Appendix 38

Whale Tail 2018 Groundwater Management Monitoring report

TECHNICAL MEMORANDUM

DATE March 22, 2019 **Reference No.** 19119750-279-TM-Rev0

TO Marie-Pier Marcil
Agnico Eagle Mines Limited

CC Michel Groleau

FROM Don Chorley / Jennifer Levenick **EMAIL dchorley@golder.com**

WHALE TAIL PIT PROJECT – GROUNDWATER MANAGEMENT MONITORING REPORT

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) received a Project Certificate No.008 from the Nunavut Impact Review Board for the development of the Whale Tail Pit, a satellite deposit located on the Amaruq Exploration Property. To comply with the Terms and Conditions No.15 and 16 included in the Project Certificate a Groundwater Monitoring Plan (GWMP) was developed that included commitments made with respect to submissions provided during the technical review of the FEIS (Agnico Eagle 2019).

This memorandum provides a compilation of the site-specific data collection in 2018 and the review of 2018 monitoring data undertaken by Agnico Eagle to meet the requirements established in the GWMP. Each of these requirements and the relevant sections of the GWMP that are addressed are described. Section 1 provides site-specific data collected in 2018; Section 2 provides data and analyses on the definition of horizontal and vertical hydraulic gradients; and Section 3 presents mine inflow monitoring data and comparison to model predictions.

1.0 SITE-SPECIFIC DATA COLLECTION

The following section presents a summary of the water sampling from the Westbay multi-level well system and the hydraulic conductivity testing conducted in 2018, that respectively meets the requirements of sections 2.3.1 and 2.3.2 of the GWMP.

1.1 Westbay Sampling and Hydraulic Head Measurements

Groundwater sampling and hydraulic head measurements of the Westbay multi-level system was undertaken in November 2018. A technical memorandum was prepared documenting the work and is presented as Attachment A. The following presents a summary of the work. The technical memorandum includes results from previous groundwater sampling at the Westbay multi-level system in 2016.

Groundwater samples were collected from ports 2, 3, 4 and 6 of the Westbay multi-level well in November 2018. During drilling and installation of the Westbay, the drilling fluid was tagged with fluorescein. During collection of the water samples, the fluorescein concentration was measured to estimate the proportion of the sample that could be attributed to drilling fluid.

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Groundwater quality of each water sample was estimated using a mass balance calculation to remove the proportion of residual drill fluid from the collected samples. The estimated groundwater quality from the water sampled from the ports was generally within the range as previously estimated in 2016. The calculated concentrations of metals and arsenic are low. The arsenic concentrations are similar to assumptions adopted in geochemical models; arsenic in groundwater is still not likely to have a significant effect on mine surface water quality.

The calculated Total Dissolved Solids (TDS) was higher in 2018 with increases at individual ports ranging from 25% to 85%. This variation from 2016 is attributed to the higher proportion of residual drilling water in the samples, as indicated by the fluorescein measurements; the higher the proportion of drilling water the higher the uncertainty in removing the chemistry of the drill water from the raw sample. Because of the higher proportion of fluorescein, and therefore higher uncertainty in the TDS data, the recent sampling is not considered to represent an increase in formation groundwater TDS. The TDS profile in the hydrogeological models were based on the more reliable and applicable 2016 data, and TDS will continue to be monitored at the Westbay Well on an annual basis and in the pit inflow water during development. The well will next be sampled to March 2019.

Hydraulic heads measurements were recorded at the sampling ports prior to any sampling or development. Based on the measurements, a downward gradient of 0.0008 m/m was estimated. This direction of groundwater flow is consistent with groundwater flow predictions in the FEIS.

1.2 Hydraulic Conductivity Testing

A hydrogeological testing program was conducted between 7 and 9 of December 2018. The technical memorandum prepared on this testing is included as Attachment B. The testing was conducted in deep bedrock in the sub-permafrost zone over a depth interval of about 375 m to 626 m below ground surface. All three of these tests resulted in estimated hydraulic conductivities of less than 1×10^{-10} m/s (due to limitations of the testing equipment, hydraulic conductivities of less than 1×10^{-10} m/s could not be quantified).

With the addition of these tests to historical measurements of bedrock hydraulic conductivity, the hydraulic conductivity of the deep bedrock is inferred to be slightly lower than what was assumed in the hydrogeologic modelling for the Whale Tail Pit. The lower higher conductivity at depth, which will control the vertical flux of water to and from the pit lake, combined with the verification of the vertical flow direction, indicates that the small predicted groundwater discharge from the pit lake during long-term post-closure is reasonable and likely conservatively high (i.e., higher than will occur in reality). These packer test data also provide a higher level of confidence that the one high value of hydraulic conductivity over a 30 m zone from a depth of about 436 m to 466 m in deep bedrock that was measured during the drilling of the borehole for the Westbay multi-level well is likely an isolated zone of jointing near the test interval and is not a large-scale enhanced permeability zone.

2.0 DEFINITION OF HORIZONTAL AND VERTICAL GROUNDWATER FLOW

The following addresses Section 3.1 of the GWMP. Thermistors have been installed at ten locations of which four (AMQ17-1337, AMQ17-1233, AMQ17-1277A and AMQ15-452) are located between Nemo Lake and Whale Tail Pit. These thermistors were monitored in 2018 to verify assumptions on permafrost conditions. These four thermistors each indicate the presence of deep permafrost below land and confirm that horizontal groundwater flow below the active layer is restricted by permafrost in at least the upper 425 m. It also confirms that the sub-permafrost groundwater flow system can only be recharged by vertical flow through open taliks beneath lakes of sufficient size such as Whale Tail and Nemo lake.

The driving force in the sub-permafrost under baseline and post-closure conditions is the hydraulic heads at each of these lakes. Groundwater flows down to the sub-permafrost groundwater flow system from the lakes with higher hydraulic heads and it flows upwards to lakes with lower hydraulic heads. The data collected at AMQ16-626 indicates the presence of a downward hydraulic gradient, which is consistent with the thermistor data and the interpreted conditions of horizontal and vertical groundwater flow below the active zone (vertical flow down to the sub-permafrost zone and lateral flow towards a lake of lower elevation in the sub-permafrost zone). The magnitude of the gradient is consistent with what would be expected based on the relative lake elevations of Whale Tail Lake and DS1, which is the predicted receptor for flow from Whale Tail Lake.

The relative difference in hydraulic heads in the lakes near Whale Tail Pit is very small and combined with the very low hydraulic conductivity measurements in 2018 of less than 1×10^{-10} m/s in the sub-permafrost and the low measured vertical hydraulic gradient, groundwater flow quantities at baseline and post-closure are calculated to be very small and negligible when compared to annual surface water exchange in the lakes near Whale Tail Pit.

3.0 DATA COMPILATIONS AND COMPARISON TO PREDICTIONS

The predicted groundwater inflows quantity and quality (represented by the TDS) are presented in Section 2.2.3 of the GWMP. In accordance with Section 3.3 of the GWMP, groundwater inflow quantity and quality will be compared to model predictions on an annual basis. If significant variations between predictions and measured are observed, then the data and hydrogeological model will be reviewed, and a determination made of if these variations require re-calibration of the hydrogeological model and prediction of future inflows. Variations considered significant were:

- Groundwater inflow to the mine, based on 6-month rolling average over six consecutive months, is 20% higher than predicted.
- The TDS of collected water samples, based on a 6-month rolling average, is more than 25% higher than the estimated water quality.
- Temperature profiles observed in thermistors between Nemo Lake and Whale Tail lake are showing signs of permafrost degradation below the active layer.

Inflow to the pit sump will be used to estimate groundwater inflow quantity and quality. It should be noted that inflow to the pit sump is not only groundwater but there are contributions to both the TDS concentrations and the total quantity by surface water inflow. These other components are accounted for by the site-wide water quality model.

Groundwater inflow to the mine was predicted to begin during dewatering of the north basin of Whale Tail Lake that is scheduled to begin in March 2019. Two Quarries were excavated on land in 2018 to provide material for

infrastructure such as dams and roads. Inflow quantity to Quarry 1 is presented in Table 1 below. Water was not pumped out of Quarry 2.

Table 1. Measured quantity of water pumped from Quarry 1 in 2018

Month	Water inflow pumped (m^3)
January 2018	0
February 2018	0
March 2018	0
April 2018	0
May 2018	0
June 2018	0
July 2018	0
August 2018	0
September 2018	30,153
October 2018	182,427
November 2018	0
December 2018	0

The inflows recorded in September to November 2018 are essentially surface water flowing from Whale Tail Lake to Quarry 1 through non-cohesive overburden that was most likely fractured after blasting the Quarry 1 top benches. The TDS of this water varied from 53 mg/L to 128 mg/L. The last 5 months of inflow data for 2018; therefore, is not considered to be groundwater and is not relevant for comparison the predicted groundwater inflows.

4.0 SUMMARY

The following presents a summary of the data contained in this document and reference to the relevant sections of the GWMP.

- The Westbay multi-level well was re-sampled in 2018 (section 2.3.1 of the GWMP). Although the calculated TDS concentrations were higher than when the well was sampled in 2016, they are not considered to represent an increase in formation groundwater TDS because the TDS profile in the hydrogeological models were based on the more reliable and applicable 2016 data.
- Hydrogeological testing (section 2.3.2 of the GWMP) was undertaken in the deep bedrock and the hydraulic conductivity values estimated from the tests were less than 1 x 10^{-10} m/s. This data indicates that the deep sub-permafrost bedrock hydraulic conductivity adopted in the FEIS was conservatively high for the prediction of long-term post closure recharge/discharge from the pit lake.

- To define horizontal and vertical groundwater flow (section 3.1 of the GWMP), thermistor, lake water levels and Westbay hydraulic head measurements were used. Thermistor data confirmed that horizontal groundwater flow below the active layer is restricted by permafrost in at least the upper 425 m. Horizontal groundwater flow in the sub-permafrost is therefore controlled by the relative hydraulic heads of lakes that are sufficiently large and deep to have an open talik beneath them. Hydraulic head measurements in the Westbay multi-level well indicated a downward vertical hydraulic gradient of 0.008 m/m that is consistent with the estimated hydraulic gradient derived form the relative difference in the hydraulic head at Whale Tail Lake and DS1 divided by the distances between these lakes (including the distance down through the open talik beneath Whale Tail lake and up through the open talik of DSI).
- Inflow to Quarries that were excavated on land for material for site infrastructure was found to be essentially surface water. Groundwater inflows to the pit sumps is not expected to occur until lake dewatering is undertaken in 2019. In the absence of groundwater inflow, comparison of observed groundwater inflow to the Whale Tail Pit to the predicted inflows (section 3.3 of the GWMP) could not be undertaken in 2018.

5.0 CLOSURE

We trust the above meets your needs, please contact the undersigned for any questions or concerns.

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https://golderassociates.sharepoint.com/sites/106337/project files/5 technical work/gw monitoring report/rev0/19119750-279-tm-gwmonitoringrpt_rev0.docx

References

Agnico Eagle (Agnico Eagle Mines Limited). 2019. Whale Tail Pit Project Groundwater Monitoring Plan. Version 2.1. February 2019.

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date March 22, 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

ATTACHMENT A

2018 Westbay Sampling Technical Memorandum

TECHNICAL MEMORANDUM

DATE February 8, 2019 **Project No.** 1789310-244-TM-Rev0

TO Michel Groleau
Agnico-Eagle Mines Ltd.

FROM Valerie Bertrand, Dale Holtze, Jennifer Levenick **EMAIL** vbertrand@golder.com

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 (km^2) 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.

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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 brine[1]. 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.

$$(1) \qquad Dilute\ Brine\ Factor_{Port\ i} = \frac{Field\ Conductivity_{Port\ i}}{Brine\ Conductivity_{calculated}}$$

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).

$$(2) \qquad Dilute\ Brine_{Port\ i} = Laboratory\ Result_{Brine} \times Dilution\ Brine\ Factor_{Port\ i}$$

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.

$$(3) \qquad Groundwater\ Quality_{calculated} = Laboratory\ Result - \frac{Proportion\ of\ Drill\ Brine \times Dilute\ Brine\ Chemistry}{Proportion\ of\ Formation\ Water}$$

[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 (ºC)
	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 x10^{-8} to 3 x 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 x 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 x10^{-8} to 3 x 10^{-8}) and the now refined hydraulic conductivity (1 x 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 x 10^{-9} to 3 x 10^{-8} m/s), and the measured downward gradient (0.008), the data would indicate long-term groundwater flux would be approximately 0.3 m^3/day to 11 m^3/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 m^3/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 ^oC, 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 crypogeg (Port 6) could have a heterogenous 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:

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

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 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.

