 minimum and maximum estimated TDS values are 35% and 28% higher than the calculated minimum and maximum values from 2016 data. At Port 4, they are 76% and 86% higher than the calculated minimum and maximum values from 2016 data. Variability is higher than the threshold of 25%. This is attributed to the higher proportion of drilling brine fluid in the Formation collected in 2018 compared to 2016.

Arsenic concentrations at both Ports 4 and 3 are estimated to be in the same order of magnitude as concentration ranges calculated in 2016.

The 2016 data is considered potentially more accurate, but 2018 data is still valid. The initial model input is still considered accurate and the new data does not warrant revising the conceptual model of groundwater TDS.

Port 2

Due to time constraints in 2016, this Port had not been extensively developed, leaving a higher proportion of drilling brine in the groundwater prior to sampling. A groundwater sample was collected in 2018 to verify the progression of water quality at that location; to assess whether drilling brine might have flushed out of the horizon since 2016 through natural groundwater flow. The 2018 field-measured groundwater fluorescein content and electrical conductivity were within a similar range than after development in 2016. Values were slightly lower than in 2016 but the trend was rising throughout the brief purging period in 2018. Electrical conductivity and fluorescein progressed at different rates during purging (conductivity rose faster than fluorescein; Figure 2) suggesting interference by a source of saline water that is not tagged with fluorescein, such as possibly, adjacent exploration borehole drilling water. Given the continued high proportion of drilling brine potentially mixed with another source of saline water that cannot be quantified at this time, a proper estimation of true Formation groundwater quality is not deemed possible for from this Port.

Summary

The higher TDS values calculated at Ports 6, 4, and 3 in 2018 are above the threshold value of 25%. These higher values are attributed to the presence of a higher content of non-Formation drilling brine in groundwater in 2018 compared to 2016. Consequently, the initial model input is still considered accurate and the new data does not warrant revising the conceptual model of groundwater TDS.

Arsenic concentration at all sampling ports is still low, the maximum calculated to be at Port 6 measured in 2016. Based on the results of the groundwater sampling completed to date, arsenic presence is low in the formation water.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

Groundwater samples were collected from each interval in triplicate and submitted in duplicate for analysis to the analytical laboratory as part of the quality assurance/quality control ('QA/QC') protocol. In addition, field and equipment blanks were also submitted for analysis of select parameters. The analytical laboratory performs equipment blanks as a method of internal QA/QC verification.

Analytical repeatability was tested by assessing the similarity between duplicate pairs of results. For each duplicate pairs of analysis where both results were higher than 5 times the method detection limit (MDL), the relative percent difference (RPD) was calculated as follows:

$$RPD = \frac{\text{absolute [difference (concentration of a given parameter)]}}{[\text{average (concentration of a given parameter)}]} \times 100$$

Per USEPA recommended methods (USEPA, 1994), an RPD of 20% or less was considered acceptable. Where one or both results of the duplicate pair were less than 5 times the MDL, a margin of +/- MDL was considered acceptable.

Table 6 presents the RPD or +/- MDL value calculated from the duplicate pair of results. Approximately 50% of duplicate pairs of analyses had one or both results below the method detection limit and consequently could not be assessed for repeatability. QA/QC results for the duplicate samples were within acceptable tolerance limits (RPD or +/- MDL) with the exception of duplicate concentrations of total suspended solids in Port 4 as well as duplicate concentrations of total chromium and nickel in Port 3. Trace components and major elements for all samples are considered adequately repeatable.

Groundwater samples were analyzed for TDS in the field and in 2018 by the analytical laboratory (ALS). The original brine fluid was analyzed by Multilab analytical laboratory. TDS values were also calculated from the laboratory results in order to assess potential discrepancies between the ionic balance and uncertainty of the results (refer to Tables 4 and 6). The results of the field, calculated, and laboratory measured values were within reasonable range limits for all

samples, with the exception of the brine fluid. The TDS result reported for the brine fluid (36,946 mg/L) was significantly less than the calculated value (130,500 mg/L). The laboratory measured TDS and consequently electrical conductivity (55.42 mS/cm) of the brine fluid were deemed unreliable due to the ionic imbalance discrepancy. This assumption was confirmed during a telephone discussion between Nuqsana Golder and the analytical laboratory (H2Lab, formerly Multilab chemist Jean-Francois Bouffard) on January 15, 2019, where the chemist indicated the TDS and electrical conductivity values reported for the brine fluid were outside the suitable range for the analytical instrument and may not be accurate. The certificate of analysis for the brine fluid is included in Appendix D. The calculated TDS of the brine fluid was used to correct the groundwater quality data as discussed in Section 2.3 of the report.

Uncertainty in the calculated groundwater water quality results from the variability in drill water composition augmented by probable mixing between aquifer zones having different levels of development (purging of drill water); this has a higher potential influence on the accuracy of 2018 calculated groundwater quality because of the higher proportion of drilling brine fluid remaining in the raw water samples compared to 2016 samples; thus while 2018 data remain valid to estimate water quality at Port 3, 4 and 6, 2016 results may be a more accurate representation of Formation groundwater quality than 2018 data.

6.0 CONCLUSION

The 2018 Westbay Well field program was carried out in support of the Whale Tail Pit Project Certificate No. 008, Term and Condition No. 15, to obtain additional pre-development groundwater quality data and to verify the hydraulic gradient. These data were used to verify modelling assumptions related to the groundwater quality and the hydraulic gradient near the mine development areas.

Hydraulic head measurements indicate that a downward vertical hydraulic gradient is present in the North Basin of Whale Tail Lake, which is consistent with the conceptual understanding of groundwater flow directions and the predicted conditions post-closure following the formation of the Whale Tail Pit Lake. Revisions to the numerical or conceptual models is not considered necessary based on the vertical gradients as the data is consistent the model assumptions.

Groundwater quality was estimated from the samples collected, removing the anticipated proportion of residual drilling water in the Formation (in the raw water sample). The 2018 program estimated groundwater quality at Ports 6, 4, and 3 are in the same range as previously estimated. The calculated groundwater TDS are slightly higher in 2018; the calculated increase in TDS ranges from 25% to 86% which is above the threshold value of 25% variability for TDS. The variation is attributed to the higher proportion of residual drilling water in the sample. In consideration that higher TDS is not considered to represent an increase in Formation water TDS, the assumptions for the conceptual model, which are based on the more reliable and applicable 2016 data, are still considered to be appropriate. Therefore, adaptive management is not considered necessary at this time.

The concentrations of metals and arsenic are low. The maximum calculated arsenic concentration remains similar to what was calculated for Port 6 in 2016. Given that the arsenic concentrations are similar to the assumptions adopted in the geochemical models (low arsenic in Formation groundwater), groundwater arsenic content is still not likely to have a significant effect on mine surface water quality.

7.0 STUDY LIMITATIONS

This technical memorandum was prepared for the exclusive use of Agnico Eagle Mines Limited. The technical memorandum, which specifically includes all tables and attachments, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the property at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this technical memorandum.

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The services performed, as described in this technical memorandum, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

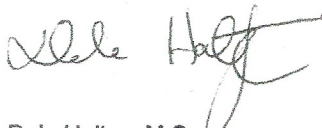
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The findings and conclusions of this technical memorandum are valid only as of the date of this technical memorandum and for the locations investigated. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this technical memorandum and provide amendments as required.

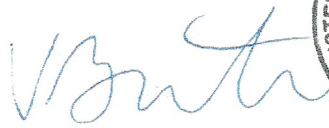
8.0 CLOSURE

We trust this report meets your needs at this time. Should you have any questions, please do not hesitate to contact the undersigned.

Golder Associates Ltd.



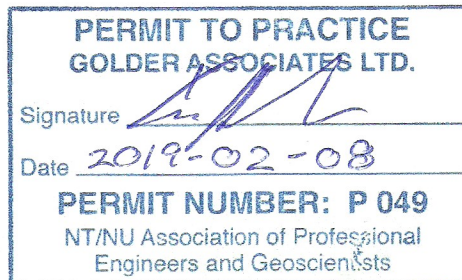
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Attachments: Tables 4, 5, 6

Figure 1 – 2016 and 2018 Development Record

Figure 2 – 2018 Development Record

Appendix A – AMQ160626 Westbay System Installation Details

Appendix B – Westbay Instruments Mosdax Sampler Calibration Reports

Appendix C – 2018 Laboratory Certificates of Analysis

Appendix D – 2016 Laboratory Certificate of Analysis – Brine Fluid

9.0 REFERENCES

- Agnico Eagle (Agnico Eagle Mines Limited). 2018. Whale Tail Pit Management Plans - AEM RESPONSES TO ECCC & CIRNAC Reply - Waste Rock Management Plan, Water Management Plan, Water Quality and Flow Monitoring Plan. November 23 2018.
- Golder (Golder Associates Ltd.). 2016a. Groundwater Quality Investigation, Amaruq, Nunavut. Technical Memorandum 1649355-080 prepared for Agnico Eagle Mines Ltd. November 15, 2016.
- Golder. 2016b. Westbay System Installation Summary – Whale Tail Pit Project, Nunavut. Technical Memorandum 1649355-033-TM-Rev0-4000 prepared for Agnico Eagle Mines Ltd. July 7, 2016.
- Golder. 2016c. Hydrogeological Model Pre-Mining, During Mining, and Closure. Submitted as Volume 6, Appendix 6-B in the Whale Tail Pit and Haul Road Final Environmental Impact Statement. June 2016.
- Golder. 2016d. Hydrogeology Baseline Report – Whale Tail Project. Submitted as Volume 6, Appendix 6-A in the Whale Tail Pit and Haul Road Final Environmental Impact Statement. June 2016.
- Golder. 2018a. Hydrogeological Assessment and Modelling, Whale Tail Pit – Expansion Project. Submitted to Agnico Eagle Mines Limited. Ref. 1789310-213-RPT-Rev0. November 2018.
- Golder. 2018b. Whale Tail Pit Project, Hydrodynamic Modelling of Whale Tail Pit Lake. Submitted to Agnico Eagle Mines Limited. Ref. 1789310-181-TM-Rev0. June 26, 2018.
- Golder. 2018c. Whale Tail Pit Post-Closure Hydrogeological Assessment for the Whale Tail Open Pit. Dated 27 June 2018.
- Maidment, D.R. 1992. Handbook of Hydrology. McGraw-Hill, New York, USA
- NIRB (Nunavut Impact Review Board). 2018. Whale Tail Pit Project, NIRB Project Certificate No.: 008. Issued March 15, 2018.
- Rusydi, A. 2017. Correlation between conductivity and total dissolved solids in various types of water: A review. Global Colloquium on GeoSciences and Engineering 2017. IOP Conf. Series: Earth and Environmental Science 118 (2018) 012019. IOP Publishing. Pp. 1-6.

Table 4
Drilling Brine Composition
Westbay Well in Whale Tail Lake Talik
Whale Tail Project, Nunavut

Sample		Brine Fluid	Calculated Drilling Brine Port 6		Calculated Drilling Brine Port 4		Calculated Drilling Brine Port 3	
			Initial Brine	Maximum Brine	Initial Brine	Maximum Brine	Initial Brine	Maximum Brine
Date		17-Apr-16	21-Jul-16	21-Jul-16	24-Apr-16	27-Apr-16	02-Sep-16	02-Sep-16
Field measured parameters	Units							
Fluorescein Concentration	mg/L	512.70	138.00	158.10	512.70	341.90	445.90	437.20
Drilling Fluid Proportion		1.00	0.27	0.31	1.00	0.67	0.87	0.85
Formation Water Proportion		0.00	0.73	0.69	0.00	0.33	0.13	0.15
Initial Conductivity Reading	uS/cm	0	10240	12210	3810	19400	52280	53800
Dilution of Brine Factor in Port		0.00	0.06	0.07	0.02	0.11	0.30	0.31
Conventional Parameters								
Total dissolved solids (calculated)	mg/L	130500	7680	3122	2858	14550	39210	40350
Total dissolved solids (lab)	mg/L	36946	-	-	-	-	-	-
pH	S.U.	10	11.25	7.40	12	11	11	11
Conductivity (lab)	uS/cm	55420	-	-	-	-	-	-
Conductivity (calculated)	uS/cm	174000	10240	4684	3810	19400	52280	53800
Reported Hardness	mg CaCO ₃ /L	105554	6212	2230	2311	11769	31715	32637
Alkalinity	mg CaCO ₃ /L	145.0	8.5	38.0	3.2	16.2	43.6	44.8
Bicarbonate (HCO3)	mg CaCO ₃ /L	27.0	1.6	38.0	0.6	3.0	8.1	8.3
Major ions								
Calcium (Ca)	mg/L	42266	2487	2966	925	4712	12699	13068
Magnesium (Mg)	mg/L	3.92	0.23	0.28	0.09	0.44	1.18	1.21
Potassium (K)	mg/L	1717	101	120	38	191	516	531
Sodium (Na)	mg/L	838	49	59	18	93	252	259
Bromide (Br)	mg/L	1066	63	75	23	119	320	330
Chloride (Cl)	mg/L	83700	4926	5873	1833	9332	25149	25880
Fluoride (F)	mg/L	0.060	0.004	0.004	0.001	0.007	0.018	0.019
Sulphate (SO4)	mg SO ₄ /L	<0.6	0	0	0	0	0	0
Nutrients								
Nitrates (NO3)	mg N/L	0.540	0.032	0.038	0.012	0.060	0.162	0.167
Nitrites (NO2)	mg N/L	0.060	0.004	0.004	0.001	0.007	0.018	0.019

Table 4
Drilling Brine Composition
Westbay Well in Whale Tail Lake Talik
Whale Tail Project, Nunavut