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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

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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	mininum	maximum	minimum	maximum
Average Field measured parameters													
Fluoroscein	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

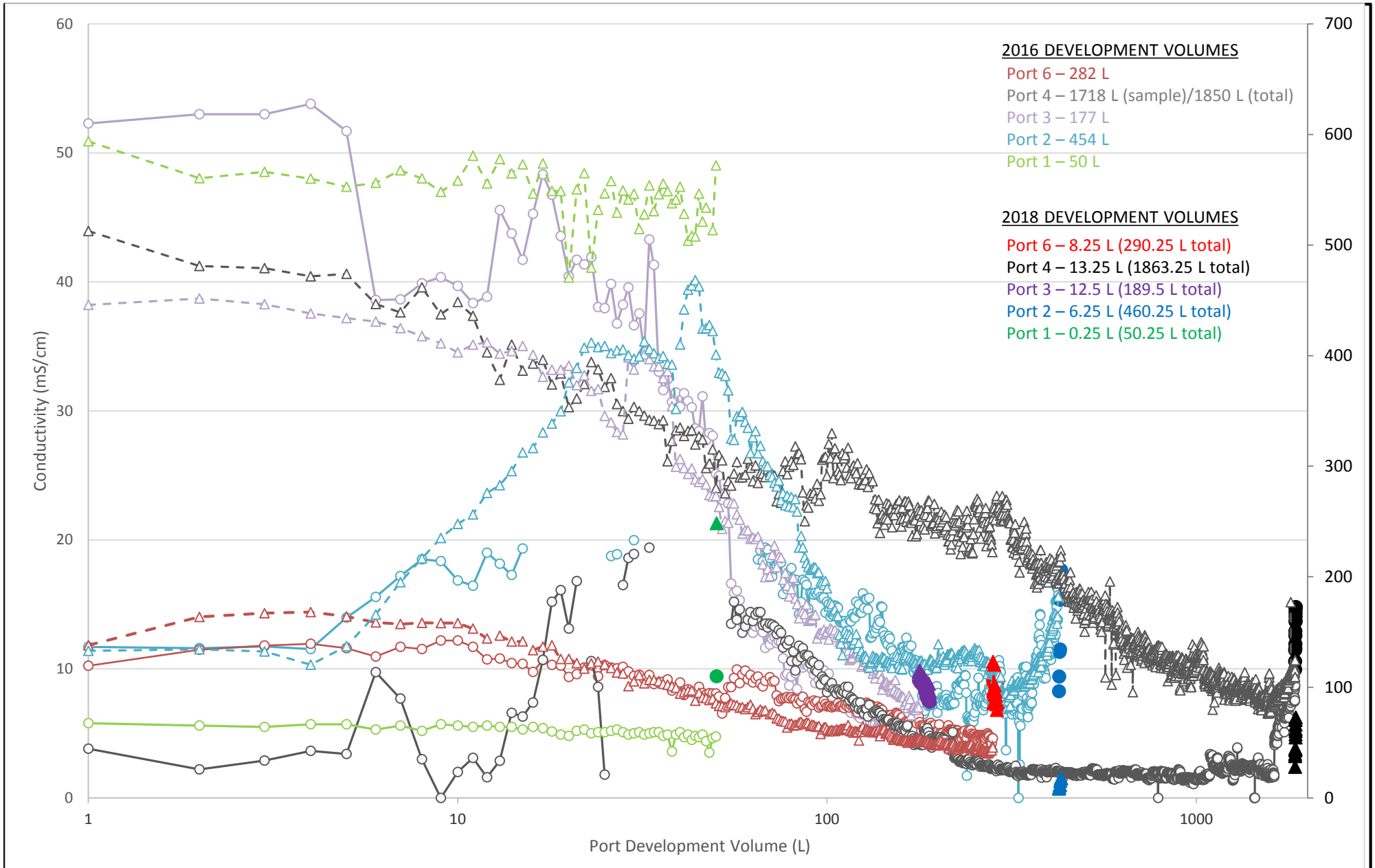
Table 5
Rock Formation Groundwater Quality Corrected to Remove Residual Drilling Water
Whale Tail Lake Talik
Whale Tail Project, Nunavut

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		RPD	12-Nov-2018		RPD
Certificate No.			L2198327-1	L2198327-2				L2197641-3	L2197641-4		L2197641-5	L2197641-6	
Sample ID	Method		Zone 6	Zone 66		Method		Zone 4	Zone 44		Zone 3	Zone 33	
Paramètres	Detection Limit	Units				Detection Limit	Units						
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)



Notes:
2016 conductivity
2016 fluorescein
2018 conductivity
2018 fluorescein
Volumes reported at time of sample collection and/or end of development (Port 1, Port 4 - 1855 L only)

2016 Data: Port 6, Port 4, Port 3, Port 2 and Port 1
2018 Data: **Port 6**, **Port 4**, **Port 3**, **Port 2** and **Port 1**

GOLDER

CLIENT
AGNICO EAGLE MINES LIMITED

CONSULTANT

YYYY-MM-DD	2019-02-08
PREPARED	DH
DESIGN	--
REVIEW	VJB
APPROVED	VJB

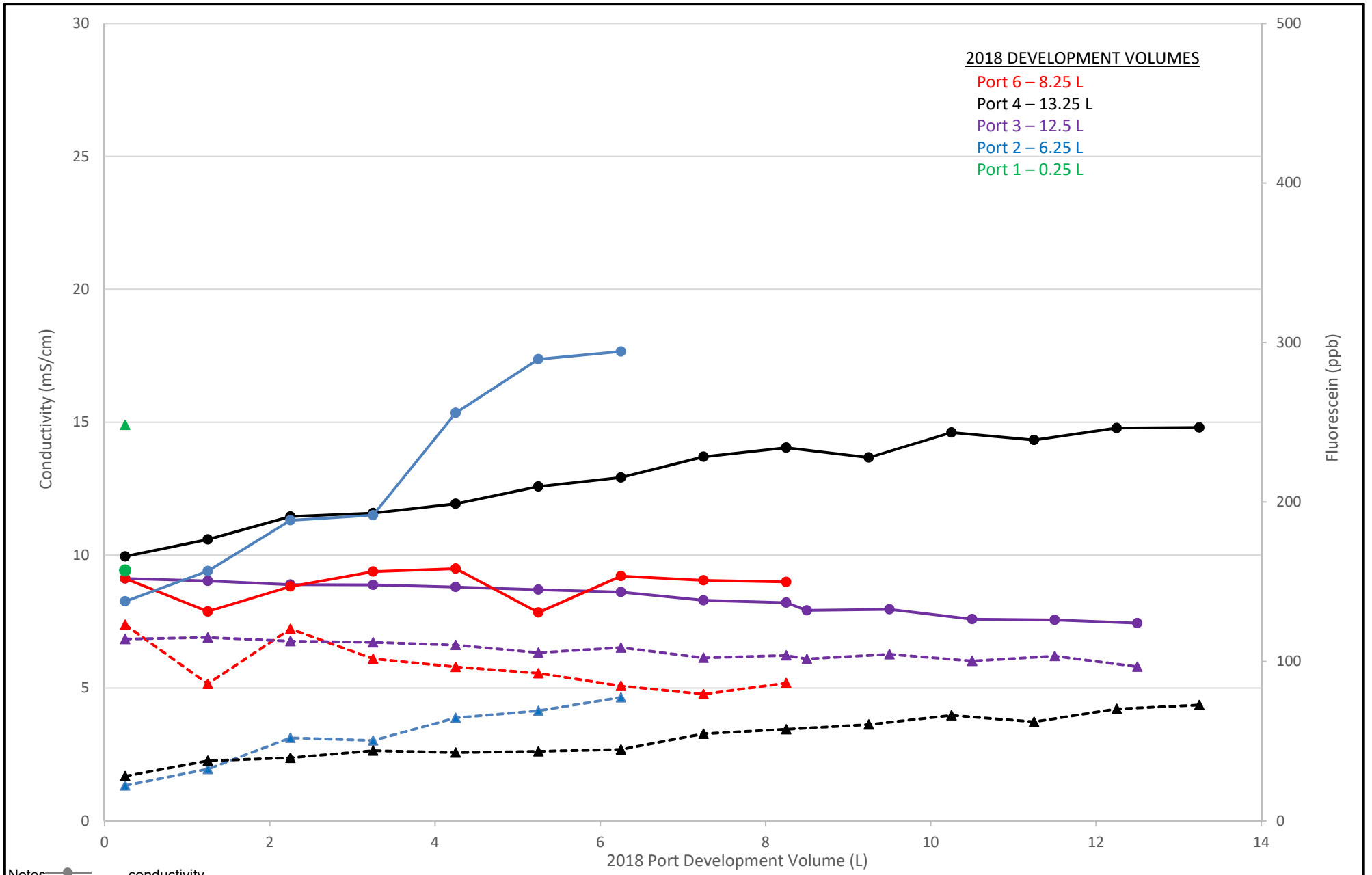
PROJECT
2018 WESTBAY SYSTEM GROUNDWATER MONITORING INVESTIGATION

TITLE
2016 AND 2018 DEVELOPMENT RECORD

PROJECT No. 1789310-244

Rev.

FIGURE 1



Notes: conductivity
fluorescein
Volumes reported at time of sample collection and/or end of development (for Port 1)

Colours **Port 6**, **Port 4**, **Port 3**, **Port 2** and Port 1

CLIENT
AGNICO EAGLE MINES LIMITED

CONSULTANT
GOLDER

YYYY-MM-DD	2019-02-08
PREPARED	DH
DESIGN	--
REVIEW	VJB
APPROVED	VJB

PROJECT
2018 WESTBAY SYSTEM GROUNDWATER MONITORING INVESTIGATION

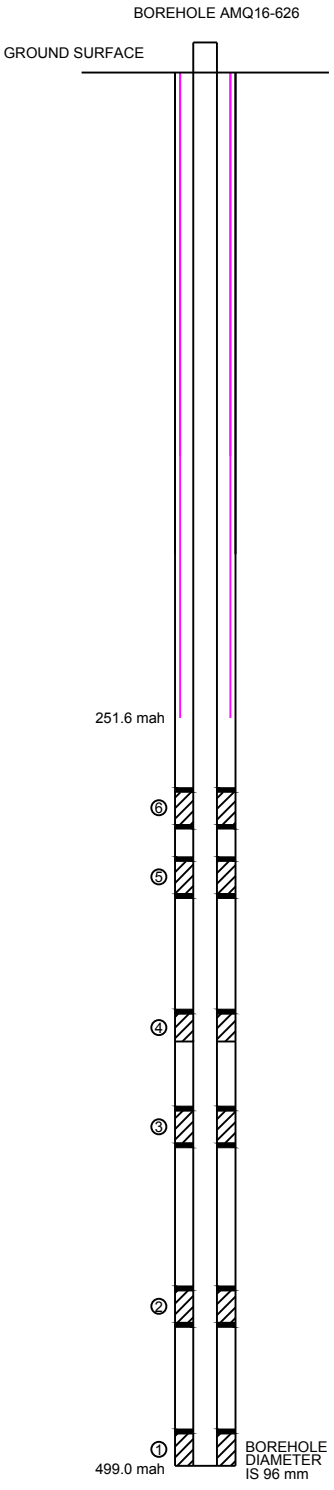
TITLE
2018 DEVELOPMENT RECORD

PROJECT No. 1789310-244 Rev.

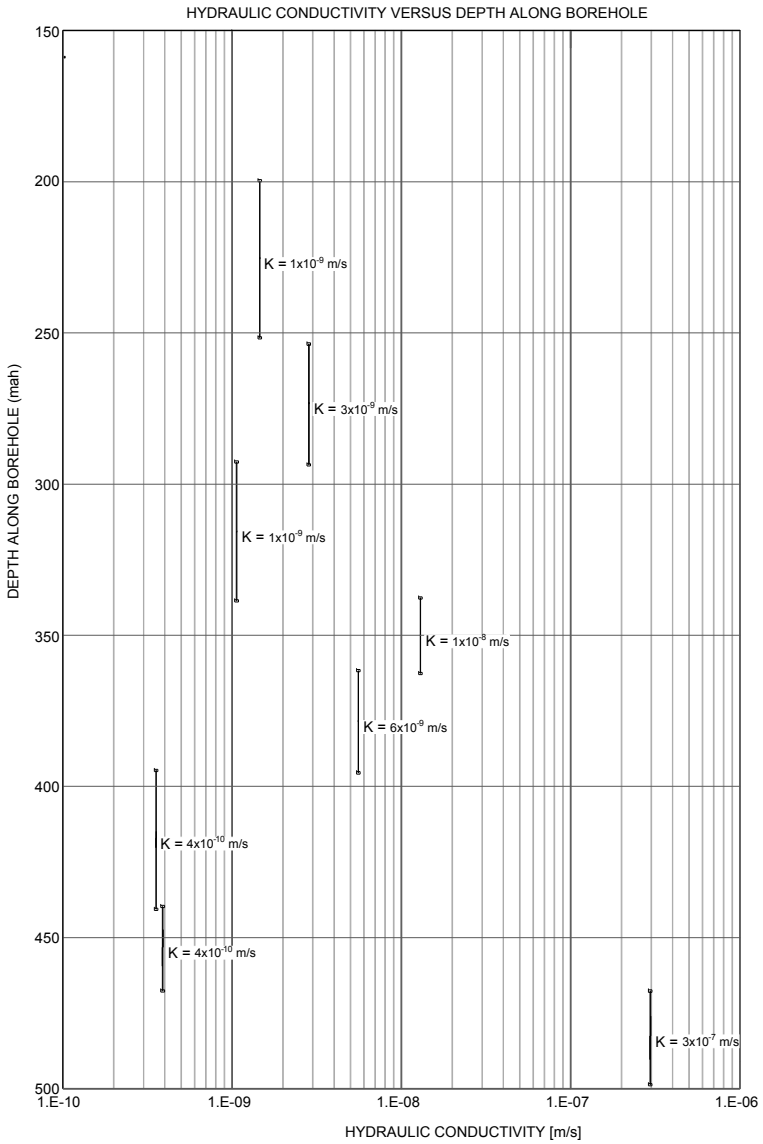
FIGURE 2

APPENDIX A

AMQ160626 Westbay System Installation Details



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

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

NOTES

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

NOT TO SCALE
SCHEMATIC ONLY

REV	DATE	REVISION DESCRIPTION	DES	CADD	CHK	RVW
0	2016-07-06	ISSUED FOR FINAL	JJ	PP	DV	DC
A	2016-05-27	ISSUED FOR REVIEW	JJ	PP		

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\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	0.208	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

Westbay Instruments

MOSDAX Calibration Report 2: EMS - 1764 Module 323

Full Scale: 2000 (psia)

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

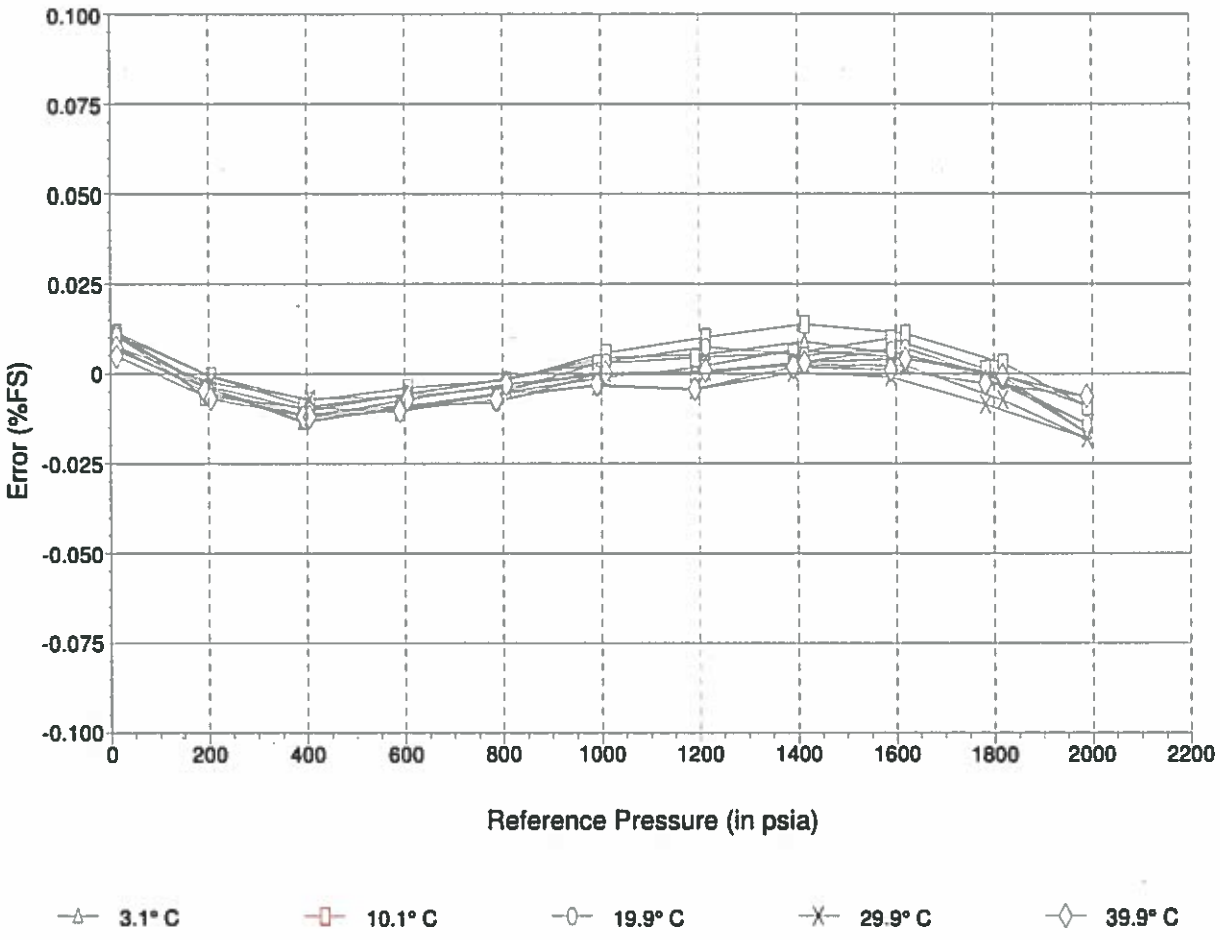
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 1764 Module 323



Comments

Issued by

Westbay Instruments

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

Full Scale: 2000 (psia)

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

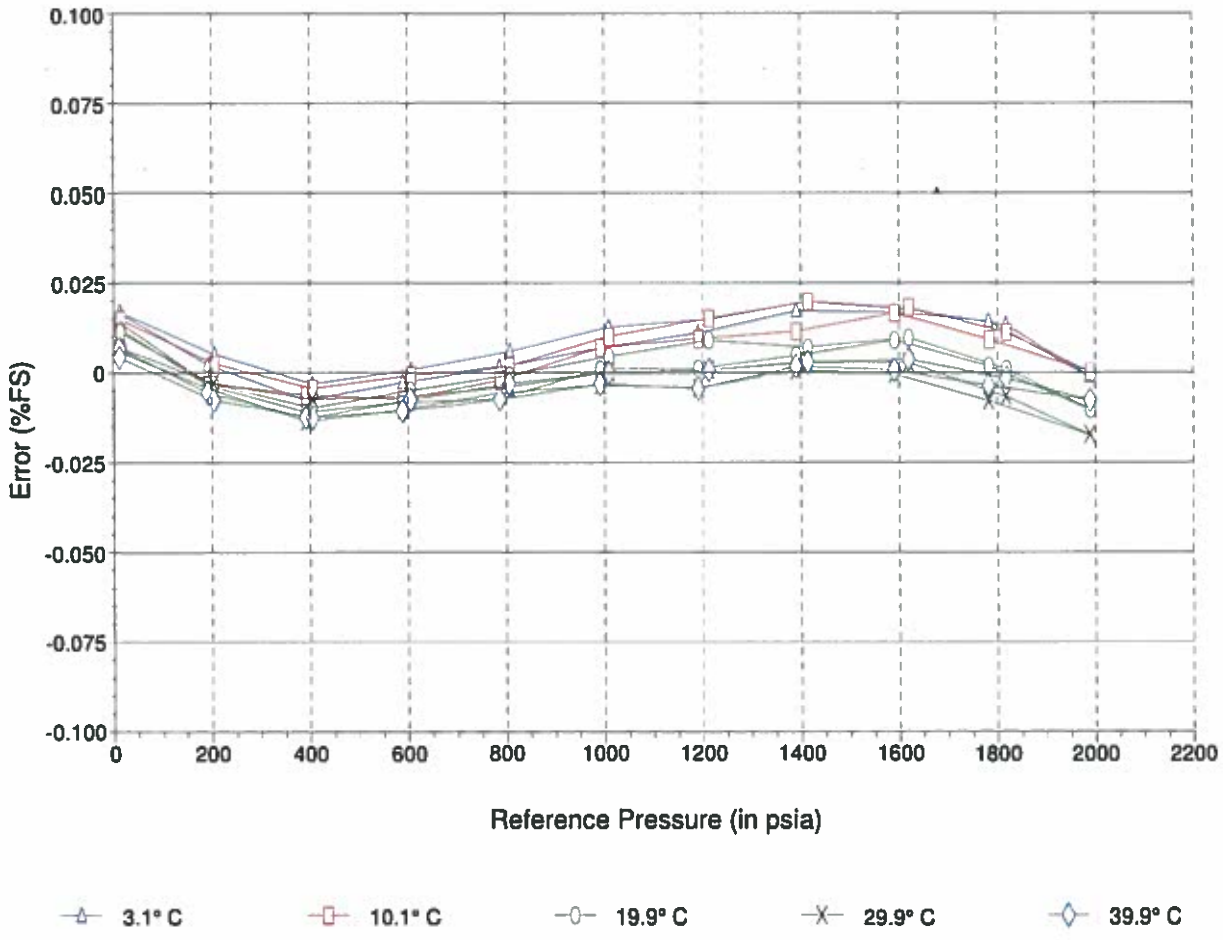
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

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

Westbay Instruments

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

Issued by

Westbay Instruments

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

Ref Pres (psia)	Error (psia)	(% FS)
14.846	-0.142	-0.007
192.843	-0.001	0.000
393.849	0.122	0.006
587.948	-0.023	-0.001
791.882	-0.022	-0.001
990.911	-0.057	-0.003
1190.327	-0.189	-0.009
1390.264	-0.181	-0.009
1589.406	-0.082	-0.004
1781.525	0.044	0.002
1989.515	0.123	0.006
1818.398	0.071	0.004
1619.022	-0.012	-0.001
1412.880	-0.003	0.000
1211.907	-0.038	-0.002
1009.806	0.075	0.004
808.334	0.096	0.005
606.956	0.169	0.008
406.373	0.123	0.006
205.741	0.110	0.006
14.848	-0.083	-0.004

EMS - 2652 Jun 02 07:51:36 2018
Range 2 Temp 10.3° C

Ref Pres (psia)	Error (psia)	(% FS)
14.855	-0.105	-0.005
192.231	-0.010	-0.001
393.607	0.068	0.003
593.420	0.070	0.003
792.296	0.087	0.004
991.833	0.075	0.004
1191.049	-0.061	-0.003
1390.953	-0.006	0.000
1589.174	0.014	0.001
1781.549	0.156	0.008
1989.230	0.324	0.016
1818.861	0.206	0.010
1618.518	0.147	0.007
1415.894	0.075	0.004
1212.127	0.094	0.005
1010.514	0.213	0.011
808.014	0.218	0.011
606.949	0.179	0.009
406.191	0.137	0.007
206.072	0.110	0.005
14.863	-0.040	-0.002

EMS - 2652 Jun 02 03:10:20 2018
Range 3 Temp 20.1° C

Ref Pres (psia)	Error (psia)	(% FS)
14.842	-0.118	-0.006
194.509	-0.104	-0.005
390.935	0.064	0.003
592.897	0.002	0.000
791.655	0.062	0.003
991.348	0.019	0.001
1190.921	-0.121	-0.006
1390.842	-0.037	-0.002
1589.397	-0.028	-0.001
1781.207	0.088	0.004
1989.355	0.295	0.015
1816.258	0.129	0.006
1618.089	0.091	0.005
1413.069	0.081	0.004
1212.924	0.023	0.001
1009.965	0.189	0.009
807.813	0.215	0.011
606.634	0.213	0.011
407.189	0.192	0.010
205.699	0.162	0.008
14.852	-0.051	-0.003

EMS - 2652 Jun 01 22:31:07 2018
Range 4 Temp 30.0° C

Ref Pres (psia)	Error (psia)	(% FS)
14.847	-0.019	-0.001
194.042	-0.002	0.000
393.209	0.097	0.005
593.265	0.087	0.004
792.056	0.052	0.003
991.614	0.043	0.002
1189.236	-0.151	-0.008
1389.839	-0.128	-0.006
1588.713	-0.048	-0.002
1788.124	0.061	0.003
1989.624	0.201	0.010
1817.189	0.140	0.007
1616.308	0.001	0.000
1412.900	0.022	0.001
1212.611	0.060	0.003
1009.750	0.246	0.012
808.478	0.183	0.009
606.817	0.225	0.011
406.966	0.233	0.012
205.745	0.163	0.008
14.853	-0.013	-0.001

EMS - 2652 Jun 01 17:53:01 2018
Range 5 Temp 39.8° C

Ref Pres (psia)	Error (psia)	(% FS)
14.838	-0.006	0.000
194.229	0.072	0.004
393.823	0.095	0.005
592.922	0.099	0.005
792.743	0.066	0.003
991.261	0.057	0.003
1190.280	-0.056	-0.003
1389.590	-0.057	-0.003
1588.437	0.020	0.001
1789.309	0.187	0.009
1989.755	0.368	0.018
1818.126	0.224	0.011
1615.388	0.129	0.006
1413.930	0.177	0.009
1208.395	0.080	0.004
1009.785	0.309	0.015
808.128	0.308	0.015
606.791	0.317	0.016
407.604	0.144	0.007
206.494	0.092	0.005
14.839	-0.005	0.000

Issued by

Westbay Instruments

MOSDAX Calibration Report 2: EMS - 2652 Module 3008

Full Scale: 2000 (psia)

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

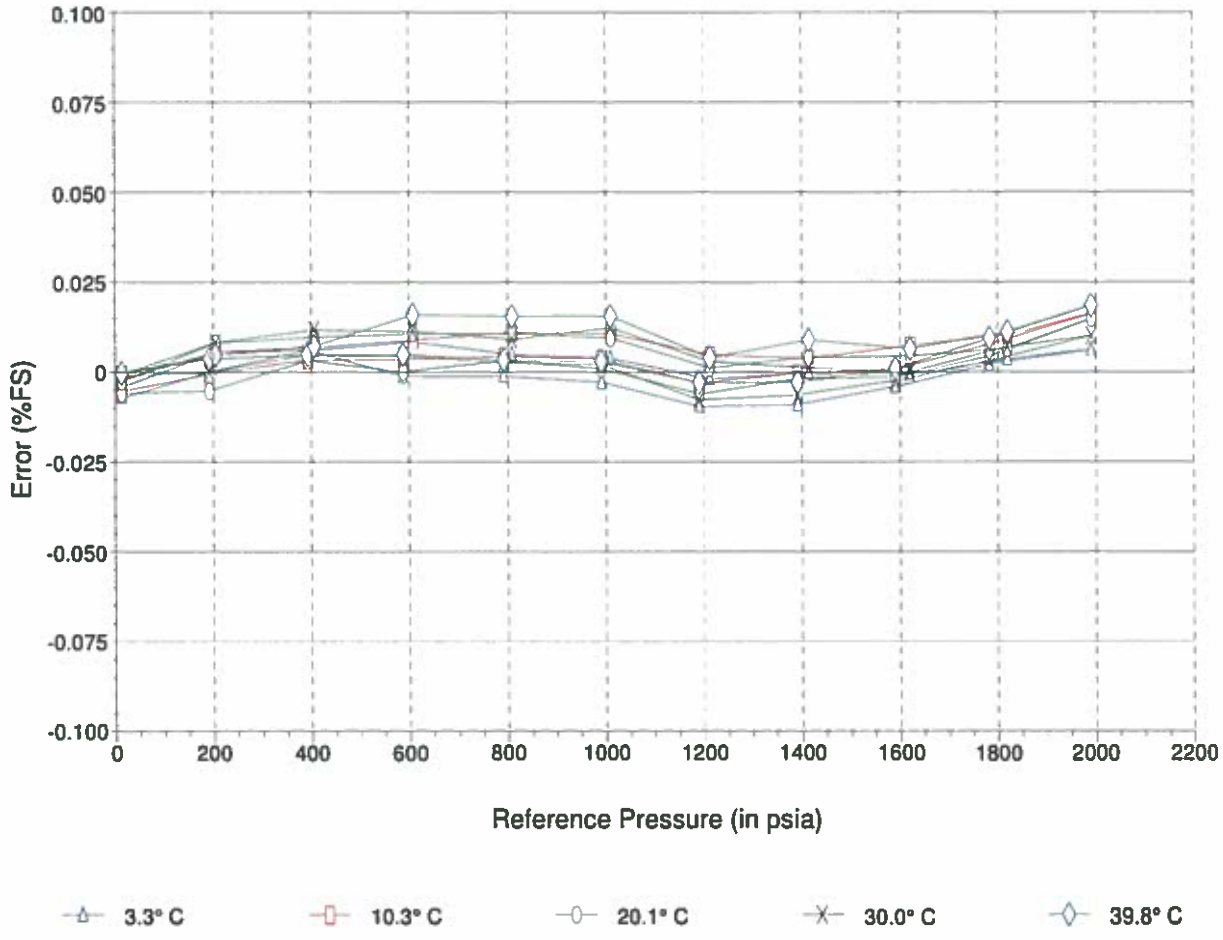
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

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

Westbay Instruments

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

Ref Pres (psia)	Error (psia)	(% FS)
14.846	0.013	0.001
192.843	0.170	0.008
393.849	0.313	0.016
587.948	0.190	0.009
791.882	0.218	0.011
990.911	0.211	0.011
1190.327	0.110	0.005
1390.264	0.152	0.008
1589.406	0.286	0.014
1781.525	0.449	0.022
1989.515	0.569	0.028
1818.398	0.484	0.024
1619.022	0.362	0.018
1412.880	0.333	0.017
1211.907	0.264	0.013
1009.806	0.346	0.017
808.334	0.338	0.017
606.956	0.385	0.019
406.373	0.315	0.016
205.741	0.282	0.014
14.848	0.072	0.004

EMS - 2652 Jun 02 07:51:36 2018
Range 2 Temp 10.3° C

Ref Pres (psia)	Error (psia)	(% FS)
14.855	0.042	0.002
192.231	0.155	0.008
393.607	0.255	0.013
593.420	0.277	0.014
792.296	0.315	0.016
991.833	0.321	0.016
1191.049	0.204	0.010
1390.953	0.279	0.014
1589.174	0.318	0.016
1781.549	0.476	0.024
1989.230	0.662	0.033
1818.861	0.530	0.027
1618.518	0.453	0.023
1415.894	0.362	0.018
1212.127	0.362	0.018
1010.514	0.462	0.023
808.014	0.447	0.022
606.949	0.388	0.019
406.191	0.325	0.016
206.072	0.277	0.014
14.863	0.107	0.005