Sample		Brine Fluid	Calculated Drilling Brine Port 6		Calculated Drilling Brine Port 4		Calculated Drilling Brine Port 3	
			Initial Brine	Maximum Brine	Initial Brine	Maximum Brine	Initial Brine	Maximum Brine
Date		17-Apr-16	21-Jul-16	21-Jul-16	24-Apr-16	27-Apr-16	02-Sep-16	02-Sep-16
Field measured parameters	Units							
Fluorescein Concentration	mg/L	512.70	138.00	158.10	512.70	341.90	445.90	437.20
Drilling Fluid Proportion		1.00	0.27	0.31	1.00	0.67	0.87	0.85
Formation Water Proportion		0.00	0.73	0.69	0.00	0.33	0.13	0.15
Initial Conductivity Reading	uS/cm	0	10240	12210	3810	19400	52280	53800
Dilution of Brine Factor in Port		0.00	0.06	0.07	0.02	0.11	0.30	0.31
Metals (dissolved)								
Aluminium (Al)	mg/L	0.498	0.0293	0.0349	0.0109	0.0555	0.1496	0.154
Antimony (Sb)	mg/L	0.0354	0.0021	0.0025	0.0008	0.0039	0.0106	0.0109
Silver (Ag)	mg/L	<0.0001	0.0	0.0	0.0	0.0	0.0	0.0
Arsenic (As)	mg/L	0.766	0.045	0.054	0.017	0.085	0.23	0.237
Barium (Ba)	mg/L	0.113	0.007	0.008	0.002	0.013	0.034	0.035
Berillium (Be)	mg/L	<0.0005	0.0	0.0	0.0	0.0	0.0	0.0
Bismuth (Bi)	mg/L	<0.0005	0.0	0.0	0.0	0.0	0.0	0.0
Boron (B)	mg/L	13.2	0.8	0.9	0.3	1.5	4.0	4.1
Cadmium (Cd)	mg/L	<0.00002	0.0	0.0	0.0	0.0	0.0	0.0
Chromium (Cr)	mg/L	<0.0006	0.0	0.0	0.0	0.0	0.0	0.0
Cobalt (Co)	mg/L	0.0406	0.0024	0.0028	0.0009	0.0045	0.0122	0.0126
Copper (Cu)	mg/L	0.0039	0.0002	0.0003	0.0001	0.0004	0.0012	0.0012
Tin (Sn)	mg/L	<0.001	0	0	0	0	0	0
Iron (Fe)	mg/L	2.6	0.15	0.18	0.06	0.29	0.78	0.8
Lithium (Li)	mg/L	34.52	2.03	2.42	0.76	3.85	10.37	10.67
Manganese (Mn)	mg/L	<0.0005	0	0	0	0	0	0
Mercury (Hg)	mg/L	0.0	0.00002	0.00003	0.00001	0.00004	0.00012	0.00012
Dissolved Mercury (Hg)	mg/L	-	0.00002	0.00003	0.00001	0.00004	0.00012	0.00012
Molybdenum (Mo)	mg/L	<0.0005	0	0	0	0	0	0
Nickel (Ni)	mg/L	1.35	0.08	0.09	0.03	0.15	0.41	0.42
Lead (Pb)	mg/L	<0.0003	0	0	0	0	0	0
Selenium (Se)	mg/L	3.83	0.23	0.27	0.08	0.43	1.15	1.18
Silica (Si)	mg/L	2.93	0.17	0.21	0.06	0.33	0.88	0.91
Strontium (Sr)	mg/L	656.0	38.61	46.03	14.36	73.14	197.1	202.83
Telluride (Te)	mg/L	<0.0005	0	0	0	0	0	0
Thallium (Tl)	mg/L	<0.002	0	0	0	0	0	0
Titanium (Ti)	mg/L	45.2	2.66	3.17	0.99	5.04	13.58	13.98
Uranium (U)	mg/L	-	0	0	0	0	0	0
Vanadium (V)	mg/L	<0.001	0	0	0	0	0	0
Zinc (Zn)	mg/L	<0.0005	0	0	0	0	0	0
QA/QC								
Calculated TDS (lab)	-	130500	-	-	-	-	-	-
Lab measured vs Calculated TDS	-	28%	-	-	-	-	-	-
Lab measured TDS vs Conductivity	-	0.67	-	-	-	-	-	-
Calculated TDS vs Calculated Conductivity	-	0.75	-	-	-	-	-	-

Table 5
Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water
Whale Tail Lake Talik
Whale Tail Project, Nunavut

Sample		Port 6				Port 4				Port 3			
Date		2-Aug-2016		13-Nov-2018		20-Jul-2016		11-Nov-2018		14-Sep-2016		12-Nov-2018	
Drilling Fluid Proportion		0.04	0.24	0.16		0.09	0.18	0.13		0.08	0.18	0.20	
Formation Water Proportion		0.96	0.76	0.84		0.91	0.82	0.87		0.92	0.82	0.80	
Sampling interval depth (metres along borehole)		274.0 m - 287.4 m				349.3 m - 359.1 m				381.3 m - 392.7 m			
Sampling interval vertical depth (metres)		257.7 m - 268.3 m				326.1 m - 335.2 m				356.0 m - 366.6 m			
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
Average Field measured parameters													
Fluorescein	ppb	41.77		83.54		93.00		66.21		81.90		100.05	
Total dissolved solids	mg/L	-	-	4543		-	-	7275		-	-	3765	
pH	S.U.	-	-	6.36		-	-	7.50		-	-	8.35	
Conductivity	uS/cm	4610		9083		6650		14555		4450		7500	
Estimated Water Quality													
Conventional parameters													
Total dissolved solids	mg/L	3198	4042	4681	5171	3581	3966	7970	9945	3483	3918	<4980	<5100
pH	S.U.	7.41	7.27	6.50	6.57	7.87	7.82	6.88	6.91	7.96	7.91	7.31	7.41
Conductivity	uS/cm	4797	6042	8041	8496	5366	5938	13084	15511	5220	5866	<7350	<7530
Reported Hardness	mg CaCO ₃ /L	2397	3030	2883	3127	2627	2910	4169	5582	1680	1891	<2600	<2740
Alkalinity	mg CaCO ₃ /L	40	51	30	31	18	20	9	11	52	58	51	52
Bicarbonate (HCO3)	mg CaCO ₃ /L	40	51	31	32	18	20	11	12	52	58	60	61
Major ions													
Calcium (Ca)	mg/L	960	1213	1071	1164	1032	1143	1563	2125	671	756	<1040	<1090
Magnesium (Mg)	mg/L	22	27	51	51	12	14	62	66	1	1	1	1
Potassium (K)	mg/L	8	10	<20	<20	38	42	67	67	16	18	<38	<40
Sodium (Na)	mg/L	232	293	287	293	267	296	341	365	306	344	285	313
Bromide (Br)	mg/L	25	32	34	37	32	35	51	77	22	25	<32.5	<32.7
Chloride (Cl)	mg/L	2089	2641	2453	2697	2582	2860	3818	5722	1714	1929	<2700	<2700
Fluoride (F)	mg/L	0.21	0.27	<1.0	<1.0	0.5	0.5	<1.0	<1.0	1.1	1.2	<1.0	<1.0
Sulphate (SO4)	mg SO ₄ /L	-	-	<15	<15	-	-	<15	<15	-	-	<15	<15
Nutrients													
Ammonia N (NH3+NH4)	mg N/L	-	-	<0.437	<0.443	-	-	0.180	0.181	-	-	0.169	0.173
Nitrates (NO3)	mg N/L	0.063	0.079	<0.25	<0.25	0.06	0.06	<0.25	<0.25	0.016	0.018	<0.25	<0.25
Nitrites (NO2)	mg N/L	0.010	0.013	<0.050	<0.050	0.011	0.012	<0.050	<0.050	0.038	0.043	<0.050	<0.050
Total Phosphorous (P)	mg P/L	0.021	0.026	<0.0043	<0.0043	0.011	0.012	0.01	0.01	0.049	0.055	0.01	0.01

Table 5
Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water
Whale Tail Lake Talik
Whale Tail Project, Nunavut

Sample		Port 6				Port 4				Port 3			
Date		2-Aug-2016		13-Nov-2018		20-Jul-2016		11-Nov-2018		14-Sep-2016		12-Nov-2018	
Drilling Fluid Proportion		0.04	0.24	0.16		0.09	0.18	0.13		0.08	0.18	0.20	
Formation Water Proportion		0.96	0.76	0.84		0.91	0.82	0.87		0.92	0.82	0.80	
Sampling interval depth (metres along borehole)		274.0 m - 287.4 m				349.3 m - 359.1 m				381.3 m - 392.7 m			
Sampling interval vertical depth (metres)		257.7 m - 268.3 m				326.1 m - 335.2 m				356.0 m - 366.6 m			
Estimated concentration range (calculated)		minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	mininum	maximum	minimum	maximum
Dissolved Metals													
Aluminium (Al)	mg/L	<0.006	<0.006	<0.0050	<0.0050	-	-	0.000	0.008	-	-	<0.0115	<0.0126
Antimony (Sb)	mg/L	0.0002	0.0003	0.001	0.001	0.003	0.004	0.001	0.002	0.0026	0.0029	0.001	0.001
Silver (Ag)	mg/L	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.00010	<0.00010	<0.0001	<0.0001	<0.00010	<0.00010
Arsenic (As)	mg/L	0.0050	0.0063	<0.0021	<0.0024	0.0031	0.0035	<0.0020	<0.0020	<0.0005	<0.0005	<0.0034	<0.0034
Barium (Ba)	mg/L	0.528	0.667	0.947	0.976	0.134	0.148	0.533	0.561	0.057	0.065	0.098	0.104
Berillium (Be)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050
Bismuth (Bi)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050
Boron (B)	mg/L	0.30	0.38	0.24	0.28	0.58	0.64	0.82	1.05	0.53	0.60	0.28	0.33
Cadmium (Cd)	mg/L	-	0.000033	<0.000050	<0.000050	<0.00002	<0.00002	<0.000050	<0.000050	<0.00002	<0.00002	<0.000050	<0.000050
Chromium (Cr)	mg/L	0.0070	0.0089	<0.00050	<0.00050	0.0054	0.0060	<0.00050	<0.00050	0.0048	0.0055	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.0015	0.0019	<0.000050	<0.000050	0.0017	0.0018	<0.000050	<0.000050	0.0011	0.0012	<0.000050	<0.000050
Copper (Cu)	mg/L	0.0055	0.0069	<0.00050	<0.00050	0.0020	0.0023	<0.00050	<0.00050	0.0046	0.0052	<0.00050	<0.00050
Tin (Sn)	mg/L	0.0010	<0.001	<0.0010	<0.0010	0.0011	0.0012	<0.0010	<0.0010	<0.001	<0.001	<0.0010	<0.0010
Iron (Fe)	mg/L	0.17	0.21	0.264	0.276	0.15	0.16	0.078	0.120	0.08	0.09	<0.018	<0.019
Lithium (Li)	mg/L	0.33	0.41	0.15	0.24	0.64	0.71	1.06	1.63	0.31	0.34	<0.749	<0.779
Manganese (Mn)	mg/L	0.04	0.05	0.115	0.116	0.022	0.024	0.093	0.096	0.008	0.009	0.022	0.023
Mercury (Hg)	mg/L	0.0008	0.0010	<0.000010	<0.000010	0.0028	0.0031	<0.000010	<0.000010	0.00215	0.00242	<0.000010	<0.000010
Dissolved Mercury (Hg)	mg/L	0.0005	0.0006	<0.000010	<0.000010	0.0031	0.0034	<0.000010	<0.000010	0.00217	0.00244	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.02	0.02	0.029	0.031	0.0062	0.0068	0.013	0.013	0.019	0.021	0.018	0.019
Nickel (Ni)	mg/L	0.05	0.06	<0.00050	<0.00050	0.05	0.05	<0.00050	<0.00050	0.04	0.05	<0.00050	<0.00050
Lead (Pb)	mg/L	<0.0003	<0.0003	<0.00030	<0.00030	0.0027	0.0030	<0.00030	<0.00030	<0.0003	<0.0003	<0.00030	<0.00030
Selenium (Se)	mg/L	0.11	0.14	<0.0020	<0.0020	0.12	0.13	<0.0020	<0.0020	0.08	0.09	<0.0020	<0.0020
Silica (Si)	mg/L	4.00	5.06	3.19	3.31	4.18	4.63	2.48	2.63	4.29	4.82	3.51	3.51
Strontium (Sr)	mg/L	13.2	16.7	14.3	16.0	18.9	20.9	27.7	36.5	12.7	14.2	<16.9	<17.2
Telluride (Te)	mg/L	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050
Thallium (Tl)	mg/L	<0.0008	<0.0008	<0.000050	<0.000050	<0.0008	<0.0008	<0.000050	<0.000050	<0.0008	<0.0008	<0.000050	<0.000050
Titanium (Ti)	mg/L	0.350	0.442	<0.0050	<0.0050	0.336	0.373	<0.0050	<0.0050	0.229	0.257	<0.0050	<0.0050
Uranium (U)	mg/L	<0.001	<0.001	0.025	0.026	<0.001	<0.001	0.051	0.052	0.064	0.072	0.085	0.090
Vanadium (V)	mg/L	0.002	0.002	<0.000050	<0.000050	<0.0005	<0.0005	<0.000050	<0.000050	<0.001	<0.001	0.00020	0.00020
Zinc (Zn)	mg/L	1.3	1.7	<0.00050	<0.00050	0.63	0.70	<0.00050	<0.00050	<0.0005	<0.0005	<0.00050	<0.00050

Table 6
QA/QC of Rock Formation Groundwater Quality
Whale Tail Lake Talik
Whale Tail Project, Nunavut

Sample			Port 6					Port 4					Port 3				
Date			13-Nov-2018				RPD				11-Nov-2018			12-Nov-2018			RPD
Certificate No.			L2198327-1		L2198327-2			L2197641-3		L2197641-4		L2197641-5		L2197641-6			
Sample ID	Method	Units	Zone 6	Zone 66			Method	Units	Zone 4	Zone 44			Zone 3	Zone 33			
Physical Tests (Water)																	
Conductivity	2	uS/cm	8720	8780	1%		2	uS/cm	13900	14000	1%		7530	7350	2%		
pH	0.1	pH	6.58	6.65	1%		0.1	pH	6.97	6.94	0%		7.40	7.50	1%		
Total Suspended Solids	3	mg/L	8	10	13%		3	mg/L	24	20	18%		8	8	5%		
Total Dissolved Solids	30	mg/L	5580	5410	3%		3	mg/L	9030	8820	2%		5100	4980	2%		
Anions and Nutrients																	
Alkalinity, Bicarbonate (as CaCO3)	1	mg/L	27	26	3%		1	mg/L	10	10	2%		51	50	1%		
Alkalinity, Carbonate (as CaCO3)	1	mg/L	<1.0	<1.0	--		1	mg/L	<1.0	<1.0	--		<1.0	<1.0	--		
Alkalinity, Hydroxide (as CaCO3)	1	mg/L	<1.0	<1.0	--		1	mg/L	<1.0	<1.0	--		<1.0	<1.0	--		
Alkalinity, Total (as CaCO3)	1	mg/L	27	26	3%		1	mg/L	10	10	2%		51	50	1%		
Ammonia, Total (as N)	0.005	mg/L	0.443	0.437	1%		0.005	mg/L	0.157	0.158	1%		0.139	0.136	2%		
Bromide (Br)	2.5	mg/L	41	41	1%		0.05	mg/L	70	60	15%		33	33	1%		
Chloride (Cl)	5	mg/L	3010	3060	2%		0.5	mg/L	5220	4530	14%		2700	2700	0%		
Fluoride (F)	1	mg/L	<1.0	<1.0	--		0.02	mg/L	<1.0	<1.0	--		<1.0	<1.0	--		
Nitrate (as N)	0.25	mg/L	<0.25	<0.25	--		0.005	mg/L	<0.25	<0.25	--		<0.25	<0.25	--		
Nitrite (as N)	0.05	mg/L	<0.050	<0.050	--		0.001	mg/L	<0.050	<0.050	--		<0.050	<0.050	--		
Phosphorus (P)-Total	0.002	mg/L	0.004	0.005	19%		0.002	mg/L	0.01	0.01	13%		0.006	0.008	+/- MDL		
Sulfate (SO4)	15	mg/L	<15	<15	--		0.3	mg/L	<15	<15	--		<15	<15	--		
Physical Tests																	
Hardness (as CaCO3)	4.8	mg/L	3630	3620	0.3%		4.8	mg/L	5160	5150	0%		2600	2740	5%		
Dissolved Metals																	
Aluminum (Al)-Dissolved	0.005	mg/L	<0.0050	<0.0050	1%		0.005	mg/L	0.0085	0.0076	11%		0.0126	0.0115	9%		
Antimony (Sb)-Dissolved	0.0005	mg/L	<0.00050	0.0005	+/- MDL		0.0005	mg/L	0.00163	0.00172	5%		0.00308	0.003	3%		
Arsenic (As)-Dissolved	0.002	mg/L	0.0021	0.0024	13%		0.002	mg/L	<0.0020	<0.0020	--		0.0034	0.0034	0%		
Barium (Ba)-Dissolved	0.001	mg/L	0.818	0.794	3%		0.001	mg/L	0.466	0.489	5%		0.0902	0.0854	5%		
Beryllium (Be)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Bismuth (Bi)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Boron (B)-Dissolved	0.1	mg/L	0.36	0.35	3%		0.1	mg/L	0.9	0.95	5%		1.04	1.02	2%		
Cadmium (Cd)-Dissolved	0.00005	mg/L	<0.000050	<0.000050	--		0.00005	mg/L	<0.000050	<0.000050	--		<0.000050	<0.000050	--		
Calcium (Ca)-Dissolved	1	mg/L	1380	1380	0%		1	mg/L	1970	1970	0%		1040	1090	5%		
Cesium (Cs)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	0.00075	0.00074	1%		<0.00050	<0.00050	--		
Chromium (Cr)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Cobalt (Co)-Dissolved	0.00005	mg/L	<0.000050	<0.000050	--		0.00005	mg/L	<0.000050	<0.000050	--		<0.000050	<0.000050	--		
Copper (Cu)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Gallium (Ga)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Iron (Fe)-Dissolved	0.01	mg/L	0.251	0.256	2%		0.01	mg/L	0.112	0.105	6%		0.018	0.019	5%		
Lead (Pb)-Dissolved	0.0003	mg/L	<0.00030	<0.00030	--		0.0003	mg/L	<0.00030	<0.00030	--		<0.00030	<0.00030	--		
Lithium (Li)-Dissolved	0.02	mg/L	0.533	0.52	2%		0.02	mg/L	1.42	1.52	7%		0.779	0.749	4%		
Magnesium (Mg)-Dissolved	1	mg/L	42.8	42.8	0%		1	mg/L	57.8	53.9	7%		1.2	1.2	0%		
Manganese (Mn)-Dissolved	0.0002	mg/L	0.0961	0.097	1%		0.0002	mg/L	0.0836	0.0812	3%		0.0184	0.0181	2%		
Mercury (Hg)-Dissolved	0.00001	mg/L	<0.000010	<0.000010	--		0.00001	mg/L	<0.000010	<0.000010	--		<0.000010	<0.000010	--		
Molybdenum (Mo)-Dissolved	0.002	mg/L	0.0257	0.0245	5%		0.002	mg/L	0.0112	0.0116	4%		0.0154	0.0144	7%		
Nickel (Ni)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Phosphorus (P)-Dissolved	0.05	mg/L	<0.050	<0.050	--		0.05	mg/L	<0.050	<0.050	--		<0.050	<0.050	--		
Potassium (K)-Dissolved	20	mg/L	<20	<20	--		20	mg/L	67	66	2%		38	40	5%		
Rhenium (Re)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Rubidium (Rb)-Dissolved	0.005	mg/L	0.0151	0.0146	3%		0.005	mg/L	0.0891	0.0914	3%		0.0549	0.0528	4%		
Selenium (Se)-Dissolved	0.002	mg/L	<0.0020	<0.0020	--		0.002	mg/L	<0.0020	<0.0020	--		<0.0020	<0.0020	--		
Silicon (Si)-Dissolved	1	mg/L	2.8	2.7	4%		1	mg/L	2.3	2.2	4%		3	3	0%		
Silver (Ag)-Dissolved	0.0001	mg/L	<0.00010	<0.00010	--		0.0001	mg/L	<0.00010	<0.00010	--		<0.00010	<0.00010	--		
Sodium (Na)-Dissolved	20	mg/L	253	250	1%		20	mg/L	309	320	3%		280	301	7%		
Strontium (Sr)-Dissolved	0.05	mg/L	19.5	19.7	1%		0.05	mg/L	33.6	33.6	0%		16.9	17.2	2%		
Sulfur (S)-Dissolved	5	mg/L	<5.0	<5.0	--		5	mg/L	<5.0	<5.0	--		<5.0	<5.0	--		
Tellurium (Te)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Thallium (Tl)-Dissolved	0.00005	mg/L	<0.000050	<0.000050	--		0.00005	mg/L	<0.000050	<0.000050	--		<0.000050	<0.000050	--		
Thorium (Th)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Tin (Sn)-Dissolved	0.001	mg/L	<0.0010	<0.0010	--		0.001	mg/L	<0.0010	<0.0010	--		<0.0010	<0.0010	--		
Titanium (Ti)-Dissolved	0.005	mg/L	<0.0050	<0.0050	--		0.005	mg/L	<0.0050	<0.0050	--		<0.0050	<0.0050	--		
Tungsten (W)-Dissolved	0.001	mg/L	0.0214	0.0208	3%		0.001	mg/L	0.0455	0.0443	3%		0.0722	0.0687	5%		
Uranium (U)-Dissolved	0.00005	mg/L	<0.000050	<0.000050	--		0.00005	mg/L	<0.000050	<0.000050	--		0.00016	0.000144	11%		
Vanadium (V)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Yttrium (Y)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
Zinc (Zn)-Dissolved	0.003	mg/L	0.0244	0.023	6%		0.003	mg/L	0.0096	0.01	4%		<0.0030	<0.0030	--		
Zirconium (Zr)-Dissolved	0.0005	mg/L	<0.00050	<0.00050	--		0.0005	mg/L	<0.00050	<0.00050	--		<0.00050	<0.00050	--		
QA/QC																	
Calculated TDS (lab)	-	mg/L	4779	4826	-	-	-	-	7743	7050	-	-	4165	4237	-		
Lab measured vs Calculated TDS	-	-	156%	162%	-	-	-	-	154%	159%	-	-	148%	148%	-		
Lab measured TDS vs conductivity	-	uS/cm	0.6	0.6	-	-	-	-	0.6	0.6	-	-	0.7	0.7	-		
Notes:																	
Concentrations are mg/L unless otherwise noted.																	
¹ Part F item 2 of Meadowbank Water License. All regulated parameters for total concentration																	
RPD value exceeds 20%																	
FD = Field duplicate																	
RPD = relative percent difference																	
-- not calculated (one or both result below MDL)																	

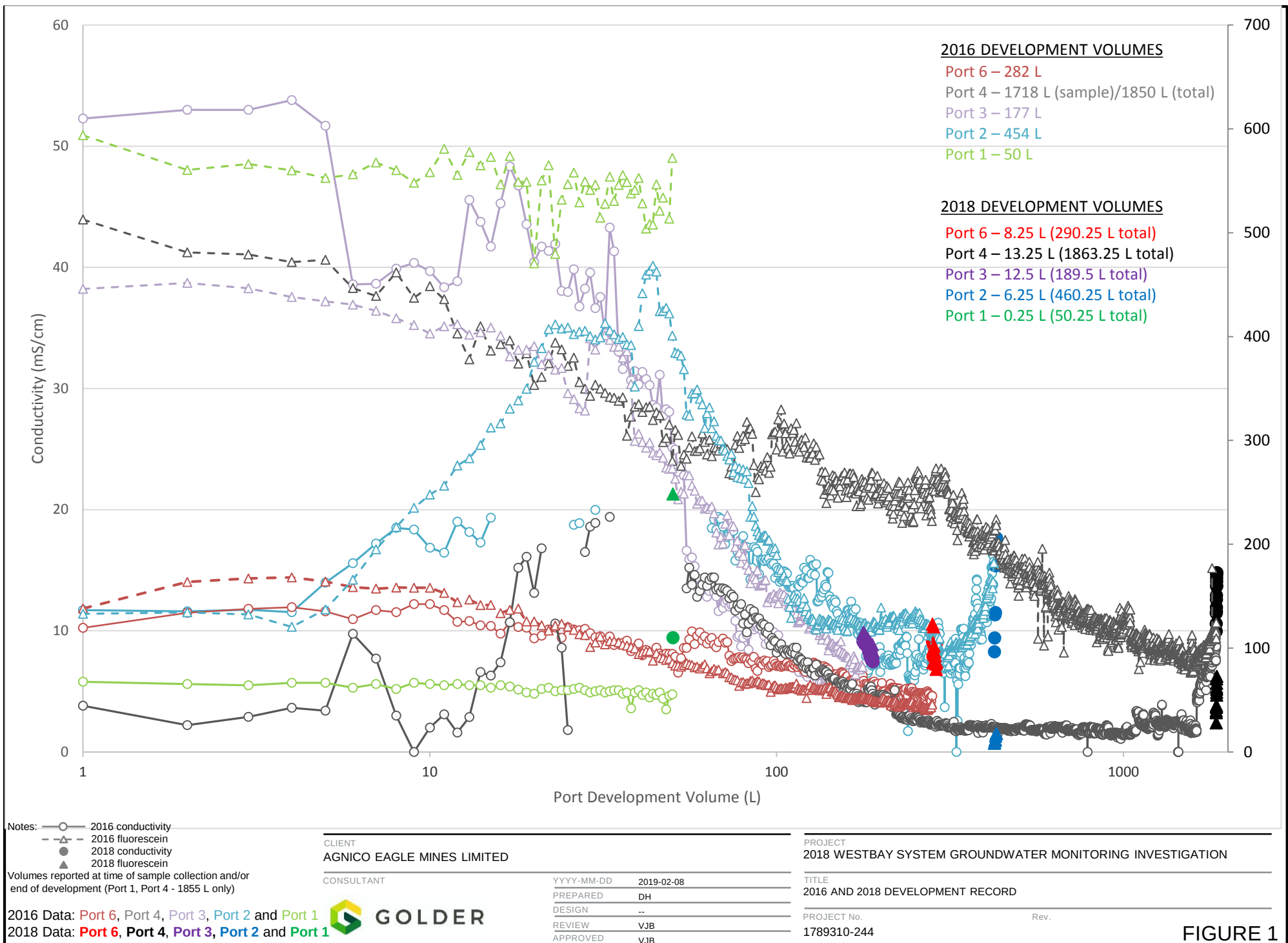


FIGURE 1

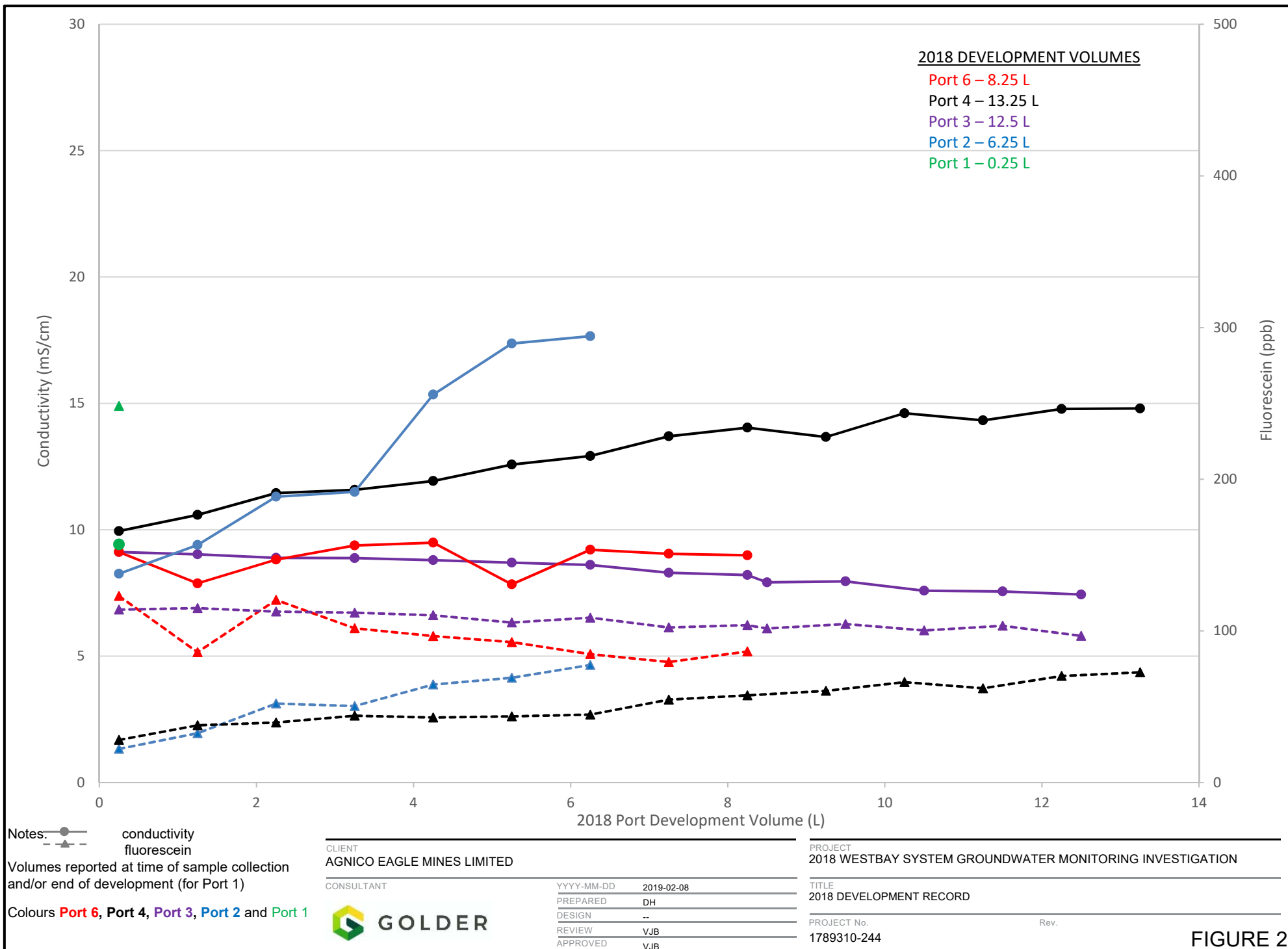
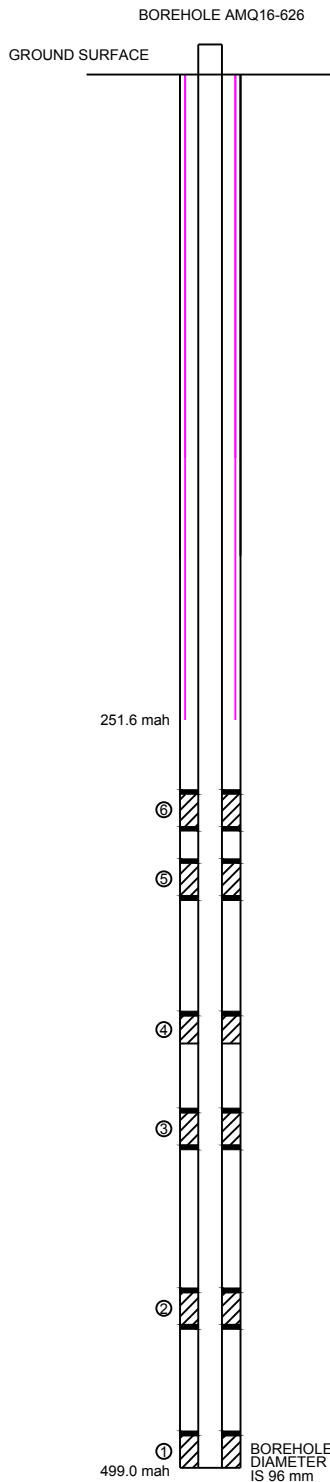