EMS - 2652 Jun 02 03:10:20 2018
Range 3 Temp 20.1° C

Ref Pres (psia)	Error (psia)	(% FS)
14.842	0.032	0.002
194.509	0.061	0.003
390.935	0.244	0.012
592.897	0.196	0.010
791.655	0.268	0.013
991.348	0.236	0.012
1190.921	0.105	0.005
1390.842	0.196	0.010
1589.397	0.211	0.011
1781.207	0.331	0.017
1989.355	0.540	0.027
1816.258	0.372	0.019
1618.089	0.330	0.017
1413.069	0.314	0.016
1212.924	0.250	0.013
1009.965	0.407	0.020
807.813	0.422	0.021
606.634	0.408	0.020
407.189	0.373	0.019
205.699	0.328	0.016
14.852	0.098	0.005

EMS - 2652 Jun 01 22:31:07 2018
Range 4 Temp 30.0° C

Ref Pres (psia)	Error (psia)	(% FS)
14.847	0.148	0.007
194.042	0.167	0.008
393.209	0.270	0.013
593.265	0.263	0.013
792.056	0.233	0.012
991.614	0.229	0.011
1189.236	0.040	0.002
1389.839	0.070	0.003
1588.713	0.156	0.008
1788.124	0.271	0.014
1989.624	0.418	0.021
1817.189	0.351	0.018
1616.308	0.205	0.010
1412.900	0.220	0.011
1212.611	0.252	0.013
1009.750	0.432	0.022
808.478	0.364	0.018
606.817	0.403	0.020
406.966	0.406	0.020
205.745	0.332	0.017
14.853	0.154	0.008

EMS - 2652 Jun 01 17:53:01 2018
Range 5 Temp 39.8° C

Ref Pres (psia)	Error (psia)	(% FS)
14.838	0.193	0.010
194.229	0.252	0.013
393.823	0.259	0.013
592.922	0.253	0.013
792.743	0.216	0.011
991.261	0.209	0.010
1190.280	0.104	0.005
1389.590	0.117	0.006
1588.437	0.215	0.011
1789.309	0.410	0.020
1989.755	0.624	0.031
1818.126	0.450	0.023
1615.388	0.327	0.016
1413.930	0.354	0.018
1208.395	0.241	0.012
1009.785	0.462	0.023
808.128	0.458	0.023
606.791	0.471	0.024
407.604	0.307	0.015
206.494	0.271	0.014
14.839	0.194	0.010

Issued by

Westbay Instruments

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

Full Scale: 2000 (psia)

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

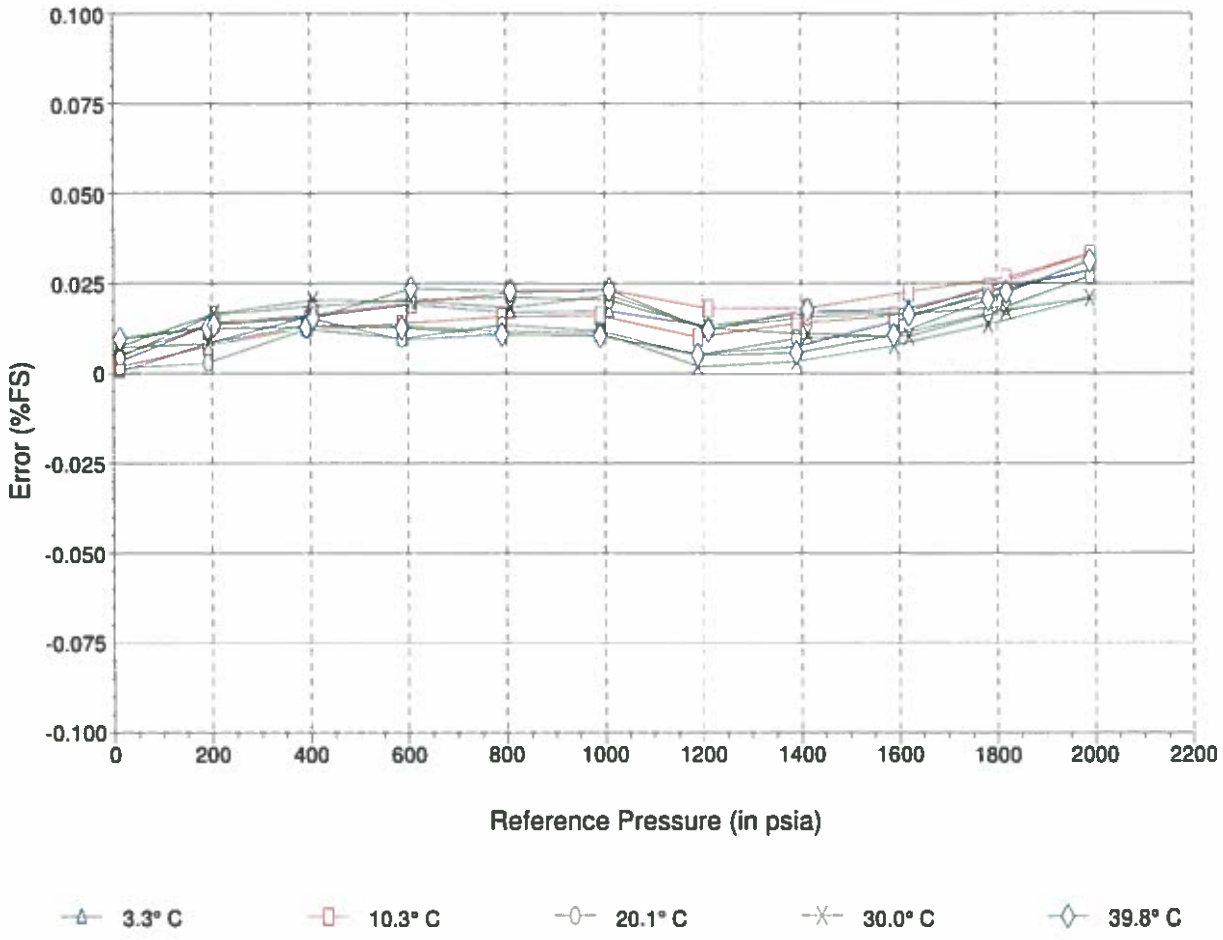
Pressure Reference: Paroscientific Model 42K-101 S/N 59937

Range: 2K PSI

Date of last reference to traceable standard: Oct 5 2017

Plot of Error vs. Reference Pressure

EMS - 2652 Module 3008



Comments

Issued by

Westbay Instruments

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2197641-1	L2197641-2	L2197641-3	L2197641-4	L2197641-5
	Description	GW	GW	GW	GW	GW
	Sampled Date	10-NOV-18	10-NOV-18	11-NOV-18	11-NOV-18	12-NOV-18
	Sampled Time	17:30	17:30	17:30	17:30	17:30
	Client ID	ZONE 2	ZONE 22	ZONE 4	ZONE 44	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	L2197641-6				
	Description	GW				
	Sampled Date	12-NOV-18				
	Sampled Time	17:30				
	Client ID	ZONE 33				
Grouping	**Analyte**					
SEAWATER						
Physical Tests	Hardness (as CaCO3) (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

Grouping	Analyte	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
	Sample ID / Description / Sampled Date / Sampled Time / Client ID					
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	L2197641-6				
	Description	GW				
	Sampled Date	12-NOV-18				
	Sampled Time	17:30				
	Client ID	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

Grouping	Analyte	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
	Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**					
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	L2197641-6				
	Description	GW				
	Sampled Date	12-NOV-18				
	Sampled Time	17:30				
	Client ID	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

Grouping	Analyte	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
Sample ID / Description / Sampled Date / Sampled Time / Client ID						
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 DLDS	5910 DLDS	5220 DLDS	4530 DLDS	2700 DLDS
	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	<0.050	<0.050	<0.050	<0.050
	Phosphorus (P)-Total (mg/L)	0.0120 DLDS	0.0132 DLDS	0.0067 DLDS	0.0059 DLDS	0.0061 DLDS
	Sulfate (SO4) (mg/L)	<15	<15	<15	<15	<15

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2197641-6				
	Description	GW				
	Sampled Date	12-NOV-18				
	Sampled Time	17:30				
	Client ID	ZONE 33				
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 CaCO3) (mg/L)	50.1				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (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 (SO4) (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 wwt - 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.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2197641-COFC

COC Number: 17 - 720417

Page of

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	Golder Associates Ltd.	Select Report Format: [X] PDF [X] EXCEL [ ] EDD (DIGITAL)	Regular [R] [X] Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Dale Holtze	Quality Control (QC) Report with Report [ ] YES [ ] NO	PRIORITY (Business Days): 4 day [P4-20%] [ ]; 3 day [P3-25%] [ ]; 2 day [P2-50%] [ ] — EMERGENCY: 1 Business day [E-100%] [ ]; Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] [ ]
Phone:	613-592-9600	[ ] Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: [ ] EMAIL [ ] MAIL [ ] FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	1931 Robertson Road	Email 1 or Fax: dholtze@golder.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Ottawa, ON	Email 2: valerie-bertrand@golder.com	
Postal Code:	K2H 5B7	Email 3:	
Invoice To	Same as Report To [X] YES [ ] NO	Invoice Distribution	Analysis Request
	Copy of Invoice with Report [ ] YES [ ] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:		Email 1 or Fax: dholtze@golder.com	
Contact:		Email 2:	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	Q70883	AFE/Cost Center:	PO#:
Job #:	1789310	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact: Joanne Lee	Sampler: P. Holtze

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	total metals	dissolved metals	total P	major ions	TDS, TSS	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	Zone 2	10-Nov-18	17:30	GW	X	X	X	X	X			6
	Zone 22	10-Nov-18	17:30									
	Zone 4	11-Nov-18	17:30									
	Zone 44	11-Nov-18	17:30									
	Zone 3	12-Nov-18	17:30									
	Zone 33	12-Nov-18	17:30									

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? [ ] YES [X] NO	Elevated salt concentrations likely (Brine) EC Zone 2+22 ~ 17.37 mS/cm Zone 4+44 ~ 14.8 mS/cm Zone 3+33 ~ 7.5 mS/cm	Frozen [ ] SIF Observations Yes [ ] No [ ]
Are samples for human consumption/ use? [ ] YES [X] NO		Ice Packs [X] Ice Cubes [ ] Custody seal intact Yes [X] No [ ]
		Cooling Initiated [ ]
		INITIAL COOLER TEMPERATURES °C: FINAL COOLER TEMPERATURES °C: 7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by: AA JC	Date: Nov 16/18	Time: 830AM
Dale Holtze	2018-11-13	8:00						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

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

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

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2198327-1	L2198327-2	L2198327-3	L2198327-4	
Description	Groundwater	Groundwater	Groundwater	Groundwater	
Sampled Date	13-NOV-18	13-NOV-18	13-NOV-18	13-NOV-18	
Sampled Time	17:00	17:00	15:00	15:30	
Client ID	ZONE 6	ZONE 66	EB	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	L2198327-1	L2198327-2	L2198327-3	L2198327-4	
Description	Groundwater	Groundwater	Groundwater	Groundwater	
Sampled Date	13-NOV-18	13-NOV-18	13-NOV-18	13-NOV-18	
Sampled Time	17:00	17:00	15:00	15:30	
Client ID	ZONE 6	ZONE 66	EB	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	L2198327-1	L2198327-2	L2198327-3	L2198327-4	
Description	Groundwater	Groundwater	Groundwater	Groundwater	
Sampled Date	13-NOV-18	13-NOV-18	13-NOV-18	13-NOV-18	
Sampled Time	17:00	17:00	15:00	15:30	
Client ID	ZONE 6	ZONE 66	EB	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

Grouping	Analyte	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	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
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 DLDS	3060 DLDS	<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	<0.050	<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
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 wwt - 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.

L2198327-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # 18-1789310

Page 1 of 1

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	GOLDER ASSOCIATES LTD			☑ Standard	☐ Other			◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Dale Holtze			☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1931 Robertson Road			Email 1:	dholtze@golder.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Ottawa, ON K2H 5B7			Email 2:	valerie_bertrand@golder.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	613-592-9600	Fax:	613-592-9601	Email 3:				**Analysis Request**
Invoice To	Same as Report ?	☑ Yes	☐ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:	1789310			F / P
Company:				PO / AFE:				
Contact:				LSD:				
Address:								
Phone:		Fax:		Quote #:	Q70883			
Lab Work Order # (lab use only)				**ALS Contact:**	Joanne Lee	**Sampler:**	Dale Holtze	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	DISSOLVED METALS	TOTAL METALS	TOTAL PHOSPHORUS	MAJOR IONS, TDS, TSS	pH	EC	NH3	Anions	Number of Containers
	Zone 6	13-Nov-18	17:00	Groundwater									4
	Zone 66	13-Nov-18	17:00	Groundwater									4
	EB	13-Nov-18	15:00	Water									4
	TB	13-Nov-18	15:30	Water									3

2 DAY RUSH

Routine 5 days

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

SAMPLES 'ZONE 6' AND 'ZONE 66' HAVE ELEVATED TDS/CONDUCTIVTY. FIELD MEASURED CONDUCTIVITY RANGES BETWEEN 9 AND 9.1 mS/cm.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Dale Holtze	14-Nov-18	8:00	PAVL	NOV 19	08:30	9.8 °C				

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
Échantillon : Brine Fluid
Nom du préleveur : N/D
Type d'échantillon : Eau surface
Réseau:

Date de prélèvement : 17 avril 2016
Heure de prélèvement : N/D
Date de réception : 19 avril 2016

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.