FIGURE 2

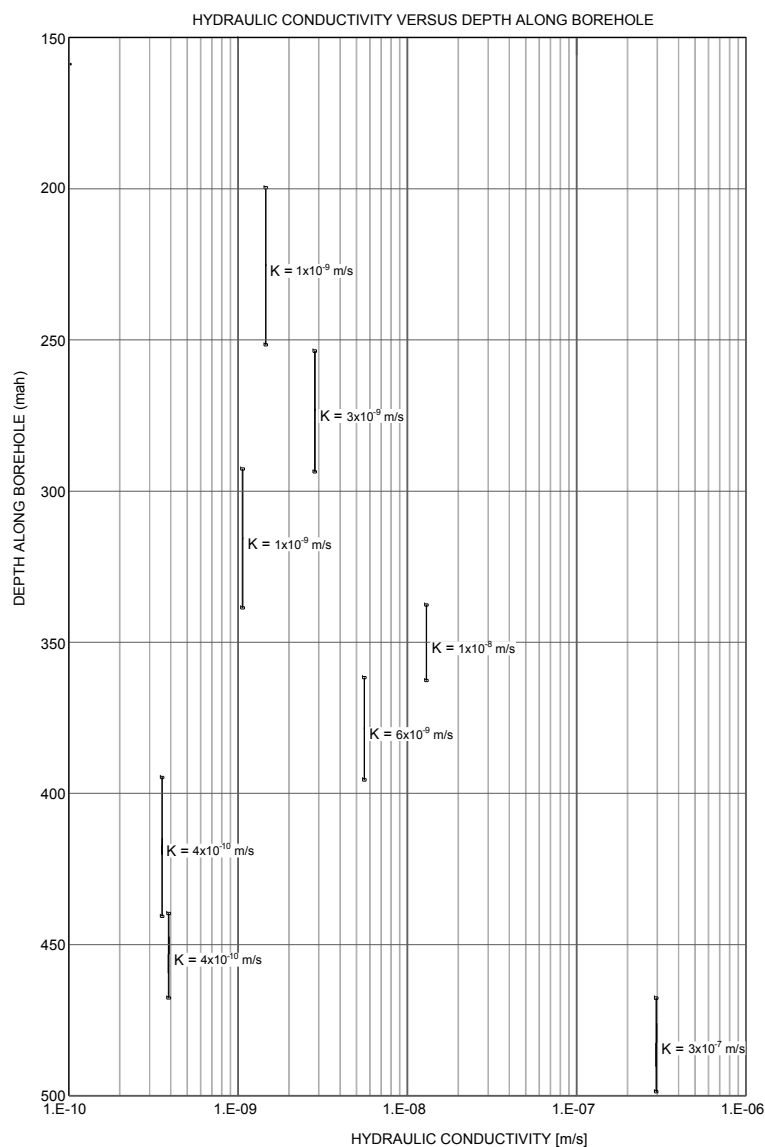
APPENDIX A

AMQ160626 Westbay System Installation Details

\\golder\gds\galiburn\Bathymetry\CAD-GIS\client\Agnico_Eagle_Mines_Ltd\WhiteTail\99_PROJECTS\1649355\02_PRODUCTION\4000\3000\DWG\1649355-4000-3000-03.dwg | Layout: AMQ16-626 WESTBAY SYSTEM INSTALLATION DETAILS | Modified: ppapouhesh 05/26/2016 1:35 PM | Plotted: ppapouhesh 07/06/2016



WESTBAY SYSTEM ZONE DEPTH SUMMARY						
ZONE	DEPTH ALONG HOLE			VERTICAL DEPTH		
	FROM	TO	LENGTH	FROM	TO	THICKNESS
	(mah)	(mah)	(m)	(mbgs)	(mbgs)	(m)
6	276.0	287.4	11.4	257.7	268.3	10.6
5	298.9	310.3	11.4	279	289.7	10.6
4	349.3	359.1	9.8	326.1	335.2	9.1
3	381.3	392.7	11.4	356.0	366.6	10.6
2	440.8	452.2	11.4	411.5	422.2	10.6
1	488.1	499.0	10.9	455.7	465.9	10.2



LEGEND

1	PACKER	K	HYDRAULIC CONDUCTIVITY
2	WESTBAY MONITORING ZONE	mah	METRES ALONG BOREHOLE, RELATIVE TO GROUND SURFACE
3	STEEL CASING	mbgs	METRES BELOW GROUND SURFACE
		m/s	METRES PER SECOND

NOTES

- ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED
- PERMAFROST ASSUMED 200 m ALONG HOLE ALIGNMENT.
- DRILL RODS TO 251.6 m ALONG HOLE.
- BOREHOLE LOCATED IN UTM NAD 83 ZONE 14, N = 7255363.5 E = 607181.68 ELEVATION = 154.46 m.
- AVERAGE BOREHOLE INCLINATION IS 69°.

NOT TO SCALE
SCHEMATIC ONLY

	2016-07-06	ISSUED FOR FINAL		JJ	PP	DV	DC		
	2016-05-27	ISSUED FOR REVIEW		JJ	PP				
REV	DATE	REVISION DESCRIPTION		DES	CADD	CHK	R/W		
PROJECT  AGNICO EAGLE AGNICO EAGLE MINES LIMITED WHALE TAIL PIT PROJECT NUNAVUT, CANADA									
TITLE AMQ16-626 WESTBAY SYSTEM INSTALLATION DETAILS									
 Golder Associates		PROJECT No.		1649355.4000.3000		FILE No.		1649355-4000-3000-03	
		DESIGN	JJ	2016-07-06	SCALE		NOT TO SCALE		
		CADD	PP	2016-07-06	FIGURE		3		
		CHECK	DV	2016-07-06					
		REVIEW	DC	2016-07-06					



APPENDIX B

Westbay Instruments Mosdax Sampler Calibration Reports

MOSDAX Calibration Report 1: EMS - 1764 Module 323

Full Scale: 2000 (psia)

File: E:\DATA\CALIB-2018\2000\26JAN2-1\01764

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

EMS - 1764 Jan 26 17:09:52 2018 Range 1 Temp 3.1° C			EMS - 1764 Jan 26 07:09:09 2018 Range 2 Temp 10.1° C			EMS - 1764 Jan 26 02:21:39 2018 Range 3 Temp 19.9° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.817	0.208	0.010	14.763	0.210	0.011	14.745	0.228	0.011
193.345	-0.073	-0.004	193.566	-0.123	-0.006	193.251	-0.079	-0.004
393.618	-0.272	-0.014	392.913	-0.184	-0.009	392.313	-0.228	-0.011
589.887	-0.183	-0.009	591.481	-0.211	-0.011	591.070	-0.177	-0.009
787.108	-0.110	-0.006	790.656	-0.114	-0.006	790.016	-0.162	-0.008
992.089	-0.024	-0.001	990.073	0.058	0.003	988.877	-0.001	0.000
1191.192	0.036	0.002	1184.170	0.092	0.005	1189.677	-0.007	0.000
1390.713	0.133	0.007	1382.638	0.117	0.006	1383.376	0.058	0.003
1589.940	0.097	0.005	1583.021	0.197	0.010	1582.918	0.132	0.007
1781.966	0.014	0.001	1783.679	0.027	0.001	1783.642	-0.023	-0.001
1987.965	-0.329	-0.016	1991.373	-0.178	-0.009	1990.362	-0.278	-0.014
1817.144	-0.012	-0.001	1816.737	0.061	0.003	1807.379	-0.041	-0.002
1618.742	0.102	0.005	1611.101	0.226	0.011	1611.387	0.144	0.007
1413.125	0.180	0.009	1410.177	0.278	0.014	1410.184	0.103	0.005
1213.194	0.108	0.005	1209.052	0.204	0.010	1209.054	0.151	0.008
1009.488	0.089	0.004	1008.134	0.118	0.006	1007.771	0.068	0.003
807.541	-0.027	-0.001	809.316	-0.034	-0.002	807.386	-0.029	-0.001
606.650	-0.114	-0.006	608.601	-0.077	-0.004	608.200	-0.110	-0.005
406.828	-0.184	-0.009	406.467	-0.147	-0.007	407.925	-0.205	-0.010
205.695	-0.015	-0.001	205.759	-0.012	-0.001	206.304	-0.075	-0.004
14.824	0.214	0.011	14.783	0.231	0.012	14.730	0.212	0.011
EMS - 1764 Jan 25 20:49:38 2018 Range 4 Temp 29.9° C			EMS - 1764 Jan 25 15:45:50 2018 Range 5 Temp 39.9° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.664	0.129	0.006	14.630	0.147	0.007			
193.289	-0.074	-0.004	193.274	-0.098	-0.005			
392.551	-0.259	-0.013	393.384	-0.239	-0.012			
590.683	-0.199	-0.010	590.646	-0.204	-0.010			
790.879	-0.111	-0.006	792.587	-0.140	-0.007			
989.404	-0.070	-0.003	989.121	-0.059	-0.003			
1188.900	-0.088	-0.004	1188.417	-0.084	-0.004			
1383.144	0.006	0.000	1390.226	0.040	0.002			
1582.510	-0.017	-0.001	1582.457	0.023	0.001			
1783.117	-0.170	-0.008	1783.077	-0.054	-0.003			
1990.420	-0.360	-0.018	1990.337	-0.125	-0.006			
1817.923	-0.145	-0.007	1809.812	-0.012	-0.001			
1612.561	0.046	0.002	1612.027	0.084	0.004			
1409.796	0.050	0.003	1410.656	0.064	0.003			
1208.930	0.011	0.001	1207.895	0.018	0.001			
1007.679	0.001	0.000	1007.484	0.004	0.000			
807.799	-0.074	-0.004	807.295	-0.056	-0.003			
607.517	-0.125	-0.006	608.401	-0.142	-0.007			
406.301	-0.139	-0.007	406.285	-0.237	-0.012			
205.701	-0.048	-0.002	205.685	-0.138	-0.007			
14.686	0.149	0.007	14.645	0.098	0.005			

Issued by




MOSDAX Calibration Report 2: EMS - 1764 Module 323

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\26JAN2-1\01764

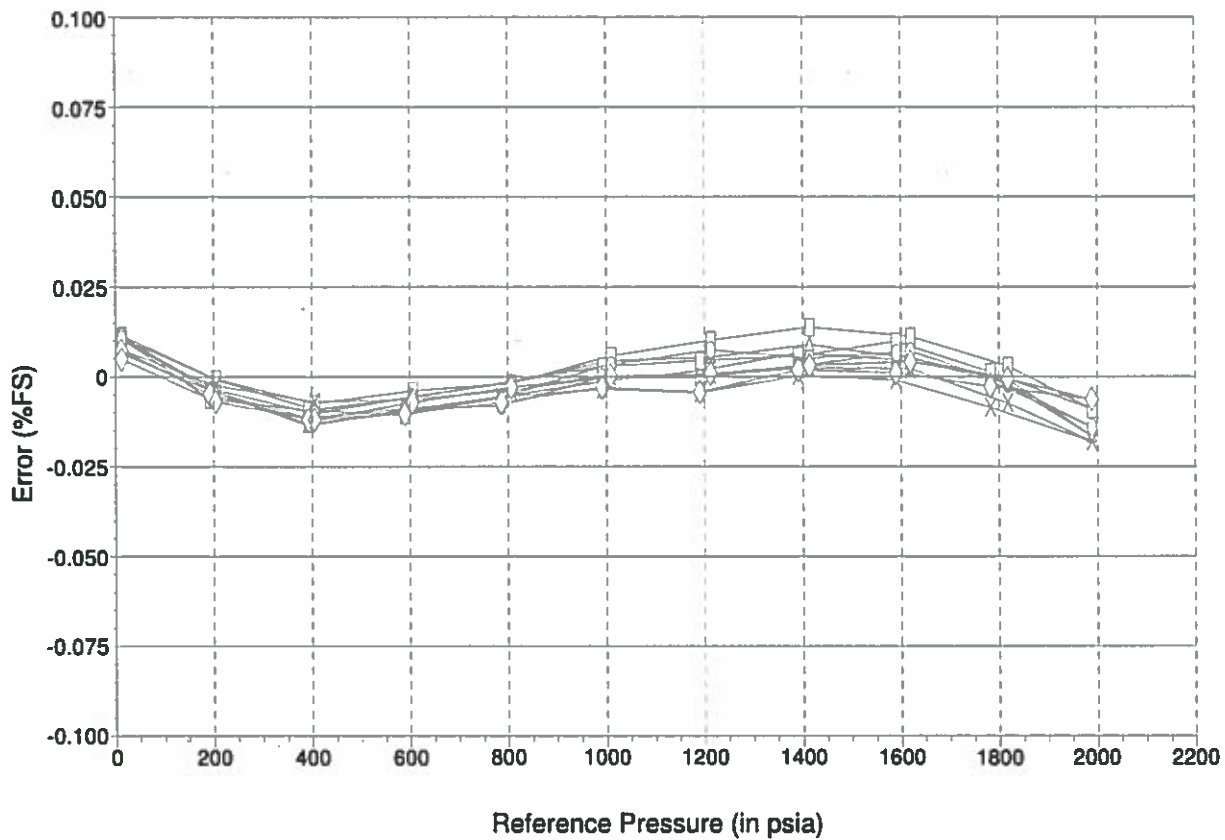
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 1764 Module 323



—△— 3.1° C

—□— 10.1° C

—○— 19.9° C

—×— 29.9° C

—◇— 39.9° C

Comments

Issued by



As Received MOSDAX Cal. Report 2: EMS - 1764 Module 323

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\26JAN2-1\01764

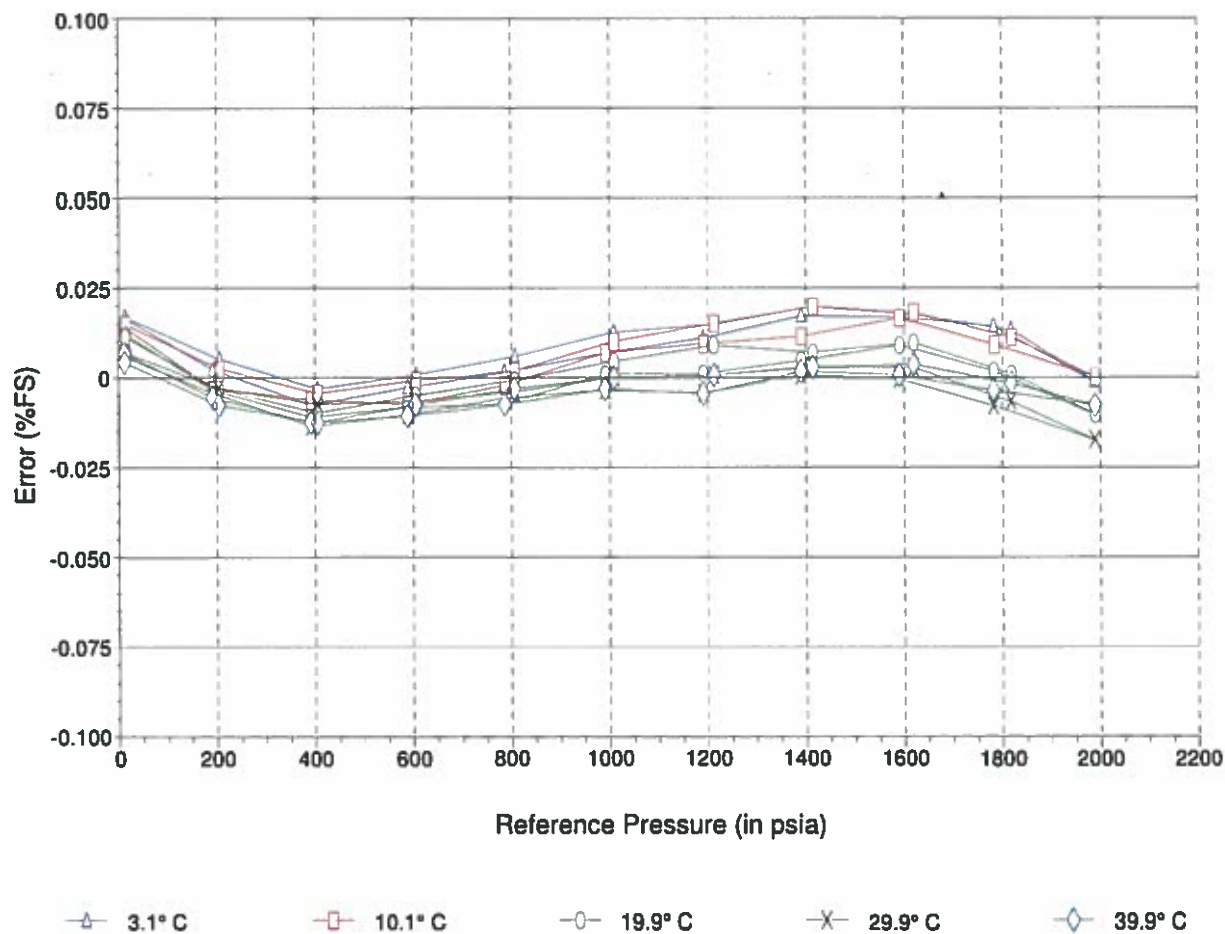
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 1764 Module 323



Comments

Issued by



As Received MOSDAX Cal. Report 1: EMS - 1764 Module 323

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\26JAN2-1\01764

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

EMS - 1764 Jan 26 17:09:52 2018 Range 1 Temp 3.1° C			EMS - 1764 Jan 26 07:09:09 2018 Range 2 Temp 10.1° C			EMS - 1764 Jan 26 02:21:39 2018 Range 3 Temp 19.9° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.817	0.330	0.016	14.763	0.276	0.014	14.745	0.240	0.012
193.345	0.046	0.002	193.566	-0.061	-0.003	193.251	-0.068	-0.003
393.618	-0.152	-0.008	392.913	-0.123	-0.006	392.313	-0.217	-0.011
589.887	-0.055	-0.003	591.481	-0.147	-0.007	591.070	-0.165	-0.008
787.108	0.031	0.002	790.656	-0.043	-0.002	790.016	-0.146	-0.007
992.089	0.136	0.007	990.073	0.140	0.007	988.877	0.020	0.001
1191.192	0.219	0.011	1184.170	0.188	0.009	1189.677	0.022	0.001
1390.713	0.343	0.017	1382.638	0.231	0.012	1383.376	0.095	0.005
1589.940	0.337	0.017	1583.021	0.331	0.017	1582.918	0.179	0.009
1781.966	0.285	0.014	1783.679	0.185	0.009	1783.642	0.037	0.002
1987.965	-0.022	-0.001	1991.373	0.007	0.000	1990.362	-0.203	-0.010
1817.144	0.265	0.013	1816.737	0.223	0.011	1807.379	0.021	0.001
1618.742	0.348	0.017	1611.101	0.363	0.018	1611.387	0.194	0.010
1413.125	0.394	0.020	1410.177	0.394	0.020	1410.184	0.141	0.007
1213.194	0.296	0.015	1209.052	0.302	0.015	1209.054	0.180	0.009
1009.488	0.252	0.013	1008.134	0.201	0.010	1007.771	0.089	0.004
807.541	0.117	0.006	809.316	0.037	0.002	807.386	-0.013	-0.001
606.650	0.016	0.001	608.601	-0.013	-0.001	608.200	-0.098	-0.005
406.828	-0.062	-0.003	406.467	-0.087	-0.004	407.925	-0.194	-0.010
205.695	0.104	0.005	205.759	0.050	0.002	206.304	-0.064	-0.003
14.824	0.336	0.017	14.783	0.297	0.015	14.730	0.225	0.011
EMS - 1764 Jan 25 20:49:38 2018 Range 4 Temp 29.9° C			EMS - 1764 Jan 25 15:45:50 2018 Range 5 Temp 39.9° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.664	0.116	0.006	14.630	0.132	0.007			
193.289	-0.086	-0.004	193.274	-0.112	-0.006			
392.551	-0.268	-0.013	393.384	-0.250	-0.013			
590.683	-0.206	-0.010	590.646	-0.212	-0.011			
790.879	-0.114	-0.006	792.587	-0.146	-0.007			
989.404	-0.069	-0.003	989.121	-0.063	-0.003			
1188.900	-0.084	-0.004	1188.417	-0.088	-0.004			
1383.144	0.013	0.001	1390.226	0.034	0.002			
1582.510	-0.007	0.000	1582.457	0.014	0.001			
1783.117	-0.157	-0.008	1783.077	-0.071	-0.004			
1990.420	-0.345	-0.017	1990.337	-0.153	-0.008			
1817.923	-0.132	-0.007	1809.812	-0.030	-0.002			
1612.561	0.056	0.003	1612.027	0.074	0.004			
1409.796	0.058	0.003	1410.656	0.058	0.003			
1208.930	0.015	0.001	1207.895	0.014	0.001			
1007.679	0.001	0.000	1007.484	0.000	0.000			
807.799	-0.077	-0.004	807.295	-0.062	-0.003			
607.517	-0.131	-0.007	608.401	-0.150	-0.007			
406.301	-0.148	-0.007	406.285	-0.249	-0.012			
205.701	-0.059	-0.003	205.685	-0.152	-0.008			
14.686	0.136	0.007	14.645	0.083	0.004			

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MOSDAX Calibration Report 1: EMS - 2652 Module 3008

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\2JUNE2-1\02652

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

EMS - 2652 Jun 02 12:30:14 2018 Range 1 Temp 3.3° C			EMS - 2652 Jun 02 07:51:36 2018 Range 2 Temp 10.3° C			EMS - 2652 Jun 02 03:10:20 2018 Range 3 Temp 20.1° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.846	-0.142	-0.007	14.855	-0.105	-0.005	14.842	-0.118	-0.006
192.843	-0.001	0.000	192.231	-0.010	-0.001	194.509	-0.104	-0.005
393.849	0.122	0.006	393.607	0.068	0.003	390.935	0.064	0.003
587.948	-0.023	-0.001	593.420	0.070	0.003	592.897	0.002	0.000
791.882	-0.022	-0.001	792.296	0.087	0.004	791.655	0.062	0.003
990.911	-0.057	-0.003	991.833	0.075	0.004	991.348	0.019	0.001
1190.327	-0.189	-0.009	1191.049	-0.061	-0.003	1190.921	-0.121	-0.006
1390.264	-0.181	-0.009	1390.953	-0.006	0.000	1390.842	-0.037	-0.002
1589.406	-0.082	-0.004	1589.174	0.014	0.001	1589.397	-0.028	-0.001
1781.525	0.044	0.002	1781.549	0.156	0.008	1781.207	0.088	0.004
1989.515	0.123	0.006	1989.230	0.324	0.016	1989.355	0.295	0.015
1818.398	0.071	0.004	1818.861	0.206	0.010	1816.258	0.129	0.006
1619.022	-0.012	-0.001	1618.518	0.147	0.007	1618.089	0.091	0.005
1412.880	-0.003	0.000	1415.894	0.075	0.004	1413.069	0.081	0.004
1211.907	-0.038	-0.002	1212.127	0.094	0.005	1212.924	0.023	0.001
1009.806	0.075	0.004	1010.514	0.213	0.011	1009.965	0.189	0.009
808.334	0.096	0.005	808.014	0.218	0.011	807.813	0.215	0.011
606.956	0.169	0.008	606.949	0.179	0.009	606.634	0.213	0.011
406.373	0.123	0.006	406.191	0.137	0.007	407.189	0.192	0.010
205.741	0.110	0.006	206.072	0.110	0.005	205.699	0.162	0.008
14.848	-0.083	-0.004	14.863	-0.040	-0.002	14.852	-0.051	-0.003
EMS - 2652 Jun 01 22:31:07 2018 Range 4 Temp 30.0° C			EMS - 2652 Jun 01 17:53:01 2018 Range 5 Temp 39.8° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.847	-0.019	-0.001	14.838	-0.006	0.000			
194.042	-0.002	0.000	194.229	0.072	0.004			
393.209	0.097	0.005	393.823	0.095	0.005			
593.265	0.087	0.004	592.922	0.099	0.005			
792.056	0.052	0.003	792.743	0.066	0.003			
991.614	0.043	0.002	991.261	0.057	0.003			
1189.236	-0.151	-0.008	1190.280	-0.056	-0.003			
1389.839	-0.128	-0.006	1389.590	-0.057	-0.003			
1588.713	-0.048	-0.002	1588.437	0.020	0.001			
1788.124	0.061	0.003	1789.309	0.187	0.009			
1989.624	0.201	0.010	1989.755	0.368	0.018			
1817.189	0.140	0.007	1818.126	0.224	0.011			
1616.308	0.001	0.000	1615.388	0.129	0.006			
1412.900	0.022	0.001	1413.930	0.177	0.009			
1212.611	0.060	0.003	1208.395	0.080	0.004			
1009.750	0.246	0.012	1009.785	0.309	0.015			
808.478	0.183	0.009	808.128	0.308	0.015			
606.817	0.225	0.011	606.791	0.317	0.016			
406.966	0.233	0.012	407.604	0.144	0.007			
205.745	0.163	0.008	206.494	0.092	0.005			
14.853	-0.013	-0.001	14.839	-0.005	0.000			

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MOSDAX Calibration Report 2: EMS - 2652 Module 3008

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\2JUNE2-1\02652

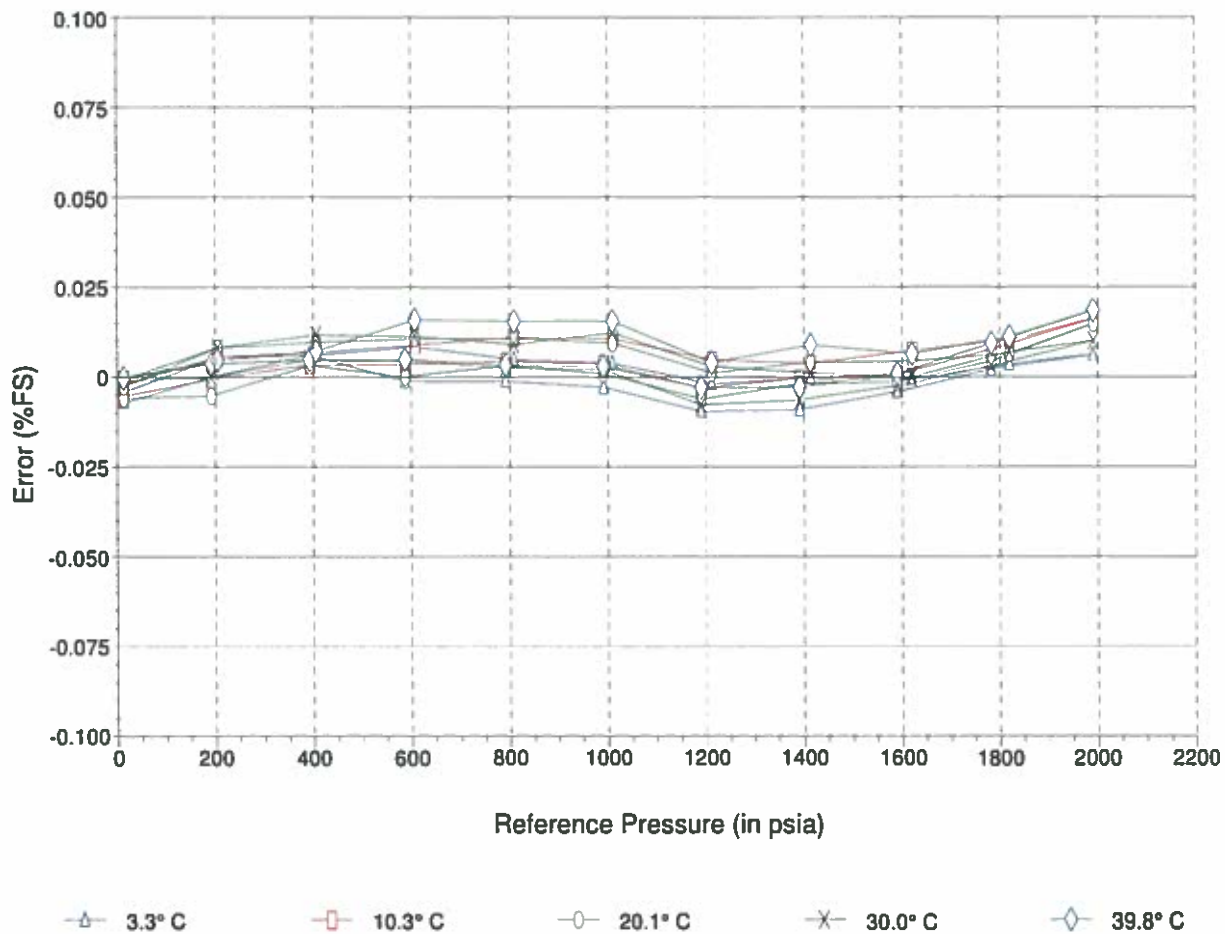
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 2652 Module 3008



Comments

Issued by

As Received MOSDAX Cal. Report 1: EMS - 2652 Module 3008

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\2JUNE2-1\02652

Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

EMS - 2652 Jun 02 12:30:14 2018 Range 1 Temp 3.3° C			EMS - 2652 Jun 02 07:51:36 2018 Range 2 Temp 10.3° C			EMS - 2652 Jun 02 03:10:20 2018 Range 3 Temp 20.1° C		
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)
14.846	0.013	0.001	14.855	0.042	0.002	14.842	0.032	0.002
192.843	0.170	0.008	192.231	0.155	0.008	194.509	0.061	0.003
393.849	0.313	0.016	393.607	0.255	0.013	390.935	0.244	0.012
587.948	0.190	0.009	593.420	0.277	0.014	592.897	0.196	0.010
791.882	0.218	0.011	792.296	0.315	0.016	791.655	0.268	0.013
990.911	0.211	0.011	991.833	0.321	0.016	991.348	0.236	0.012
1190.327	0.110	0.005	1191.049	0.204	0.010	1190.921	0.105	0.005
1390.264	0.152	0.008	1390.953	0.279	0.014	1390.842	0.196	0.010
1589.406	0.286	0.014	1589.174	0.318	0.016	1589.397	0.211	0.011
1781.525	0.449	0.022	1781.549	0.476	0.024	1781.207	0.331	0.017
1989.515	0.569	0.028	1989.230	0.662	0.033	1989.355	0.540	0.027
1818.398	0.484	0.024	1818.861	0.530	0.027	1816.258	0.372	0.019
1619.022	0.362	0.018	1618.518	0.453	0.023	1618.089	0.330	0.017
1412.880	0.333	0.017	1415.894	0.362	0.018	1413.069	0.314	0.016
1211.907	0.264	0.013	1212.127	0.362	0.018	1212.924	0.250	0.013
1009.806	0.346	0.017	1010.514	0.462	0.023	1009.965	0.407	0.020
808.334	0.338	0.017	808.014	0.447	0.022	807.813	0.422	0.021
606.956	0.385	0.019	606.949	0.388	0.019	606.634	0.408	0.020
406.373	0.315	0.016	406.191	0.325	0.016	407.189	0.373	0.019
205.741	0.282	0.014	206.072	0.277	0.014	205.699	0.328	0.016
14.848	0.072	0.004	14.863	0.107	0.005	14.852	0.098	0.005
EMS - 2652 Jun 01 22:31:07 2018 Range 4 Temp 30.0° C			EMS - 2652 Jun 01 17:53:01 2018 Range 5 Temp 39.8° C					
Ref Pres (psia)	Error (psia)	(% FS)	Ref Pres (psia)	Error (psia)	(% FS)			
14.847	0.148	0.007	14.838	0.193	0.010			
194.042	0.167	0.008	194.229	0.252	0.013			
393.209	0.270	0.013	393.823	0.259	0.013			
593.265	0.263	0.013	592.922	0.253	0.013			
792.056	0.233	0.012	792.743	0.216	0.011			
991.614	0.229	0.011	991.261	0.209	0.010			
1189.236	0.040	0.002	1190.280	0.104	0.005			
1389.839	0.070	0.003	1389.590	0.117	0.006			
1588.713	0.156	0.008	1588.437	0.215	0.011			
1788.124	0.271	0.014	1789.309	0.410	0.020			
1989.624	0.418	0.021	1989.755	0.624	0.031			
1817.189	0.351	0.018	1818.126	0.450	0.023			
1616.308	0.205	0.010	1615.388	0.327	0.016			
1412.900	0.220	0.011	1413.930	0.354	0.018			
1212.611	0.252	0.013	1208.395	0.241	0.012			
1009.750	0.432	0.022	1009.785	0.462	0.023			
808.478	0.364	0.018	808.128	0.458	0.023			
606.817	0.403	0.020	606.791	0.471	0.024			
406.966	0.406	0.020	407.604	0.307	0.015			
205.745	0.332	0.017	206.494	0.271	0.014			
14.853	0.154	0.008	14.839	0.194	0.010			