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Site web: www.multilab-direct.com

Multilab Val-d'Or

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 (HCO3)	27 mg CaCO3/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 CaCO3/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
Molybdene (Mo)	<0.0005 mg/L	Sous-traitance\Multilab Direct	20 avril 2016
NH3 (NH3 non-ionisé)	1.52 mg N/L	Sous-traitance\Multilab Direct	20 avril 2016
NH4	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 (NO3)	0.54 mg N/L	Sous-traitance\Multilab Direct	19 avril 2016
Nitrites (NO2)	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

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F-02-06
Version 3ième: 26/10/2005

Multilab Val-d'Or

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
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 CaCO3/L	M-TIT-1.0	20 avril 2016
Sulfate (SO4)	<0.6 mg SO4/L	Sous-traitance\Multilab Direct	12 mai 2016

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

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F-02-06
Version 3ième: 26/10/2005

Multilab Val-d'Or

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 (HCO3)	2	mg CaCO3/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 CaCO3/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
Molybdene (Mo)	0.0005	mg/L	Sous-traitance	Oui
NH3 (NH3 non-ionisé)	0.01	mg N/L	Sous-traitance	-
NH4	0.01	mg N/L	Sous-traitance	-
Nickel (Ni)	0.0005	mg/L	Sous-traitance	Oui
Nitrates (NO3)	0.01	mg N/L	Sous-traitance	Oui
Nitrites (NO2)	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

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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 CaCO3/L	M-TIT-1.0	
Sulfate (SO4)	0.6	mg SO4/L	Sous-traitance	Oui

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Multilab Val-d'Or

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 CaCO3/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

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Multilab Val-d'Or

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

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Certificat contrôle qualité

Numéro de projet : V-52584

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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
Molybdene (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 (NO3) mg N/L	Blanc	<0.01
Nitrites (NO2) mg N/L	Blanc	<0.01
	Nom Standard	DMR-0175-2016-NO2
	Valeur obtenue	1.97
	Justesse	97.5%

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Multilab Val-d'Or

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

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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 (SO4) mg SO4/L	Blanc	<0.6
	Nom Standard	DMR-0175-2016-SO4
	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	Tl-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

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F-02-06
Version 3ième: 26/10/2005

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

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ATTACHMENT B

2018 Hydrogeological Testing Program

TECHNICAL MEMORANDUM

DATE 25 March 2019 **Reference No.** 18113037-002-TM-Rev0-3000

TO Michel Groleau
Agnico Eagle Mines Limited

CC Jenyfer Mosquera, Jennifer Range

FROM Alex Cassidy and Michal Dobr **EMAIL** **Alex_Cassidy@golder.com; Michal_Dobr@golder.com**

WINTER 2018 HYDROGEOLOGICAL FIELD PROGRAM – AMARUQ PROJECT, NUNAVUT

1.0 INTRODUCTION

Golder Associates Ltd (Golder) was retained by Agnico Eagle Mines Limited (Agnico Eagle) to carry out a hydrogeological testing program in support of the development of the IVR Zone, Amaruq Project. The objective of the hydrogeological testing program was to provide additional information on the hydraulic parameters of the deep bedrock in the study area to refine estimates of the groundwater inflow to the proposed underground development below the permafrost.

The hydrogeological field investigations were carried out from 28 November to 9 December 2018 and included the following activities:

- review of rock core from borehole AMQ18-1925 and the preliminary borehole log prepared by Knight Piésold to identify target zones for packer placement
- hydraulic testing using pneumatic packers in borehole AMQ18-1925 (target IVR-112)
- field data compilation and analyses

This technical memorandum provides a summary of the field investigations and the results of data analysis.

2.0 DRILLING PROGRAM

The drilling program was undertaken over the period from 14 November to 7 December 2018 and included drilling of one borehole by Forage Orbit Garant (Orbit). The borehole was drilled at an inclination of -66 degrees to a total depth of 699 meters along hole (mah). The collar location and projected borehole trace is presented on Figure 1. PQ size surface casing was advanced to approximately 6 m through overburden and weathered rock into competent bedrock to prevent caving of the unconsolidated materials during drilling. From 6 to 123 metres the borehole was drilled in 96 mm (HQ) diameter, and from 123 to 699 metres in 76 mm (NQ) diameter. A triple-tube

system was used to recover oriented core from 420 to 650 mah. Detailed information on the borehole, including collar coordinates, ground surface elevation, average orientation and end depth is presented in Table 1.

Table 1: Borehole Details

Borehole ID	Northing (m)	Easting (m)	Ground Surface Elevation (masl)	Borehole Depth (mah)	Average Borehole Azimuth (degrees)	Average Borehole Inclination (degrees)
AMQ-2018-1925	7256185	607632	161	699	315	63.7

Notes:
Coordinates in UTM NAD 83, Zone 14 W.
m – metres; masl – metres above sea level; mah – metres along hole.

3.0 HYDROGEOLOGICAL TESTING

The hydrogeological testing program was conducted between 7 and 9 December 2018. A pneumatic packer tool in a single packer configuration on dedicated rods was used to carry out the testing. The single packer tool was used in place of the proposed double packer setup due to equipment damage at the start of the program. A schematic diagram of the single packer tool configuration is shown in Figure 2.

3.1 Testing Approach

Single-well pressure response tests were carried out to obtain information on local-scale aquifer parameters of the bedrock. Hydrogeological testing targeted the unfrozen portion of the borehole below permafrost, which at the time of the investigation was expected to be below the depth of 425 metres below ground surface (425 m bgs). Testing was initiated at the completion of drilling and progressed from the top of the selected test zone downwards. The final test was conducted over the same interval as the first test to verify the results.

Prior to testing, the borehole was flushed with clean water to remove any residual drill cuttings or drilling fluid. A brine solution with approximately 21% calcium chloride and a density of 1195 kg/m^3 was pumped to the bottom of the borehole through drill rods to displace the fresh water and prevent freezing during testing.

To perform a test, the NQ drill string was removed from the borehole and the tool was lowered on BQ size rods to the selected depth. The HQ rods (123 m) remained in the borehole during testing for borehole stability. The NQ section of the borehole was uncased.

The pneumatic packer tool consisted of a single packer attached to testing rods with a perforated gauge carrier mounted below the packer. When the tool was positioned in the selected test interval the packer was inflated with nitrogen gas. This isolated the section of the borehole between the packer and the bottom of the borehole from the remainder of the borehole, while allowing communication between the interior of the test rods and the test interval via the perforated section. The packer was deflated after the test, and the tool was moved to the next test interval. This sequence was repeated until all selected intervals were tested, at which time the packer was removed from the borehole. To monitor the progress of the individual test sequences in real time, an RST Instruments vibrating wire piezometer connected to a datalogger was lowered below the water level in the drill rods and was programmed to collect data every two seconds. A LevelTROLL 700 memory gauge was placed into a gauge carrier directly in the test interval to obtain more accurate pressure response data. The memory gauge was programmed to collect data at two second intervals. The data recorded from the LevelTROLL were used in

the analysis for each tested interval. The calibration certificates for the RST Instruments vibrating wire piezometer and the LevelTROLL 700 memory gauge are provided in Attachment A.

Prior to testing, the core recovered from the borehole was reviewed in detail to assess the borehole stability, and to identify suitable locations for placement of the testing equipment. The test intervals varied in length from 99.6 m to 279.5 m and were selected to provide a continuous hydraulic conductivity profile along the selected borehole interval. A summary of the tests carried out is presented in Table 2.

Table 2: Summary of Hydrogeological Tests

Borehole ID	Interval Tested (mah)[(a)]	Number of Tests Conducted	Date Started	Date Ended
AMQ18-1925	419.5 to 699.0	4	08-Dec-18	09-Dec-18

Note:
(a) Measured along hole referenced to surface.

3.2 Testing Methodology

The following general methodology was planned for the hydrogeological testing:

- pressure static recovery (PSR) sequence
- slug injection (SI) sequence
- slug withdrawal (SW) sequence

The testing procedures and the order of the individual test sequences were adjusted for each test based on the pressure response during the SI sequence. Detailed descriptions of the individual test sequences are provided below.

Pressure Static Recovery

Following packer inflation at the desired depth, a pressure transducer was lowered inside the test rods below the water table to monitor the pressure response of the aquifer in real time. The pressure static recovery (PSR) sequence was carried out to allow the aquifer within the isolated interval to reach static conditions after packer inflation. This sequence lasted between 30 and 60 minutes. After this time, the next test sequence was initiated, even if full hydrostatic conditions were not achieved in the test interval.

Slug Injection / Withdraw

After the PSR sequence, a slug injection (SI) and/or a slug withdrawal (SW) test was carried out. These test sequences consisted of adding or removing an instantaneous slug of water into/from the test rods and monitoring the recovery of the water level for a minimum period of 30 minutes. The addition of a slug was achieved by adding brine into the testing rods. Water removal was achieved by injecting compressed nitrogen through a length of tubing lowered inside the test rods below the water level.

3.3 Test Analysis

3.4 Software

The test analyses were carried out with HydroBench® (Version 3.7.1), a Golder internally developed software package designed to analyze different types of hydrogeological tests. HydroBench is a pressure transient interpretation package using the Bourdet Derivative method (e.g., Gringarten 2008) coupled with a library of analytical reservoir models. Further information on the HydroBench software, including a detailed documentation of the verification of the software, is available on request.

3.5 Results

The hydraulic conductivity values were calculated by dividing the transmissivity value by the length of the corresponding test interval. A density of 1195 kg/m^3 was applied in the data analysis to represent the brine solution used to condition the borehole. The table shows the test sequences carried out in each interval; SI and SW. For each test interval, the test sequence with the most reliable pressure response data set was selected for analyses.

The results of the test analyses indicate hydraulic conductivity values in the range of 7x10^{-12} and 7x 10^{-11} m/s. It is however recommended to assume a hydraulic conductivity of less than 1 x 10^{-10} m/s for all intervals tested because this value represents the low-end cut-off for accuracy of the testing equipment and the methodology used. Detailed analytical test reports are presented in Attachment B. These reports are computer generated protocols, and some values in these documents may differ from values discussed within the text section of this document.

The results also indicate that the hydraulic conductivity of the deep sub-permafrost bedrock aquifer may be lower than previously assumed in modelling for the Whale Tail Pit and support previous observations from the study area that show a decrease of the bedrock hydraulic conductivity with depth. A summary of the measured hydraulic conductivity values relative to historical measurements are shown in Figure 3.

Table 3: Summary of Hydrogeological Test Results

BH ID	Test No.	Test Interval						Test Sequences Conducted[b]	Test Sequence Analysed[b]	Transmissivity (T) (m^2/s)	Hydraulic Conductivity (K) (m/s)	Assumed[d] Hydraulic Conductivity (K) (m/s)
		From (mah)[a]	To (mah)[a]	Length (m)	From (mbgs)	To (mbgs)	Vertical Length (m)					
AMQ18-1925	1	419.5	699.0	279.5	375.9[c]	626.4	250.5	SI	SI	2×10^{-9}	8×10^{-12}	$<1 \times 10^{-10}$
	2	500.4	699.0	198.6	448.4	626.4	178.0	SI	SI	7×10^{-9}	4×10^{-11}	$<1 \times 10^{-10}$
	3	599.4	699.0	99.6	537.1	626.4	89.3	SI, SW	SI	7×10^{-9}	7×10^{-11}	$<1 \times 10^{-10}$
	4	419.5	699.0	279.5	375.9	626.4	250.5	SI, SW	SI	2×10^{-9}	7×10^{-12}	$<1 \times 10^{-10}$

Notes:

(a) Measured along hole referenced to surface.

(b) SI = Slug Injection, SW = Slug Withdrawal.

(c) part of the test interval from 375.9 to 626.4 likely within the permafrost

(d) A hydraulic conductivity of less than 1 x 10-10 m/s was assumed for all intervals tested because this value represents the low-end cut-off for accuracy of the testing equipment and the methodology used

4.0 CONCLUSIONS

A summary of the findings from the hydrogeological field investigation is provided below:

- Hydrogeological testing was carried out in one inclined borehole targeting an interval between 419.5 m to 699 mah. The testing was conducted to support the evaluation of the hydraulic conductivity of the deep bedrock below the permafrost.
- A total of 4 tests were conducted with test interval lengths varying from 99.6 m to 279.5 m.
- Based on the results of hydrogeological testing and a review of the drill core no zones of potentially enhanced hydraulic conductivity were identified within the tested section of the borehole.
- An average value of the brine densities recorded during testing was used for transmissivity calculations.
- The assumed hydraulic conductivity of 1 $x10^{-10}$ m/s for all tests indicate a very low hydraulic conductivity. The results indicate that the hydraulic conductivity of the deep sub-permafrost bedrock aquifer may be lower than previously assumed in modelling for the Whale Tail Pit and support previous observations from the study area that show a decrease of the bedrock hydraulic conductivity with depth.

5.0 CLOSURE

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this memorandum.

We trust that the information provided above satisfies your current project requirements. If you have any questions or concerns, please do not hesitate to contact us at your convenience.

Golder Associates Ltd.

Alex Cassidy
Mine Water Group

Michal Dobr, R.N.Dr.
Principal, Mine Water Group

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 25MAR2019.
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

REGISTERED PROFESSIONAL GEOLOGIST
March 25, 20
D.W. CHORLEY
LICENSEE
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Don Chorley, M.Sc., P.Geo.
Senior Hydrogeology Specialist

AC/MD/DC/ah

Attachments: ~~Study Limitations~~
Figures 1, 2 and 3
Attachment 1: Transducer Calibration Certificates
Attachment 2: *HydroBench*® Analysis Reports

https://golderassociates.sharepoint.com/sites/100859/deliverables/issued/18113037-002-tm-rev0-3000/01 text/18113037-002-tm-rev0-3000-2018 amaruq hydrogeo_25mar 2019.docx

Reference

Golder Associates Ltd. 2016. Westbay System Installation Summary – Whale Tail Pit Project, Nunavut. Dated July 7, 2016 (Reference 1649355-003-TM-Rev0-4000).

Golder Associates Ltd. 2017. Hydrogeological and Permafrost Field Investigations, Amaruq Project 2017 Factual Report. Dated 31 July 2017. (Reference 1649355-008-R-Rev0-5000).

Gringarten AC. 2008. From Straight Lines to Deconvolution: The Evolution of the State of the Art in Well Test Analysis. SPE Reservoir Evaluation & Engineering 11: 41-62.

Knight Piésold Consulting. 2015. Whale Tail Pit Permafrost and Hydrogeological Characterization. Prepared for Agnico Eagle Mines: Meadowbank Division.

Knight Piésold Consulting. 2016. Whale Tail Pit 2016 Geomechanical Site Investigation Summary. Prepared for Agnico Eagle Mines: Meadowbank Division.

SNC Lavalin. 2017. Preliminary Studies for the Water Management and Geotechnical Infrastructures at Amaruq. Dated 25 May 2017.