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As Received MOSDAX Cal. Report 2: EMS - 2652 Module 3008

Full Scale: 2000 (psia)

File: E:\DATA\CAL\0-2018\2000\2JUNE2-1\02652

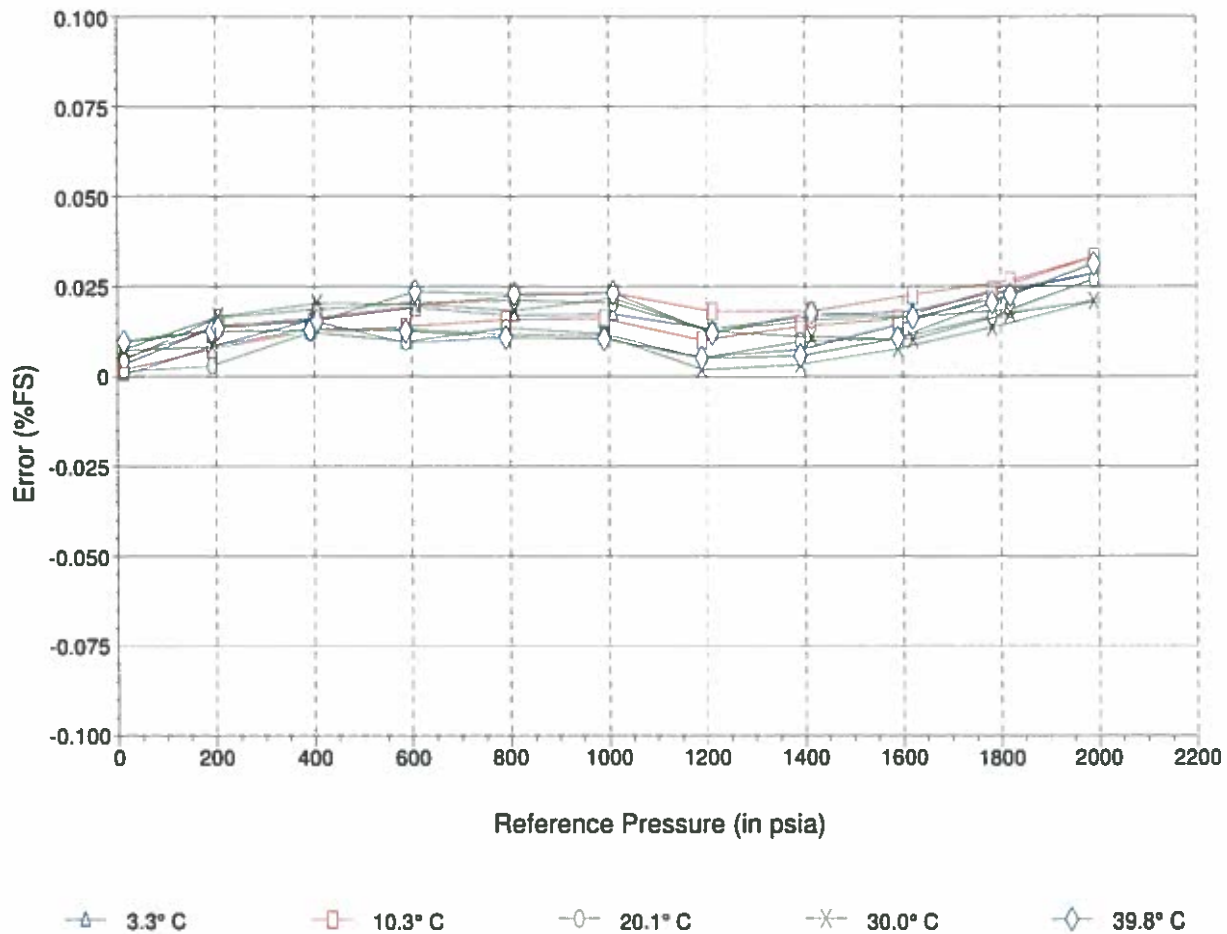
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 2652 Module 3008



Comments

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APPENDIX C

2018 Laboratory Certificates of Analysis



Golder Associates Ltd. (Ottawa)
ATTN: Dale Holtze
1931 Robertson Road
Ottawa ON K2H 5B7

Date Received: 16-NOV-18
Report Date: 22-NOV-18 16:58 (MT)
Version: FINAL REV. 2

Client Phone: 613-592-9600

Certificate of Analysis

Lab Work Order #: L2197641
Project P.O. #: NOT SUBMITTED
Job Reference: 1789310
C of C Numbers: 17-720417
Legal Site Desc:

Comments: ADDITIONAL 21-NOV-18 16:20
ADDITIONAL 19-NOV-18 17:56

Joanne Lee
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2197641-1 GW 10-NOV-18 17:30 ZONE 2	L2197641-2 GW 10-NOV-18 17:30 ZONE 22	L2197641-3 GW 11-NOV-18 17:30 ZONE 4	L2197641-4 GW 11-NOV-18 17:30 ZONE 44	L2197641-5 GW 12-NOV-18 17:30 ZONE 3
Grouping	Analyte					
SEAWATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	6260	6260	5160	5150	2600
Total Metals	Aluminum (Al)-Total (mg/L)	0.118	0.126	0.0140	0.0139	0.0128
	Antimony (Sb)-Total (mg/L)	0.00126	0.00129	0.00180	0.00186	0.00322
	Arsenic (As)-Total (mg/L)	<0.0020	<0.0020	0.0021	0.0022	0.0032
	Barium (Ba)-Total (mg/L)	0.102	0.0985	0.493	0.510	0.0918
	Beryllium (Be)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	1.86	1.72	0.97	1.00	1.10
	Cadmium (Cd)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000055	<0.000050
	Calcium (Ca)-Total (mg/L)	2710	2580	2040	1920	991
	Cesium (Cs)-Total (mg/L)	0.00190	0.00184	0.00075	0.00077	<0.00050
	Chromium (Cr)-Total (mg/L)	0.00246	0.00119	0.0130	0.0127	0.00999
	Cobalt (Co)-Total (mg/L)	0.000120	0.000101	0.000237	0.000231	0.000166
	Copper (Cu)-Total (mg/L)	0.00272	0.00303	0.00113	0.00102	<0.00050
	Gallium (Ga)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.555	0.584	0.366	0.354	0.076
	Lead (Pb)-Total (mg/L)	0.00460	0.00472	<0.00030	<0.00030	<0.00030
	Lithium (Li)-Total (mg/L)	2.33	2.14	1.48	1.65	0.802
	Magnesium (Mg)-Total (mg/L)	<1.0	<1.0	55.3	53.3	1.2
	Manganese (Mn)-Total (mg/L)	0.0215	0.0228	0.0816	0.0752	0.0181
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.0096	0.0092	0.0130	0.0141	0.0172
	Nickel (Ni)-Total (mg/L)	0.00276	0.00190	0.00818	0.00817	0.00703
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	106	100	67.1	70.8	35.9
	Rhenium (Re)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Rubidium (Rb)-Total (mg/L)	0.171	0.171	0.0933	0.101	0.0559
	Selenium (Se)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicon (Si)-Total (mg/L)	3.2	3.6	2.2	1.9	2.7
	Silver (Ag)-Total (mg/L)	0.00034	0.00038	<0.00010	<0.00010	<0.00010
	Sodium (Na)-Total (mg/L)	379	372	326	318	275
	Strontium (Sr)-Total (mg/L)	47.3	47.5	34.8	34.4	16.9
	Sulfur (S)-Total (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
	Tellurium (Te)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Thorium (Th)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Tin (Sn)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID				
		Description				
		Sampled Date				
		Sampled Time				
		Client ID				
		L2197641-6				
		GW				
		12-NOV-18				
		17:30				
		ZONE 33				
Grouping	Analyte					
SEAWATER						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	2740				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0126				
	Antimony (Sb)-Total (mg/L)	0.00339				
	Arsenic (As)-Total (mg/L)	0.0038				
	Barium (Ba)-Total (mg/L)	0.0956				
	Beryllium (Be)-Total (mg/L)	<0.00050				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	1.19				
	Cadmium (Cd)-Total (mg/L)	<0.000050				
	Calcium (Ca)-Total (mg/L)	1080				
	Cesium (Cs)-Total (mg/L)	<0.00050				
	Chromium (Cr)-Total (mg/L)	0.00674				
	Cobalt (Co)-Total (mg/L)	0.000111				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Gallium (Ga)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.064				
	Lead (Pb)-Total (mg/L)	<0.00030				
	Lithium (Li)-Total (mg/L)	0.850				
	Magnesium (Mg)-Total (mg/L)	1.2				
	Manganese (Mn)-Total (mg/L)	0.0171				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.0184				
	Nickel (Ni)-Total (mg/L)	0.00436				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	39.7				
	Rhenium (Re)-Total (mg/L)	<0.00050				
	Rubidium (Rb)-Total (mg/L)	0.0564				
	Selenium (Se)-Total (mg/L)	<0.0020				
	Silicon (Si)-Total (mg/L)	2.8				
	Silver (Ag)-Total (mg/L)	<0.00010				
	Sodium (Na)-Total (mg/L)	300				
	Strontium (Sr)-Total (mg/L)	17.2				
	Sulfur (S)-Total (mg/L)	<5.0				
	Tellurium (Te)-Total (mg/L)	<0.00050				
	Thallium (Tl)-Total (mg/L)	<0.000050				
	Thorium (Th)-Total (mg/L)	<0.00050				
	Tin (Sn)-Total (mg/L)	<0.0010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2197641-1 GW 10-NOV-18 17:30 ZONE 2	L2197641-2 GW 10-NOV-18 17:30 ZONE 22	L2197641-3 GW 11-NOV-18 17:30 ZONE 4	L2197641-4 GW 11-NOV-18 17:30 ZONE 44	L2197641-5 GW 12-NOV-18 17:30 ZONE 3
Grouping	Analyte					
SEAWATER						
Total Metals	Titanium (Ti)-Total (mg/L)	0.0070	0.0075	<0.0050	<0.0050	<0.0050
	Tungsten (W)-Total (mg/L)	0.0815	0.0854	0.0470	0.0462	0.0736
	Uranium (U)-Total (mg/L)	0.000283	0.000304	<0.000050	<0.000050	0.000160
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Yttrium (Y)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0374	0.0410	0.0625	0.0605	0.0395
	Zirconium (Zr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0219	0.0176	0.0085	0.0076	0.0126
	Antimony (Sb)-Dissolved (mg/L)	0.00125	0.00128	0.00163	0.00172	0.00308
	Arsenic (As)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	0.0034
	Barium (Ba)-Dissolved (mg/L)	0.0986	0.0996	0.466	0.489	0.0902
	Beryllium (Be)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	1.76	1.88	0.90	0.95	1.04
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Calcium (Ca)-Dissolved (mg/L)	2510	2510	1970	1970	1040
	Cesium (Cs)-Dissolved (mg/L)	0.00189	0.00195	0.00075	0.00074	<0.00050
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Gallium (Ga)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Dissolved (mg/L)	0.013	0.013	0.112	0.105	0.018
	Lead (Pb)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Lithium (Li)-Dissolved (mg/L)	2.25	2.16	1.42	1.52	0.779
	Magnesium (Mg)-Dissolved (mg/L)	<1.0	<1.0	57.8	53.9	1.2
	Manganese (Mn)-Dissolved (mg/L)	0.0171	0.0164	0.0836	0.0812	0.0184
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.0090	0.0093	0.0112	0.0116	0.0154
	Nickel (Ni)-Dissolved (mg/L)	0.00118	0.00122	<0.00050	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	99	98	67	66	38
	Rhenium (Re)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Rubidium (Rb)-Dissolved (mg/L)	0.173	0.174	0.0891	0.0914	0.0549
	Selenium (Se)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Silicon (Si)-Dissolved (mg/L)	2.8	2.7	2.3	2.2	3.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID				
		Description				
		Sampled Date				
		Sampled Time				
		Client ID				
		L2197641-6				
		GW				
		12-NOV-18				
		17:30				
		ZONE 33				
Grouping	Analyte					
SEAWATER						
Total Metals	Titanium (Ti)-Total (mg/L)	<0.0050				
	Tungsten (W)-Total (mg/L)	0.0756				
	Uranium (U)-Total (mg/L)	0.000164				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Yttrium (Y)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0477				
	Zirconium (Zr)-Total (mg/L)	<0.00050				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0115				
	Antimony (Sb)-Dissolved (mg/L)	0.00300				
	Arsenic (As)-Dissolved (mg/L)	0.0034				
	Barium (Ba)-Dissolved (mg/L)	0.0854				
	Beryllium (Be)-Dissolved (mg/L)	<0.00050				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	1.02				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050				
	Calcium (Ca)-Dissolved (mg/L)	1090				
	Cesium (Cs)-Dissolved (mg/L)	<0.00050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00050				
	Cobalt (Co)-Dissolved (mg/L)	<0.000050				
	Copper (Cu)-Dissolved (mg/L)	<0.00050				
	Gallium (Ga)-Dissolved (mg/L)	<0.00050				
	Iron (Fe)-Dissolved (mg/L)	0.019				
	Lead (Pb)-Dissolved (mg/L)	<0.00030				
	Lithium (Li)-Dissolved (mg/L)	0.749				
	Magnesium (Mg)-Dissolved (mg/L)	1.2				
	Manganese (Mn)-Dissolved (mg/L)	0.0181				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.0144				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	40				
	Rhenium (Re)-Dissolved (mg/L)	<0.00050				
	Rubidium (Rb)-Dissolved (mg/L)	0.0528				
	Selenium (Se)-Dissolved (mg/L)	<0.0020				
	Silicon (Si)-Dissolved (mg/L)	3.0				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2197641-1 GW 10-NOV-18 17:30 ZONE 2	L2197641-2 GW 10-NOV-18 17:30 ZONE 22	L2197641-3 GW 11-NOV-18 17:30 ZONE 4	L2197641-4 GW 11-NOV-18 17:30 ZONE 44	L2197641-5 GW 12-NOV-18 17:30 ZONE 3
Grouping	Analyte					
SEAWATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Sodium (Na)-Dissolved (mg/L)	353	368	309	320	280
	Strontium (Sr)-Dissolved (mg/L)	44.9	45.3	33.6	33.6	16.9
	Sulfur (S)-Dissolved (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
	Tellurium (Te)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Thorium (Th)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Titanium (Ti)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Tungsten (W)-Dissolved (mg/L)	0.0806	0.0789	0.0455	0.0443	0.0722
	Uranium (U)-Dissolved (mg/L)	0.000235	0.000238	<0.000050	<0.000050	0.000160
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Yttrium (Y)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	0.0096	0.0100	<0.0030
	Zirconium (Zr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2197641-6 GW 12-NOV-18 17:30 ZONE 33				
Grouping	Analyte					
SEAWATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.00010				
	Sodium (Na)-Dissolved (mg/L)	301				
	Strontium (Sr)-Dissolved (mg/L)	17.2				
	Sulfur (S)-Dissolved (mg/L)	<5.0				
	Tellurium (Te)-Dissolved (mg/L)	<0.00050				
	Thallium (Tl)-Dissolved (mg/L)	<0.000050				
	Thorium (Th)-Dissolved (mg/L)	<0.00050				
	Tin (Sn)-Dissolved (mg/L)	<0.0010				
	Titanium (Ti)-Dissolved (mg/L)	<0.0050				
	Tungsten (W)-Dissolved (mg/L)	0.0687				
	Uranium (U)-Dissolved (mg/L)	0.000144				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Yttrium (Y)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0030				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2197641-1 GW 10-NOV-18 17:30 ZONE 2	L2197641-2 GW 10-NOV-18 17:30 ZONE 22	L2197641-3 GW 11-NOV-18 17:30 ZONE 4	L2197641-4 GW 11-NOV-18 17:30 ZONE 44	L2197641-5 GW 12-NOV-18 17:30 ZONE 3
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	16700	16800	13900	14000	7530
	pH (pH)	8.13	8.22	6.97	6.94	7.40
	Total Suspended Solids (mg/L)	17.3	32.5	24.3	20.3	7.9
	Total Dissolved Solids (mg/L)	10900	10800	9030	8820	5100
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	61.8	61.2	10.2	10.4	50.5
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	61.8	61.2	10.2	10.4	50.5
	Ammonia, Total (as N) (mg/L)	0.142	0.141	0.157	0.158	0.139
	Bromide (Br) (mg/L)	76.1	76.8	69.7	60.1	32.7
	Chloride (Cl) (mg/L)	5900	5910	5220	4530	2700
	Fluoride (F) (mg/L)	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<1.0 ^{DLDS}
	Nitrate (as N) (mg/L)	<0.25 ^{DLDS}	<0.25 ^{DLDS}	<0.25 ^{DLDS}	<0.25 ^{DLDS}	<0.25 ^{DLDS}
	Nitrite (as N) (mg/L)	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.050 ^{DLDS}
	Phosphorus (P)-Total (mg/L)	0.0120	0.0132	0.0067	0.0059	0.0061
	Sulfate (SO4) (mg/L)	<15 ^{DLDS}	<15 ^{DLDS}	<15 ^{DLDS}	<15 ^{DLDS}	<15 ^{DLDS}

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID				
		Description				
		Sampled Date				
		Sampled Time				
		Client ID				
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	7350				
	pH (pH)	7.50				
	Total Suspended Solids (mg/L)	7.5				
	Total Dissolved Solids (mg/L)	4980				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO ₃) (mg/L)	50.1				
	Alkalinity, Carbonate (as CaCO ₃) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO ₃) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO ₃) (mg/L)	50.1				
	Ammonia, Total (as N) (mg/L)	0.136				
	Bromide (Br) (mg/L)	32.5				
	Chloride (Cl) (mg/L)	2700				
	Fluoride (F) (mg/L)	<1.0 ^{DLDS}				
	Nitrate (as N) (mg/L)	<0.25 ^{DLDS}				
	Nitrite (as N) (mg/L)	<0.050 ^{DLDS}				
	Phosphorus (P)-Total (mg/L)	0.0082				
	Sulfate (SO ₄) (mg/L)	<15 ^{DLDS}				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Lithium (Li)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Potassium (K)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Rubidium (Rb)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Sodium (Na)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2197641-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-L-IC-N-VA	Water	Chloride in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Seawater	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DIS-C-CVAFS-VA	Seawater	Diss. Mercury in Seawater by CVAFS	PUGET SOUND PROTOCOLS, EPA 245.7
This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
HG-TOT-C-CVAFS-VA	Seawater	Total Mercury in Seawater by CVAFS	PUGET SOUND PROTOCOLS, EPA 245.7
This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			

Reference Information

MET-D-L-HRMS-VA	Seawater	Diss. Metals in Seawater by HR-ICPMS	EPA 200.8
Trace metals in seawater are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) based on US EPA Method 200.8, (Revision 5.5). The procedures may involve laboratory sample filtration based on APHA Method 3030B.			
MET-T-L-HRMS-VA	Seawater	Tot. Metals in Seawater by HR-ICPMS	EPA 200.8
Trace metals in seawater are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) based on US EPA Method 200.8, (Revision 5.5). The procedures may involve preliminary sample treatment by acid digestion based on APHA Method 3030E.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
P-T-PRES-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.			
Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.			
Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-LOW-VA	Water	Low Level TDS (3.0mg/L) by Gravimetric	APHA 2540C
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			
Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.			

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

17-720417

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg ww - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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.



JULY 2017 FRONT



Golder Associates Ltd. (Ottawa)
ATTN: Dale Holtze
1931 Robertson Road
Ottawa ON K2H 5B7

Date Received: 19-NOV-18
Report Date: 22-NOV-18 17:29 (MT)
Version: FINAL

Client Phone: 613-592-9600

Certificate of Analysis

Lab Work Order #: L2198327
Project P.O. #: NOT SUBMITTED
Job Reference: 1789310
C of C Numbers: 18-1789310
Legal Site Desc:

Joanne Lee
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID Description Sampled Date Sampled Time Client ID	L2198327-1 Groundwater 13-NOV-18 17:00 ZONE 6	L2198327-2 Groundwater 13-NOV-18 17:00 ZONE 66	L2198327-3 Groundwater 13-NOV-18 15:00 EB	L2198327-4 Groundwater 13-NOV-18 15:30 TB	
Grouping	Analyte						
SEAWATER							
Physical Tests	Hardness (as CaCO3) (mg/L)		3630	3620	<4.8	<4.8	
Total Metals	Aluminum (Al)-Total (mg/L)		0.0118	0.0127	<0.0050		
	Antimony (Sb)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Arsenic (As)-Total (mg/L)		0.0024	0.0024	<0.0020		
	Barium (Ba)-Total (mg/L)		0.859	0.894	<0.0010		
	Beryllium (Be)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Bismuth (Bi)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)		0.41	0.40	<0.10		
	Cadmium (Cd)-Total (mg/L)		<0.000050	<0.000050	<0.000050		
	Calcium (Ca)-Total (mg/L)		1330	1370	<1.0		
	Cesium (Cs)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Chromium (Cr)-Total (mg/L)		0.00383	0.00381	<0.00050		
	Cobalt (Co)-Total (mg/L)		0.000072	0.000093	<0.000050		
	Copper (Cu)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Gallium (Ga)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)		0.314	0.322	<0.010		
	Lead (Pb)-Total (mg/L)		<0.00030	<0.00030	<0.00030		
	Lithium (Li)-Total (mg/L)		0.558	0.563	<0.020		
	Magnesium (Mg)-Total (mg/L)		40.6	39.8	<1.0		
	Manganese (Mn)-Total (mg/L)		0.101	0.103	<0.00020		
	Mercury (Hg)-Total (mg/L)		<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)		0.0279	0.0270	<0.0020		
	Nickel (Ni)-Total (mg/L)		0.00288	0.00262	<0.00050		
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050		
	Potassium (K)-Total (mg/L)		9.7	10.1	<1.0		
	Rhenium (Re)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Rubidium (Rb)-Total (mg/L)		0.0166	0.0164	<0.0050		
	Selenium (Se)-Total (mg/L)		<0.0020	<0.0020	<0.0020		
	Silicon (Si)-Total (mg/L)		2.6	2.5	<1.0		
	Silver (Ag)-Total (mg/L)		<0.00010	<0.00010	<0.00010		
	Sodium (Na)-Total (mg/L)		232	238	<1.0		
	Strontium (Sr)-Total (mg/L)		18.1	18.6	<0.010		
	Sulfur (S)-Total (mg/L)		<5.0	<5.0	<5.0		
	Tellurium (Te)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Thallium (Tl)-Total (mg/L)		<0.000050	<0.000050	<0.000050		
	Thorium (Th)-Total (mg/L)		<0.00050	<0.00050	<0.00050		
	Tin (Sn)-Total (mg/L)		<0.0010	<0.0010	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2198327-1 Groundwater 13-NOV-18 17:00 ZONE 6	L2198327-2 Groundwater 13-NOV-18 17:00 ZONE 66	L2198327-3 Groundwater 13-NOV-18 15:00 EB	L2198327-4 Groundwater 13-NOV-18 15:30 TB	
Grouping	Analyte					
SEAWATER						
Total Metals	Titanium (Ti)-Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Tungsten (W)-Total (mg/L)	0.0214	0.0223	<0.0010		
	Uranium (U)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Yttrium (Y)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Total (mg/L)	0.109	0.113	<0.0030		
	Zirconium (Zr)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	0.00050	<0.00050	<0.00050	
	Arsenic (As)-Dissolved (mg/L)	0.0021	0.0024	<0.0020	<0.0020	
	Barium (Ba)-Dissolved (mg/L)	0.818	0.794	<0.0010	<0.0010	
	Beryllium (Be)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	0.36	0.35	<0.10	<0.10	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Calcium (Ca)-Dissolved (mg/L)	1380	1380	<1.0	<1.0	
	Cesium (Cs)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Cobalt (Co)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Gallium (Ga)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Dissolved (mg/L)	0.251	0.256	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	
	Lithium (Li)-Dissolved (mg/L)	0.533	0.520	<0.020	<0.020	
	Magnesium (Mg)-Dissolved (mg/L)	42.8	42.8	<1.0	<1.0	
	Manganese (Mn)-Dissolved (mg/L)	0.0961	0.0970	<0.00020	<0.00020	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0257	0.0245	<0.0020	<0.0020	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Potassium (K)-Dissolved (mg/L)	<20	<20	<20	<20	
	Rhenium (Re)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Rubidium (Rb)-Dissolved (mg/L)	0.0151	0.0146	<0.0050	<0.0050	
	Selenium (Se)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Silicon (Si)-Dissolved (mg/L)	2.8	2.7	<1.0	<1.0	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2198327-1 Groundwater 13-NOV-18 17:00 ZONE 6	L2198327-2 Groundwater 13-NOV-18 17:00 ZONE 66	L2198327-3 Groundwater 13-NOV-18 15:00 EB	L2198327-4 Groundwater 13-NOV-18 15:30 TB	
Grouping	Analyte					
SEAWATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Sodium (Na)-Dissolved (mg/L)	253	250	<20	<20	
	Strontium (Sr)-Dissolved (mg/L)	19.5	19.7	<0.050	<0.050	
	Sulfur (S)-Dissolved (mg/L)	<5.0	<5.0	<5.0	<5.0	
	Tellurium (Te)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Thorium (Th)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Titanium (Ti)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Tungsten (W)-Dissolved (mg/L)	0.0214	0.0208	<0.0010	<0.0010	
	Uranium (U)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Yttrium (Y)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0244	0.0230	<0.0030	<0.0030	
	Zirconium (Zr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L2198327-1 Groundwater 13-NOV-18 17:00 ZONE 6	L2198327-2 Groundwater 13-NOV-18 17:00 ZONE 66	L2198327-3 Groundwater 13-NOV-18 15:00 EB	L2198327-4 Groundwater 13-NOV-18 15:30 TB	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	8720	8780	<2.0	<2.0	
	pH (pH)	6.58	6.65	5.76	5.98	
	Total Suspended Solids (mg/L)	8.3	9.5	<3.0	<3.0	
	Total Dissolved Solids (mg/L)	5580	5410	<3.0	<3.0	
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	27.2	26.4	<1.0	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	27.2	26.4	<1.0	<1.0	
	Ammonia, Total (as N) (mg/L)	0.443	0.437	<0.0050	<0.0050	
	Bromide (Br) (mg/L)	40.9	41.4	<0.050	<0.050	
	Chloride (Cl) (mg/L)	3010	3060	<0.50	<0.50	
	Fluoride (F) (mg/L)	<1.0 ^{DLDS}	<1.0 ^{DLDS}	<0.020	<0.020	
	Nitrate (as N) (mg/L)	<0.25 ^{DLDS}	<0.25 ^{DLDS}	<0.0050	<0.0050	
	Nitrite (as N) (mg/L)	<0.050 ^{DLDS}	<0.050 ^{DLDS}	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0043	0.0052	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	<15 ^{DLDS}	<15 ^{DLDS}	<0.30	<0.30	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

Qualifiers for Individual Samples Listed:

Sample Number	Client Sample ID	Qualifier	Description
L2198327-1	ZONE 6	WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L2198327-2	ZONE 66	WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
L2198327-3	EB	WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2198327-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2198327-1, -2, -3, -4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2198327-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2198327-1, -2, -3, -4

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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**
ALK-TITR-VA	Water	Alkalinity Species by Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Seawater	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DIS-C-CVAFS-VA	Seawater	Diss. Mercury in Seawater by CVAFS	PUGET SOUND PROTOCOLS, EPA 245.7
This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
HG-TOT-C-CVAFS-VA	Seawater	Total Mercury in Seawater by CVAFS	PUGET SOUND PROTOCOLS, EPA 245.7
This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method			

Reference Information

245.7).

MET-D-L-HRMS-VA Seawater Diss. Metals in Seawater by HR-ICPMS EPA 200.8

Trace metals in seawater are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) based on US EPA Method 200.8, (Revision 5.5). The procedures may involve laboratory sample filtration based on APHA Method 3030B.

MET-T-L-HRMS-VA Seawater Tot. Metals in Seawater by HR-ICPMS EPA 200.8

Trace metals in seawater are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) based on US EPA Method 200.8, (Revision 5.5). The procedures may involve preliminary sample treatment by acid digestion based on APHA Method 3030E.

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

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

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

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

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Samples with very high dissolved solids (i.e. seawaters, brackish waters) may produce a negative bias by this method. Alternate methods are available for these types of samples.

Arsenic (5+), at elevated levels, is a positive interference on colourimetric phosphate analysis.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

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

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

TDS-LOW-VA Water Low Level TDS (3.0mg/L) by Gravimetric APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

** 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
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VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA
----	---

Chain of Custody Numbers:

18-1789310

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg ww - milligrams per kilogram based on wet weight of sample.

mg/kg lw - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

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.



12198327-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # 18-1789310

Page 1 of 1

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APPENDIX D

2016 Laboratory Certificate of Analysis – Brine Fluid

Certificat d'analyse

Client : Agnico-Eagle CSD - Amaruq Study

Responsable : Mme Odrée-Maude Vachon

Adresse : CSD

tél.: (819) 759-3555 ()

fax.: (000) 000-0000

Numéro de projet : V-52584

Lieu de prélèvement : Brine Fluid

Date de prélèvement : 17 avril 2016

Échantillon : Brine Fluid

Heure de prélèvement : N/D

Nom du préleveur : N/D

Date de réception : 19 avril 2016

Type d'échantillon : Eau surface

Réseau:

Certificat corrigé, remplace le certificat V-52584 émis le 09 mai 2016

Les résultats ne se rapportent qu'aux échantillons soumis pour analyse.

Les échantillons seront conservés pendant 30 jours à partir de la date du rapport à moins d'avis écrit du client.