STUDY LIMITATIONS

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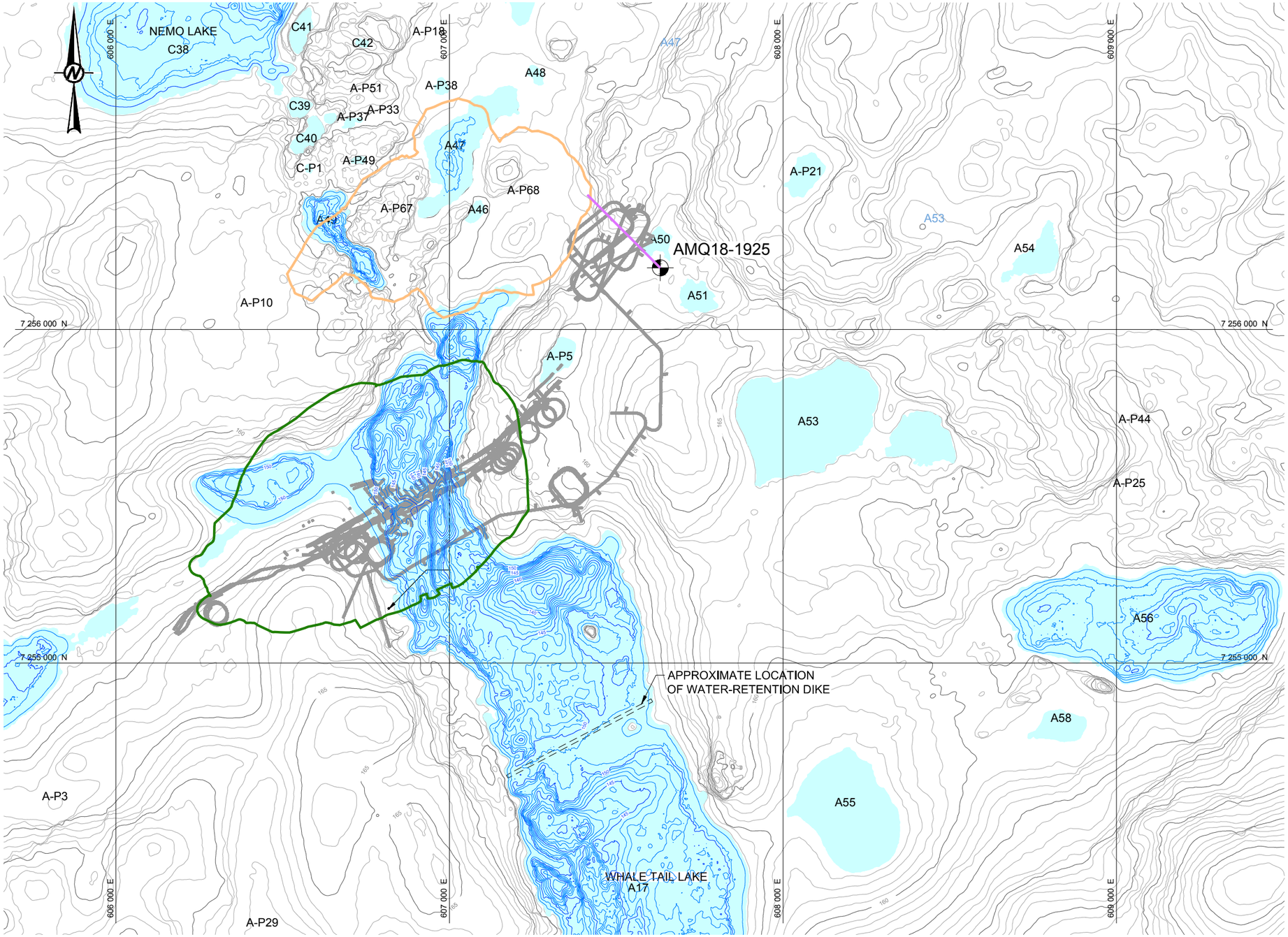


LEGEND

- EXISTING GROUND SURVEY
- EXISTING BATHYMETRY
- WATER BODY
- BOREHOLE COLLAR LOCATION
- APPROXIMATE BOREHOLE TRACE
- WHALE TAIL PIT
- IVR PIT
- UNDERGROUND WORKS

NOTE(S)

1. ALL UNITS ARE IN METERS UNLESS NOTED OTHERWISE.
2. CONTOUR INTERVAL 1m MINOR AND 5m MAJOR.

REFERENCE

1. BASE PLAN AND BATHYMETRY DATA RECEIVED FROM AGNICO EAGLE MINES LTD. DATE RECEIVED NOVEMBER 25, 2016.
   CAD FILE: COURBESZM_AMARUQ_GLOBAL_UTM14_20150929.DWG
   CAD FILE: 1665858-2100B-CM-0002.DWG
   CAD FILE: 61-000-142-001_R0BLOC.DWG
2. UNDERGROUND WORKS RECEIVED FROM AGNICO EAGLE MINE LTD. ON OCTOBER 18, 2017.
   DXF FILE: AMQMY17UG_003_DEV_2018_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2019_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2020_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2021_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2022_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2023_SHIFTED.DXF
   DXF FILE: AMQMY17UG_003_DEV_2024_SHIFTED.DXF

NOT FOR CONSTRUCTION

0 250 500
1:12,500 METRES

CLIENT
AGNICO EAGLE MINTES LIMITED
MEADOWBANK DIVISION

CONSULTANT
GOLDER

YYYY-MM-DD	2019-01-31
DESIGNED	JJ
PREPARED	BM
REVIEWED	JJ
APPROVED	MD

PROJECT
WINTER 2018 HYDROGEOLOGICAL FIELD PROGRAM
AMARUQ PROJECT, NUNAVUT

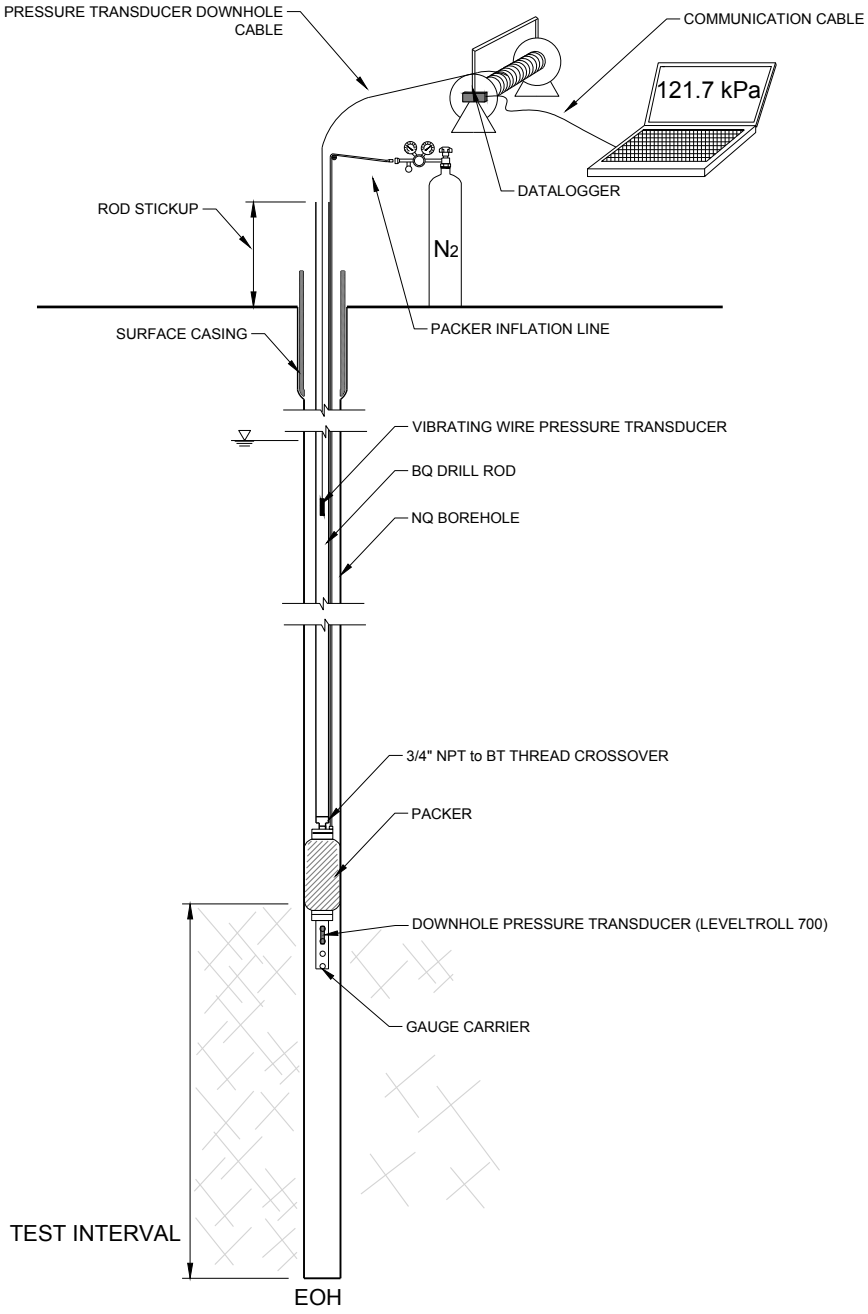
TITLE
LOCATION OF AMQ18-1925

PROJECT NO.	PHASE/TASK	REV.	FIGURE
18113037	3000/3100	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

Path: \\golder.gds\gal\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Whale_Tail\99_PROJECTS\18113037\02_PRODUCTION\N3000\DWG\ | File Name: 18113037-3000-3100-01.dwg | Last Edited By: bmasongsong Date: 2019-01-31 Time:10:53:21 AM | Printed By: BMasongsong Date: 2019-01-31 Time:1:40:42 PM



NOT TO SCALE

SCHEMATIC ONLY

CLIENT

AGNICO EAGLE MINES LIMITED

CONSULTANT

GOLDER

YYYY-MM-DD	2019-01-21
DESIGNED	A.C.
PREPARED	A.C.
REVIEWED	J.J.
APPROVED	MD

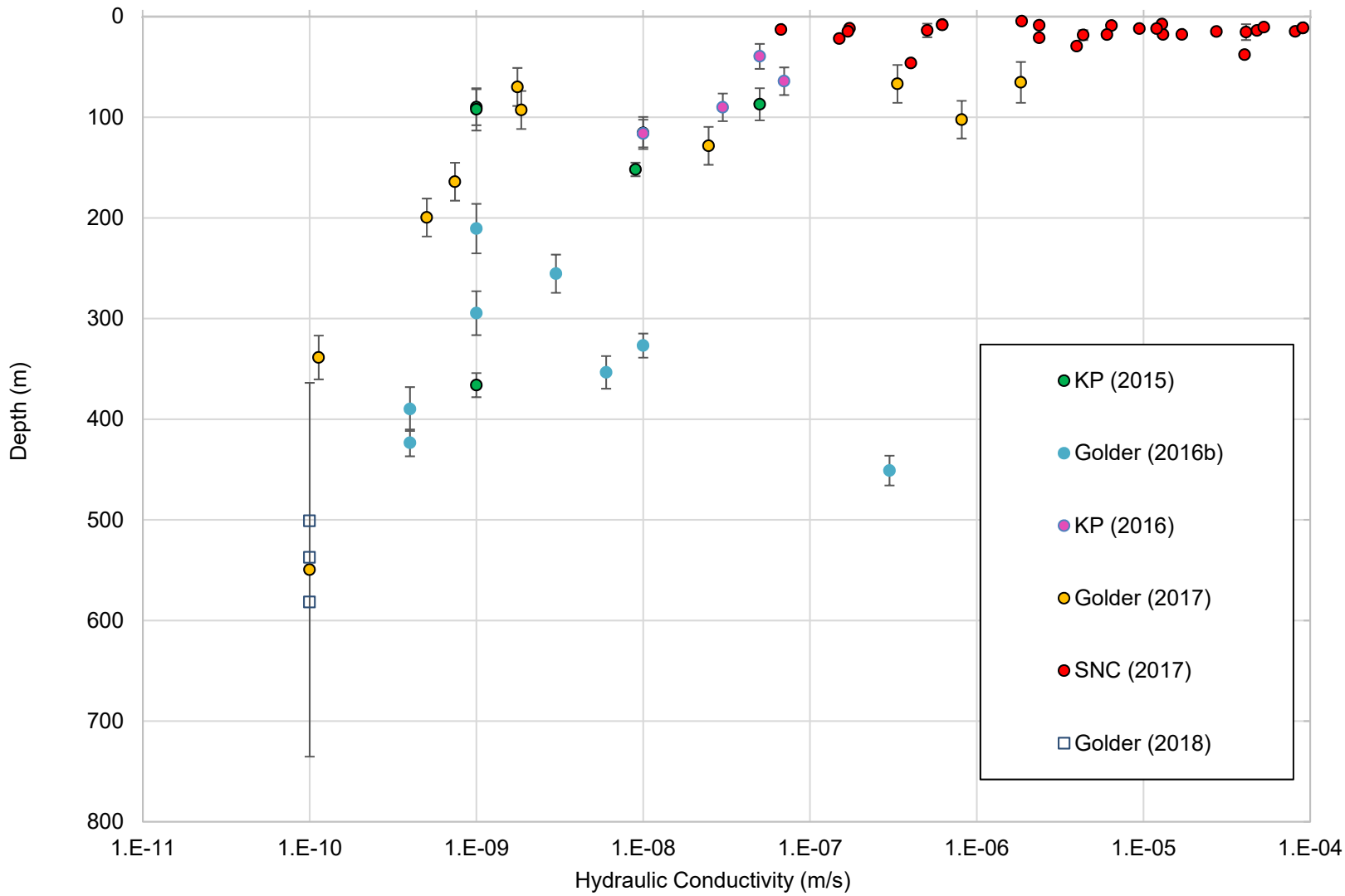
PROJECT

WHALE TAIL DEPOSIT, AMARUQ
WINTER 2018 HYDROGEOLOGICAL INVESTIGATION
KIVALLIQ DISTRICT, NUNAVUT

TITLE

PNEUMATIC SINGLE PACKER TOOL ON DEDICATED RODS

PROJECT NO.	PHASE	REV.	FIGURE
18113037	3000	0	2



CLIENT
AGNICO EAGLE MINES LIMITED

CONSULTANT
GOLDER

YYYY-MM-DD	2019-02-06
PREPARED	A.C.
DESIGN	J.L.
REVIEW	M.D.
APPROVED	J.L.