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat d'analyse

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres	Résultats	Méthode d'analyse	Date d'analyse
Aluminium (Al)	0.498 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Antimoine (Sb)	0.0354 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Argent (Ag)	<0.0001 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Arsenic (As)	0.7662 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Baryum (Ba)	0.1126 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Béryllium (Be)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Bicarbonate (HCO ₃)	27 mg CaCO ₃ /L	M-TIT-1.0	19 avril 2016
Bismuth (Bi)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Bore (B)	13.2 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Bromures	1066 mg/L	Sous-traitance\Multilab Direct	22 avril 2016
Cadmium (Cd)	<0.00002 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Calcium (Ca)	42266 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Carbone inorganique total (C.I.T.)	2.1 mg/L	M-COT-1.0	19 avril 2016
Carbone organique total (C.O.T.)	28.5 mg/L	M-COT-1.0	19 avril 2016
Chlorure (Cl)	83700 mg/L	Sous-traitance\Multilab Direct	29 avril 2016
Chrome (Cr)	<0.0006 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Cobalt (Co)	0.0406 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Conductivité	55420 µmhos/cm	M-TIT-1.0	19 avril 2016
Cuivre (Cu)	0.0039 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Dureté	105554 mg CaCO ₃ /L	Sous-traitance\Multilab Direct	20 avril 2016
Étain (Sn)	<0.001 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Fer (Fe)	2.60 mg/L	Sous-traitance\Multilab Direct	22 avril 2016
Fluorures (F)	0.06 mg/L	Sous-traitance\Multilab Direct	27 avril 2016
Lithium (Li)	34.52 mg/L	Sous-traitance\Multilab Direct	22 avril 2016
Magnésium (Mg)	3.92 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Manganèse (Mn)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Mercure (Hg)	0.00039 mg/L	Sous-traitance\Multilab Direct	21 avril 2016
Molybdène (Mo)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
NH ₃ (NH ₃ non-ionisé)	1.52 mg N/L	Sous-traitance\Multilab Direct	20 avril 2016
NH ₄	0.67 mg N/L	Sous-traitance\Multilab Direct	20 avril 2016
Nickel (Ni)	1.350 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Nitrates (NO ₃)	0.54 mg N/L	Sous-traitance\Multilab Direct	19 avril 2016
Nitrites (NO ₂)	0.06 mg N/L	Sous-traitance\Multilab Direct	21 avril 2016
pH	10.02	M-TIT-1.0	19 avril 2016
Plomb (Pb)	<0.0003 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Potassium (K)	1717 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Radium (RA 226)	<0.066 Becquerels/L	M-RA-2.0	02 mai 2016
Sélénium (Se)	3.83 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Silice (Si)	2.93 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Sodium (Na)	838 mg/L	Sous-traitance\Multilab Direct	20 avril 2016

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat d'analyse

Numéro de projet : V-52584

Échantillon : Brine Fluid

Lieu de prélèvement : Brine Fluid

Date de prélèvement : 17 avril 2016

Heure de prélèvement : N/D

Paramètres	Résultats	Méthode d'analyse	Date d'analyse
Solides dissous	36946 mg/L	M-TIT-1.0	19 avril 2016
Solides totaux	149736 mg/L	M-SOLI-1.0	27 avril 2016
Strontium (Sr)	656 mg/L	Sous-traitance\Multilab Direct	22 avril 2016
Tellure (Te)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Thallium (Tl)	<0.002 mg/L	Sous-traitance\Multilab Direct	22 avril 2016
Titane (Ti)	45.2 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Uranium (U)	<0.001 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Vanadium (V)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Zinc (Zn)	<0.001 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
Alcalinité	145 mg CaCO ₃ /L	M-TIT-1.0	20 avril 2016
Sulfate (SO ₄)	<0.6 mg SO ₄ /L	Sous-traitance\Multilab Direct	12 mai 2016

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Limite de détection rapportée

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètre	Valeur	Unité	Méthode	Accréditation
Aluminium (Al)	0.006	mg/L	Sous-traitance	
Antimoine (Sb)	0.0001	mg/L	Sous-traitance	Oui
Argent (Ag)	0.0001	mg/L	Sous-traitance	Oui
Arsenic (As)	0.0005	mg/L	Sous-traitance	Oui
Baryum (Ba)	0.0005	mg/L	Sous-traitance	Oui
Béryllium (Be)	0.0005	mg/L	Sous-traitance	
Bicarbonate (HCO ₃)	2	mg CaCO ₃ /L	M-TIT-1.0	
Bismuth (Bi)	0.0005	mg/L	Sous-traitance	
Bore (B)	0.01	mg/L	Sous-traitance	Oui
Bromures	0.01	mg/L	Sous-traitance	
Cadmium (Cd)	0.00002	mg/L	Sous-traitance	Oui
Calcium (Ca)	0.03	mg/L	Sous-traitance	Oui
Carbone inorganique total (C.I.T.)	0.2	mg/L	M-COT-1.0	--
Carbone organique total (C.O.T.)	0.2	mg/L	M-COT-1.0	Oui
Chlorure (Cl)	0.5	mg/L	Sous-traitance	Oui
Chrome (Cr)	0.0006	mg/L	Sous-traitance	Oui
Cobalt (Co)	0.0005	mg/L	Sous-traitance	
Conductivité	1	µmhos/cm	M-TIT-1.0	Oui
Cuivre (Cu)	0.0005	mg/L	Sous-traitance	Oui
Dureté	1	mg CaCO ₃ /L	Sous-traitance	
Étain (Sn)	0.001	mg/L	Sous-traitance	Oui
Fer (Fe)	0.01	mg/L	Sous-traitance	Oui
Fluorures (F)	0.02	mg/L	Sous-traitance	Oui
Lithium (Li)	0.005	mg/L	Sous-traitance	
Magnésium (Mg)	0.02	mg/L	Sous-traitance	Oui
Manganèse (Mn)	0.0005	mg/L	Sous-traitance	Oui
Mercure (Hg)	0.00001	mg/L	Sous-traitance	Oui
Molybdène (Mo)	0.0005	mg/L	Sous-traitance	Oui
NH ₃ (NH ₃ non-ionisé)	0.01	mg N/L	Sous-traitance	-
NH ₄	0.01	mg N/L	Sous-traitance	-
Nickel (Ni)	0.0005	mg/L	Sous-traitance	Oui
Nitrates (NO ₃)	0.01	mg N/L	Sous-traitance	Oui
Nitrites (NO ₂)	0.01	mg N/L	Sous-traitance	Oui
pH			M-TIT-1.0	Oui
Plomb (Pb)	0.0003	mg/L	Sous-traitance	Oui
Potassium (K)	0.05	mg/L	Sous-traitance	
Radium (RA 226)	0.002	Becquerels/L	M-RA-2.0	Oui
Sélénium (Se)	0.001	mg/L	Sous-traitance	Oui
Silice (Si)	0.01	mg/L	Sous-traitance	
Sodium (Na)	0.05	mg/L	Sous-traitance	Oui

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Limite de détection rapportée

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètre	Valeur	Unité	Méthode	Accréditation
Solides dissous	1	mg/L	M-TIT-1.0	
Solides totaux	2	mg/L	M-SOLI-1.0	Oui
Strontium (Sr)	0.005	mg/L	Sous-traitance	
Tellure (Te)	0.0005	mg/L	Sous-traitance	
Thallium (Tl)	0.002	mg/L	Sous-traitance	
Titane (Ti)	0.01	mg/L	Sous-traitance	
Uranium (U)	0.001	mg/L	Sous-traitance	
Vanadium (V)	0.0005	mg/L	Sous-traitance	Oui
Zinc (Zn)	0.001	mg/L	Sous-traitance	Oui
Alcalinité	2	mg CaCO ₃ /L	M-TIT-1.0	
Sulfate (SO ₄)	0.6	mg SO ₄ /L	Sous-traitance	Oui

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat contrôle qualité

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres

Alcalinité mg CaCO ₃ /L	Nom Standard STD alcalinité Valeur obtenue 144 Justesse 99.3% Intervalle 123 - 167
Aluminium (Al) mg/L	Blanc <0.006
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 6.82 Justesse 92.9% Intervalle 5.10 - 7.64
Antimoine (Sb) mg/L	Blanc <0.0001
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 0.2049 Justesse 92.3% Intervalle 0.178 - 0.266
Argent (Ag) mg/L	Blanc <0.0001
	Nom Standard DMR-0009-2016-Ag Valeur obtenue 0.6004 Justesse 82.9% Intervalle 0.579 - 0.869
Arsenic (As) mg/L	Blanc <0.0005
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 0.2700 Justesse 95.4% Intervalle 0.198 - 0.368
Baryum (Ba) mg/L	Blanc <0.0005
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 2.572 Justesse 94.2% Intervalle 1.94 - 2.92
Béryllium (Be) mg/L	Blanc <0.0005
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 1.900 Justesse 88.2% Intervalle 1.36 - 2.04
Bismuth (Bi) mg/L	Blanc <0.0005
Bore (B) mg/L	Blanc <0.01
	Nom Standard DMR-0009-2016-Eu Valeur obtenue 3.43 Justesse 83.7% Intervalle 2.36 - 3.54

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat contrôle qualité

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres

Bromures mg/L
Blanc <0.01
Nom Standard DMR-0123-2016-Br
Valeur obtenue 5.39
Justesse 95.7%
Intervalle 4.50 - 6.76

Cadmium (Cd) mg/L
Blanc <0.00002
Nom Standard DMR-0009-2016-Eu
Valeur obtenue 0.89802
Justesse 99.8%
Intervalle 0.720 - 1.080

Calcium (Ca) mg/L
Blanc <0.03
Nom Standard DMR-0009-2016-Eu
Valeur obtenue 17.1
Justesse 98.3%
Intervalle 13.9 - 20.9

Chlorure (Cl) mg/L
Blanc <0.5
Nom Standard DMR-0175-2016-Cl
Valeur obtenue 53.7
Justesse 96.7%
Intervalle 46 - 58

Chrome (Cr) mg/L
Blanc <0.0006
Nom Standard DMR-0009-2016-Eu
Valeur obtenue 4.115
Justesse 98.4%
Intervalle 3.24 - 4.86

Cobalt (Co) mg/L
Blanc <0.0005
Nom Standard DMR-0009-2016-Eu
Valeur obtenue 1.549
Justesse 99.9%
Intervalle 1.24 - 1.86

Conductivité µmhos/cm
Nom Standard STD cond maison
Valeur obtenue 1407
Justesse 99.4%
Intervalle 1203 - 1627

Cuivre (Cu) mg/L
Blanc <0.0005
Nom Standard DMR-0009-2016-Eu
Valeur obtenue 1.379
Justesse 94.7%
Intervalle 1.05 - 1.57

Étain (Sn) mg/L
Blanc <0.001

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat contrôle qualité

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres

Fer (Fe) mg/L	Blanc <0.01 Nom Standard DMR-0009-2016-Eu Valeur obtenue 16.0 Justesse 88.1% Intervalle 11.4 - 17.2
Lithium (Li) mg/L	Blanc <0.005 Nom Standard DMR-0009-2016-Eu Valeur obtenue 0.827 Justesse 97.8% Intervalle 0.677 - 1.015
Magnésium (Mg) mg/L	Blanc <0.02 Nom Standard DMR-0009-2016-Eu Valeur obtenue 8.04 Justesse 89.4% Intervalle 5.82 - 8.72
Manganèse (Mn) mg/L	Blanc <0.0005 Nom Standard DMR-0009-2016-Eu Valeur obtenue 3.781 Justesse 97.2% Intervalle 3.11 - 4.67
Mercure (Hg) mg/L	Blanc <0.00001 Nom Standard DMR-0123-2016-HgEu Valeur obtenue 0.00062 Justesse 93.9% Intervalle 0.00040 - 0.00092
Molybdène (Mo) mg/L	Blanc <0.0005 Nom Standard DMR-0009-2016-Eu Valeur obtenue 0.6382 Justesse 90.1% Intervalle 0.566 - 0.850
Nickel (Ni) mg/L	Blanc <0.0005 Nom Standard DMR-0009-2016-Eu Valeur obtenue 1.110 Justesse 98.2% Intervalle 0.90 - 1.36
Nitrates (NO ₃) mg N/L	Blanc <0.01
Nitrites (NO ₂) mg N/L	Blanc <0.01 Nom Standard DMR-0175-2016-NO ₂ Valeur obtenue 1.97 Justesse 97.5%

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat contrôle qualité

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres

pH	Intervalle 1.72 - 2.32
	Nom Standard STD pH 7.0
	Valeur obtenue 7.01
	Justesse 99.9%
	Intervalle 6.96 - 7.04
Plomb (Pb) mg/L	Blanc <0.0003
	Nom Standard DMR-0009-2016-Eu
	Valeur obtenue 0.9397
	Justesse 96.6%
	Intervalle 0.727 - 1.091
Potassium (K) mg/L	Blanc <0.05
	Nom Standard DMR-0009-2016-Eu
	Valeur obtenue 20.2
	Justesse 89%
	Intervalle 14.6 - 21.8
Radium (RA 226) Becquerels/L	Blanc <0.002
	Nom Standard STD 45462
	Valeur obtenue 0.0700
	Justesse 85%
	Intervalle 0.0700 - 0.0948
Sélénium (Se) mg/L	Blanc <0.001
	Nom Standard DMR-0009-2016-Eu
	Valeur obtenue 1.33
	Justesse 98.5%
	Intervalle 1.08 - 1.62
Sodium (Na) mg/L	Blanc <0.05
	Nom Standard DMR-0009-2016-Eu
	Valeur obtenue 29.0
	Justesse 91%
	Intervalle 21.3 - 31.9
Solides totaux mg/L	Blanc <2
	Nom Standard DMR-0124-2016-3
	Valeur obtenue 289
	Justesse 99%
	Intervalle 243 - 329
Strontium (Sr) mg/L	Blanc <0.005
	Nom Standard DMR-0009-2016-Eu
	Valeur obtenue 1.25
	Justesse 97.7%
	Intervalle 1.02 - 1.54

Sauf indication contraire, tous les échantillons ont été reçus en bon état.

Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Certificat contrôle qualité

Numéro de projet : V-52584

Échantillon : Brine Fluid

Date de prélèvement : 17 avril 2016

Lieu de prélèvement : Brine Fluid

Heure de prélèvement : N/D

Paramètres

Sulfate (SO ₄) mg SO ₄ /L	Blanc <0.6 Nom Standard DMR-0175-2016-SO ₄ Valeur obtenue 71.2 Justesse 93.7% Intervalle 60.3 - 73.7
Tellure (Te) mg/L	Blanc <0.0005
Thallium (Tl) mg/L	Blanc <0.002 Nom Standard TI-S140909023-1000ppm Valeur obtenue 989 Justesse 98.9% Intervalle 800 - 1200
Titane (Ti) mg/L	Blanc <0.01
Uranium (U) mg/L	Blanc <0.001 Nom Standard DMR-0009-2016-Eu Valeur obtenue 1.93 Justesse 90.3% Intervalle 1.41 - 2.11
Vanadium (V) mg/L	Blanc <0.0005 Nom Standard DMR-0009-2016-Eu Valeur obtenue 2.023 Justesse 98.3% Intervalle 1.59 - 2.39
Zinc (Zn) mg/L	Blanc <0.001 Nom Standard DMR-0009-2016-Eu Valeur obtenue 4.67 Justesse 97.7% Intervalle 3.82 - 5.74

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.

Informations supplémentaires

Numéro de projet : V-52584

Échantillon : Brine Fluid

Lieu de prélèvement : Brine Fluid

Date de prélèvement : 17 avril 2016

Heure de prélèvement : N/D

Méthode laboratoire	Méthode de référence
M-MET-3.0	MA.200-Mét. 1.2
M-TIT-1.0	MA.303-Titr Auto 2.0
M-CL-2.0	MA.300-Ions 1.3
M-CI-1.0	MA.300-Anions 1.0
M-NITR-2.0	MA.300-NO3 2.0
M-RA-2.0	APHA 7500-Ra B et EPA P.13 (EMSL-CI)
M-SOLI-1.0	MA.104-S.S. 1.1
M-SULF-2.0	MA.300-Ions 1.3

Sauf indication contraire, tous les échantillons ont été reçus en bon état.
Toute reproduction, sinon en entier, est interdite sans l'autorisation écrite du laboratoire.