PROJECT
WHALE TAIL DEPOSIT, AMARUQ
WINTER 2018 HYDROGEOLOGICAL INVESTIGATION
KIVALLIQ DISTRICT, NUNAVUT

TITLE
HYDRAULIC CONDUCTIVITY BY DEPTH BELOW GROUND SURFACE

PROJECT No.	Phase.	Rev.	Fig.
18113037	**3000**	**0**	**3**

ATTACHMENT 1

Transducer Calibration Certificates

Calibration Report

Report Number: 20180727-600912

In-Situ Inc.
221 East Lincoln Avenue, Fort Collins, CO 80524 USA
1-970-498-1500, 1-800-446-7488, FAX: 1-970-498-1598
Visit us at www.in-situ.com

Instrument Details:

Instrument Model:	**Level TROLL 700**
Full Scale Pressure Range:	**1000 PSI / 693 m / 2273 ft / non-vented**
Serial Number:	**600912**
Hardware Version:	**3**
Firmware Version:	**2.13**

Calibration Details:

Calibration Result:	**PASS**
Calibration Date:	2018-07-27 01:27:20 (UTC)
Nominal Range of Applied Temperature:	-5 C to +50 C
Temperature Accuracy Specification:	+/- 0.1 C From -5 C to +50 C
Nominal Range of Applied Pressure:	7 PSI to 1000 PSI
Pressure Accuracy Specification:	+/- 0.1 %FS from -5 C to +50 C, +/- 0.05 %FS at +15 C

Post-Calibration Check:

Parameter	Applied	Reported	Deviation	Unit
Pressure	1000.0100	1000.1370	0.1270	PSI
Pressure	424.0600	424.1086	0.0486	PSI
Pressure	6.9996	7.0841	0.0845	PSI
Temperature	25.0060	24.9778	-0.0282	C

Calibration Procedures and Equipment Used:

Automated calibration procedures used.
Manu Agilent Model 34980A SerialNo MY44001931
Manu Instrulab Model 4312A-15 SerialNo 30117
Manu Instrulab Model 832-151-01 SerialNo 811
Manu Mensor Model CPC6000 SerialNo 410009W9
Manu Agilent Model 53131A-010 SerialNo MY47002678
Manu MENSOR Model 600 SerialNo 622743

Notes:

1. Standards used in this calibration are traceable to the National Institute of Standards and Technology.
2. This calibration report shall not be reproduced, except in full, without the written approval of In-Situ, Inc.
3. A calibration interval of 12 to 18 months is recommended.

In-Situ
Crafted with pride by
Russ G

Performed By: WR

Golder Associates Ltd.

CALIBRATION REPORT

Instrument type	VW transducer with data logger
Calibration Date	15-May-18 Due date: 15-May-19
Model Number	VW2100-1.0-HD
Pressure Range	1.0 MPa or 145.04 PSI
Manufacturer	RST instruments
Serial number	DT02036 VW45255

Pressure Test Data Sheet

Polynomial Fits			
Applied Pressure	**Reported Pressure**	**Deviation**	**FS Error**
(kPa)	**(kPa)**	**(kPa)**	**%**
0.1	0.13	0.03	0.00
197.9	198.77	0.87	0.09
400.7	401.67	0.97	0.10
596.7	597.90	1.20	0.12
791.6	793.13	1.53	0.15
974.7	976.77	2.07	0.21
	Maximum Value:	2.07	0.21

End of calibration data

Performed by A.Brugger

Calibration and Equipment used:

Instrument type DPG4000-2K

Calibration Date 15-Jan-18

Manufacturer Omega

Equipment used is traceable to the National Institute of Standards and Technology

Pressure Range: 0-2000 psi

Accuracy +/- 0.1%

Serial Number 2892054

ATTACHMENT 2

HydroBench® Analysis Reports

HYDROBENCH REPORT

Project	2018 Hydrogeology Program		
Site	Amaruq Project Site		
Source Well	AMQ-18-1925		
Test Name	Test 1		
Test Date/Time			
Interval	top: 419.46 m	bottom: 699.00 m	
Description	Testing: AC Analysis: AC Review: JDJ		

Basic Data

Test Interval	279.54 m		
Porosity	0.10		
Well Radius	0.038 m	Tubing Radius	0.023 m
Inclination	24.0 deg		
Test Volume	1261.456 l		
Well Type	Source		

Fluid Properties

Viscosity	0.001 Pa*s
Density	1195.0 kg/m³
Compressibility	2.0e-09 1/Pa

Sequence Definition

Name	Category	t(o) [hrs]	P(o) [kPa]	P(i) [kPa]	Rate [l/min]	C [m³/Pa]
COM1	Variable Pressure	0.00000	4151.84			1.6e-07
PSR	Recovery	1.13278	4150.86			1.6e-07
SI-INIT	dP-Event	1.76889	4150.53	-51.1 *		1.6e-07
SI	Slug	1.78278	4201.67	4150.5		1.6e-07
COM2	Variable Pressure	3.15556	4200.18			1.6e-07

Analysis Results

Analysis "SI"

Static Pressure: 4149.87 kPa

Shell Parameters:

Name	Transmissivity [m²/s]	Storativity [-]	Radius [m]	Flow Dimension [-]
Shell 1	2.4e-09	5.5e-04	- -	2.0

Sequence Parameters:

Name	Wellbore Storage [m³/Pa]	Skin [-]
COM1	1.6e-07	0.0
PSR	1.6e-07	0.0
SI-INIT	1.6e-07	0.0
SI	1.6e-07	0.0
COM2	1.6e-07	0.0

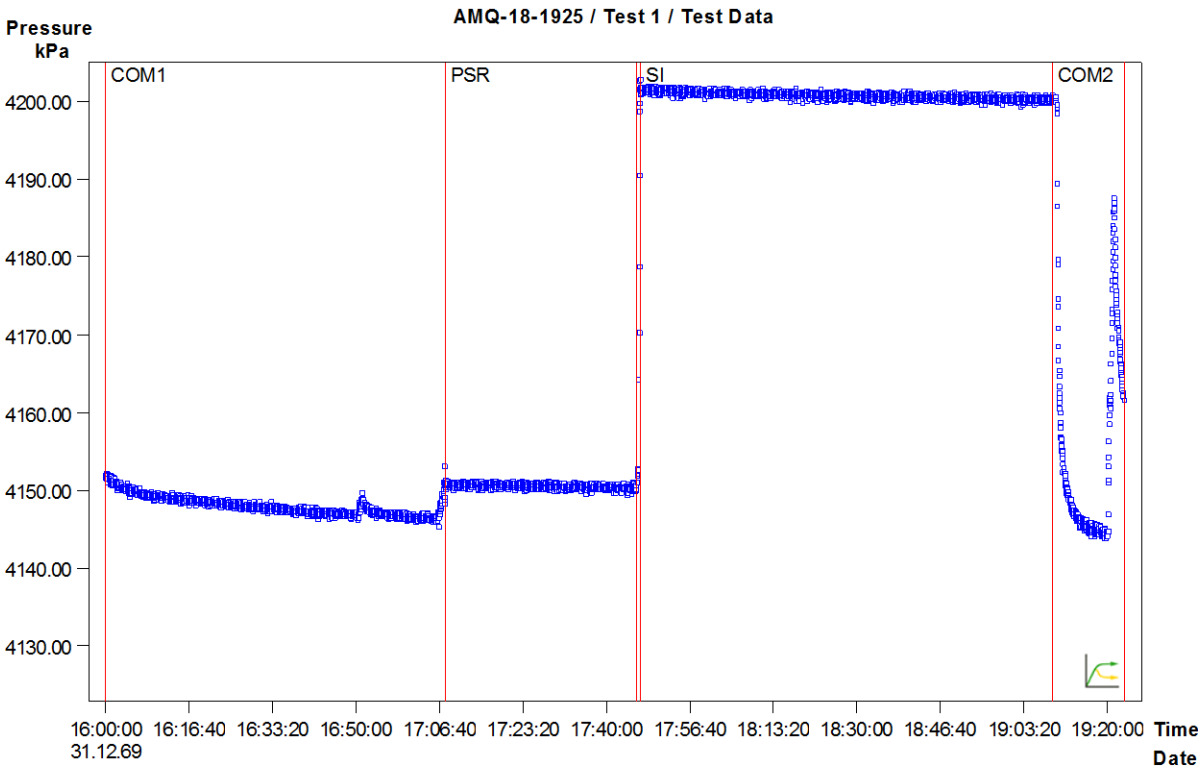


Figure 1: Pressure response and sequence definition

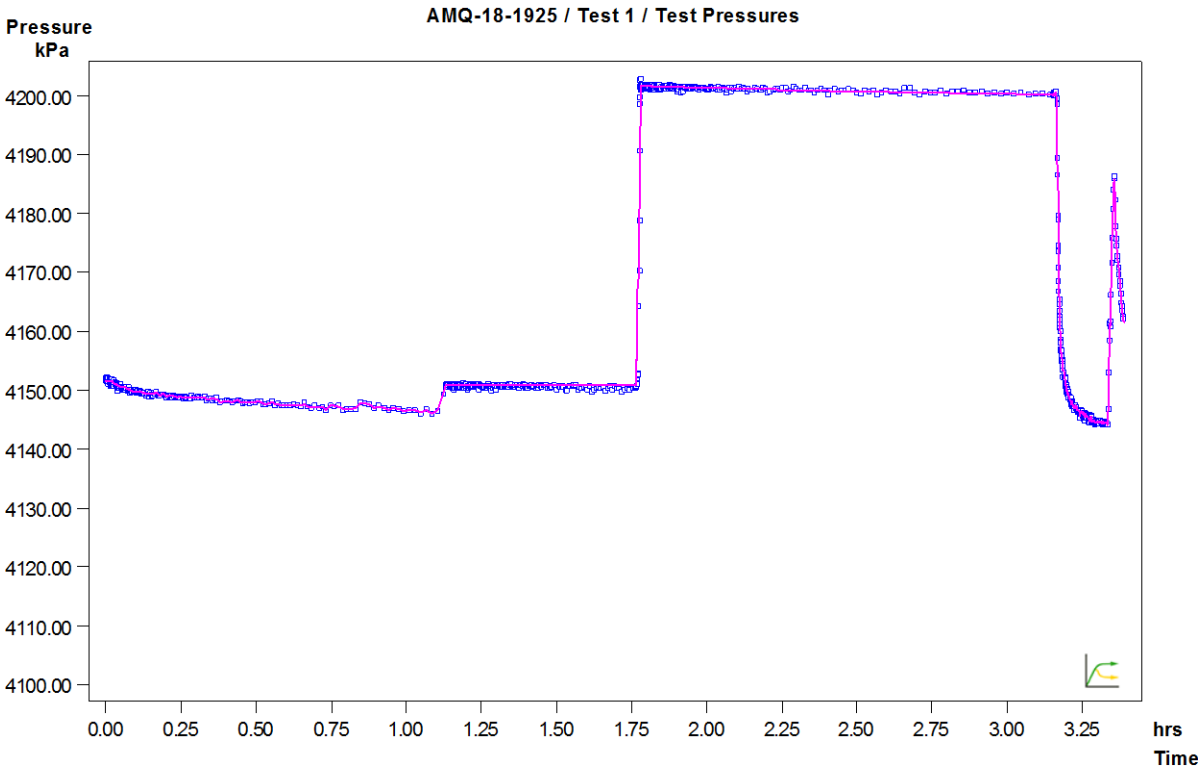


Figure 2: Pressure response (blue) and simulation (pink) cartesian plot

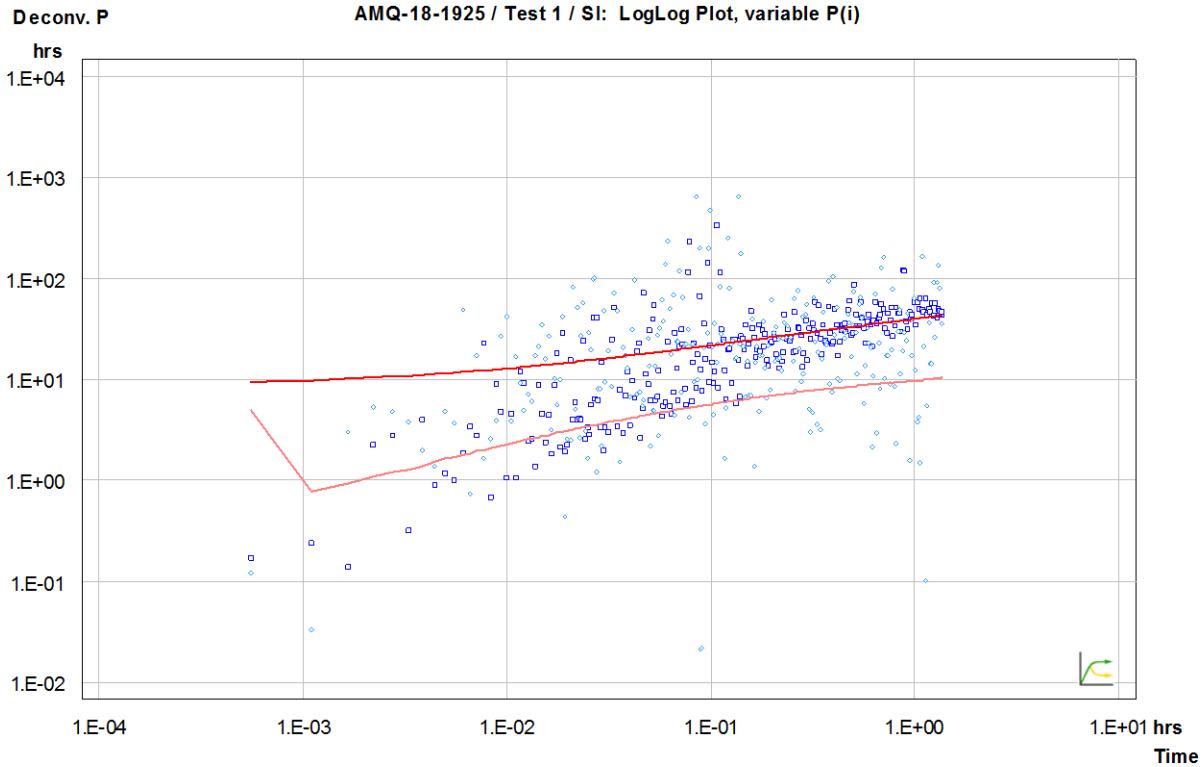


Figure 3: Deconvolved pressure response (dark blue), derivative (light blue) and simulation (red): Log-Log diagnostic plot, SI sequence

HYDROBENCH REPORT

Project	2018 Hydrogeology Program
Site	Amaruq Project Site
Source Well	AMQ-18-1925
Test Name	Test 2
Test Date/Time	
Interval	top: 500.40 m bottom: 699.00 m
Description	Testing: CM Analysis: AC Review: JDJ

Basic Data

Test Interval	198.60 m		
Porosity	0.10		
Well Radius	0.038 m	Tubing Radius	0.023 m
Inclination	24.0 deg		
Test Volume	896.205 l		
Well Type	Source		

Fluid Properties

Viscosity	0.001 Pa*s
Density	1195.0 kg/m³
Compressibility	2.0e-09 1/Pa

Sequence Definition

Name	Category	t(o) [hrs]	P(o) [kPa]	P(i) [kPa]	Rate [l/min]	C [m³/Pa]
COM1	Variable Pressure	0.00000	4993.77			1.6e-07
PSR	Recovery	1.01278	4991.46			1.6e-07
SI-INIT	dP-Event	1.68167	4991.14	-45.5 *		1.6e-07
SI	Slug	1.79111	5036.64	4991.1		1.6e-07
COM2	Variable Pressure	2.62722	5035.46			1.6e-07

Analysis Results

Analysis "SI"

Static Pressure: 4990.99 kPa

Shell Parameters:

Name	Transmissivity [m²/s]	Storativity [-]	Radius [m]	Flow Dimension [-]
Shell 1	7.0e-09	3.9e-04	- -	2.0

Sequence Parameters:

Name	Wellbore Storage [m³/Pa]	Skin [-]
COM1	1.6e-07	0.0
PSR	1.6e-07	0.0
SI-INIT	1.6e-07	0.0
SI	1.6e-07	0.0
COM2	1.6e-07	0.0

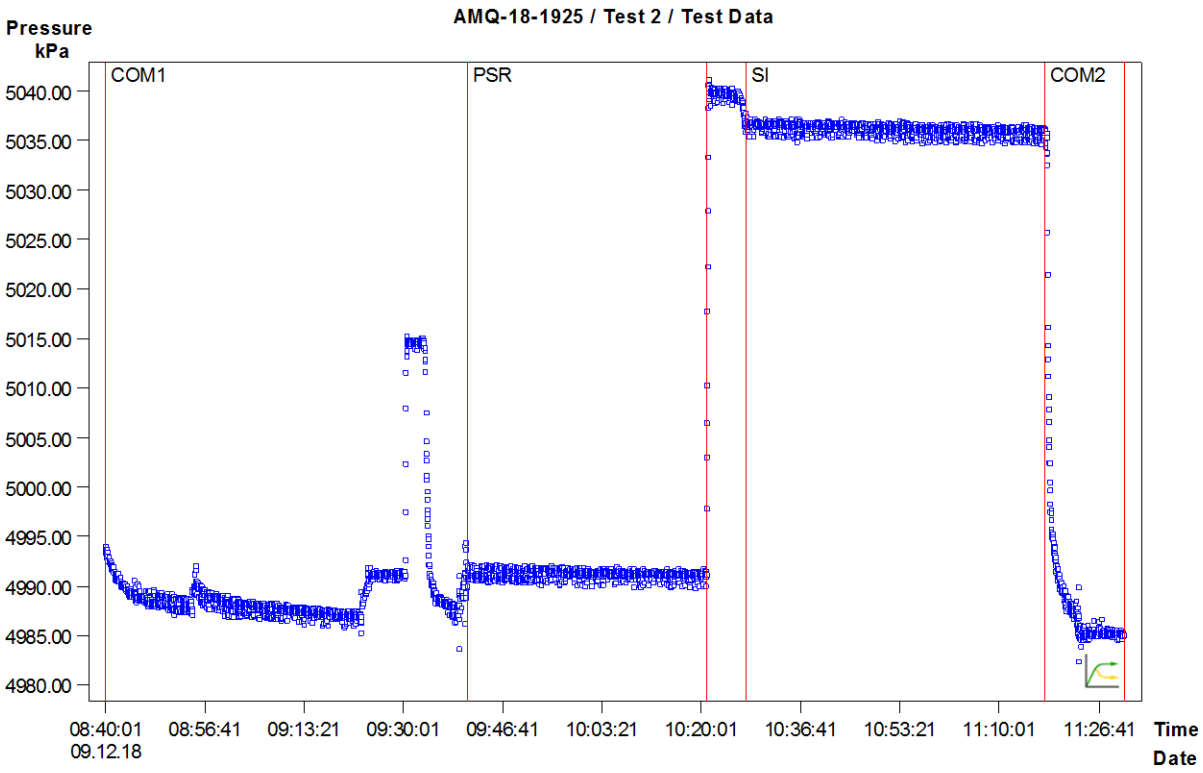


Figure 1: Pressure response and sequence definition

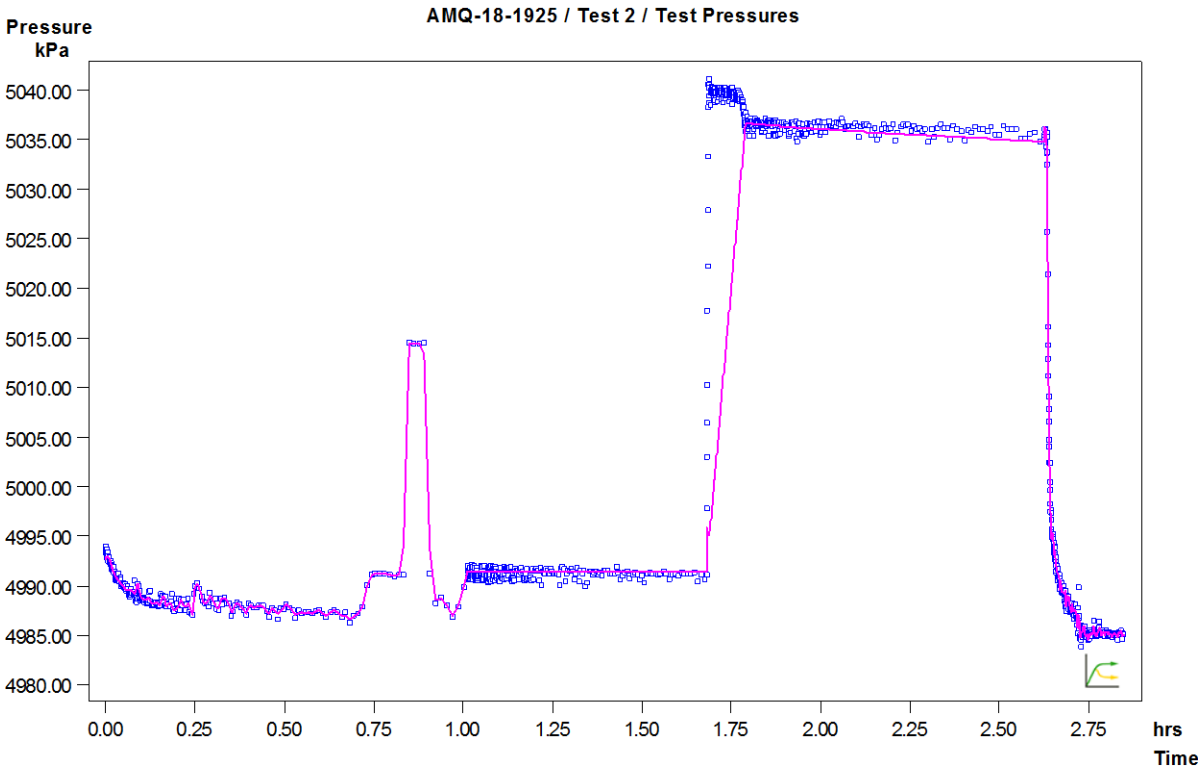


Figure 2: Pressure response (blue) and simulation (pink) cartesian plot

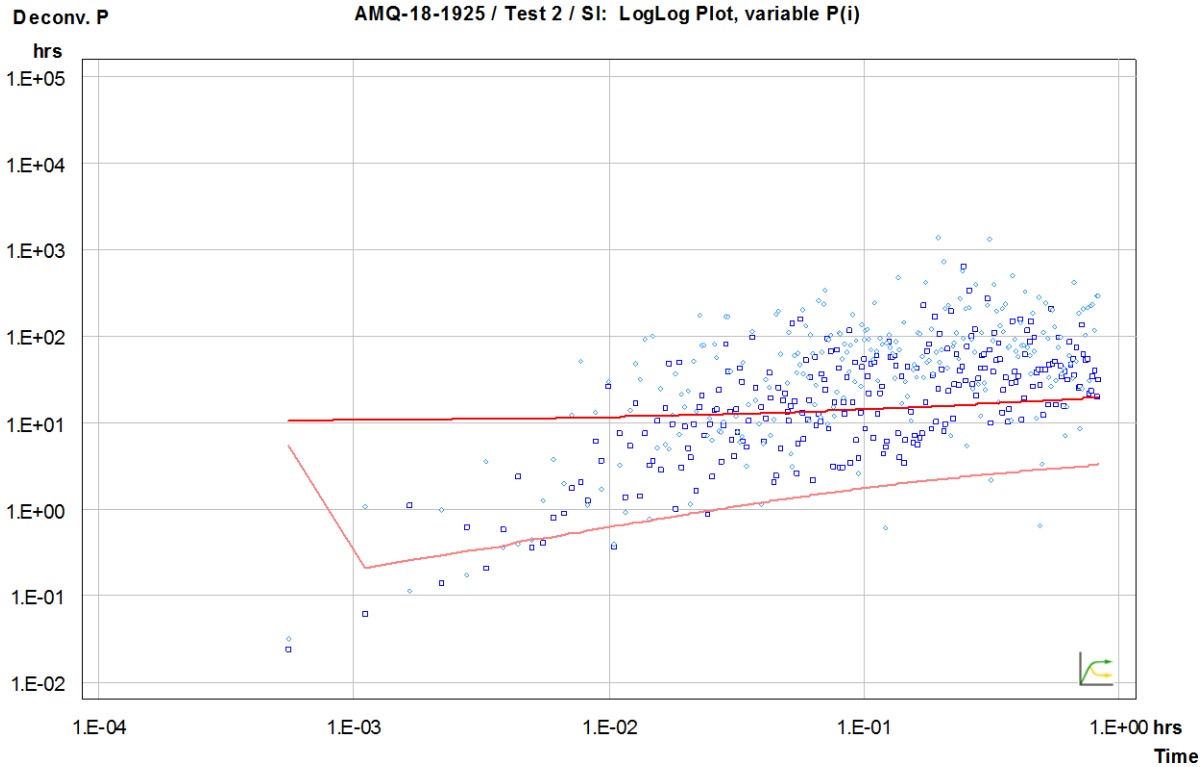


Figure 3: Deconvolved pressure response (dark blue), derivative (light blue) and simulation (red): Log-Log diagnostic plot, SI sequence

HYDROBENCH REPORT

Project	2018 Hydrogeology Program
Site	Amaruq Project Site
Source Well	AMQ-18-1925
Test Name	Test 3
Test Date/Time	
Interval	top: 599.38 m bottom: 699.00 m
Description	Testing: CM Analysis: AC Review: JDJ

Basic Data

Test Interval	99.62 m		
Porosity	0.10		
Well Radius	0.038 m	Tubing Radius	0.023 m
Inclination	24.0 deg		
Test Volume	449.547 l		
Well Type	Source		

Fluid Properties

Viscosity	0.001 Pa*s
Density	1195.0 kg/m³
Compressibility	2.0e-09 1/Pa

Sequence Definition

Name	Category	t(o) [hrs]	P(o) [kPa]	P(i) [kPa]	Rate [l/min]	C [m³/Pa]
COM1	Variable Pressure	0.00000	6056.00			1.6e-07
PSR	Recovery	0.67889	6045.48			1.6e-07
SI-INIT	dP-Event	1.76444	6045.09	-26.2 *		1.6e-07
SI	Slug	1.77389	6071.28	6045.1		1.6e-07
COM2	Variable Pressure	2.88000	6070.23			1.6e-07
PSR2	Recovery	2.90611	6068.51			1.6e-07
SW-INIT	dP-Event	3.01056	6068.36	82.2 *		1.6e-07
SW	Slug	3.02778	5986.11	6068.4		1.6e-07
COM3	Variable Pressure	3.96056	5985.60			1.6e-07

Analysis Results

Analysis "SI"

Static Pressure: 6044.76 kPa

Shell Parameters:

Name	Transmissivity [m²/s]	Storativity [-]	Radius [m]	Flow Dimension [-]
Shell 1	7.3e-09	2.0e-04	- -	2.0

Sequence Parameters:

Name	Wellbore Storage [m³/Pa]	Skin [-]
COM1	1.6e-07	0.0
PSR	1.6e-07	0.0
SI-INIT	1.6e-07	0.0
SI	1.6e-07	0.0
COM2	1.6e-07	0.0
PSR2	1.6e-07	0.0
SW-INIT	1.6e-07	0.0
SW	1.6e-07	0.0
COM3	1.6e-07	0.0

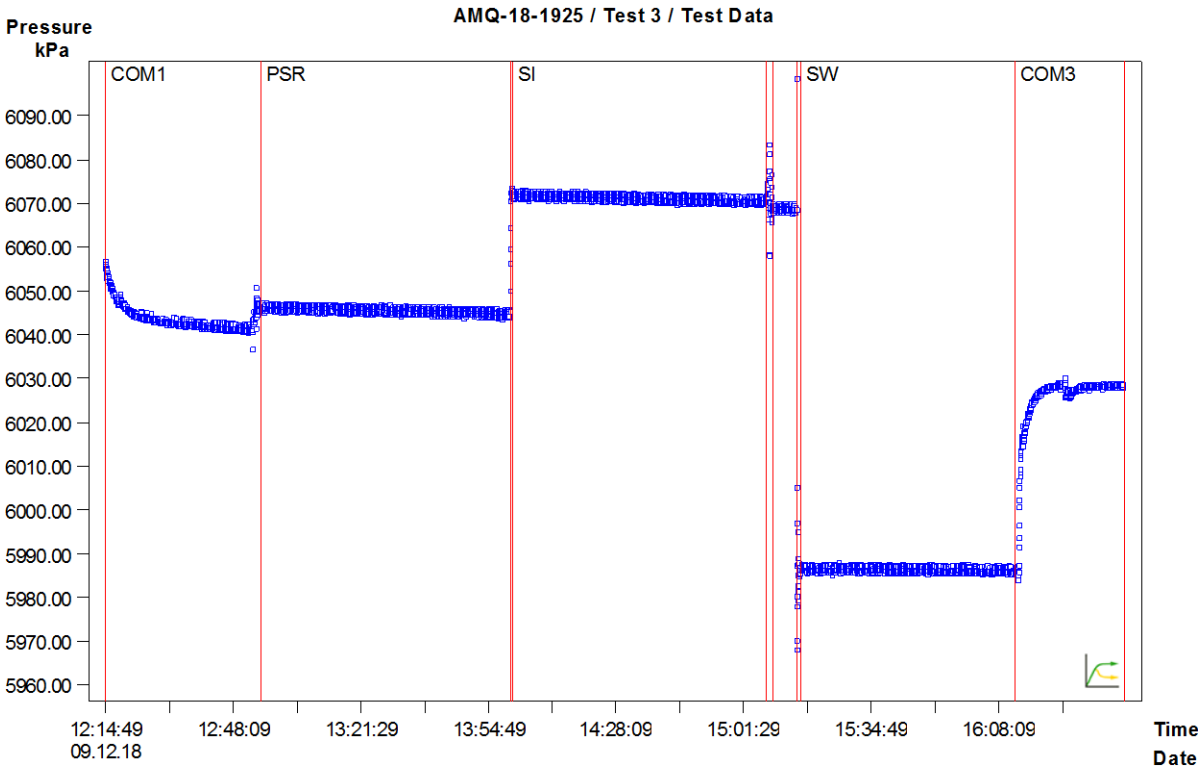


Figure 1: Pressure response and sequence definition

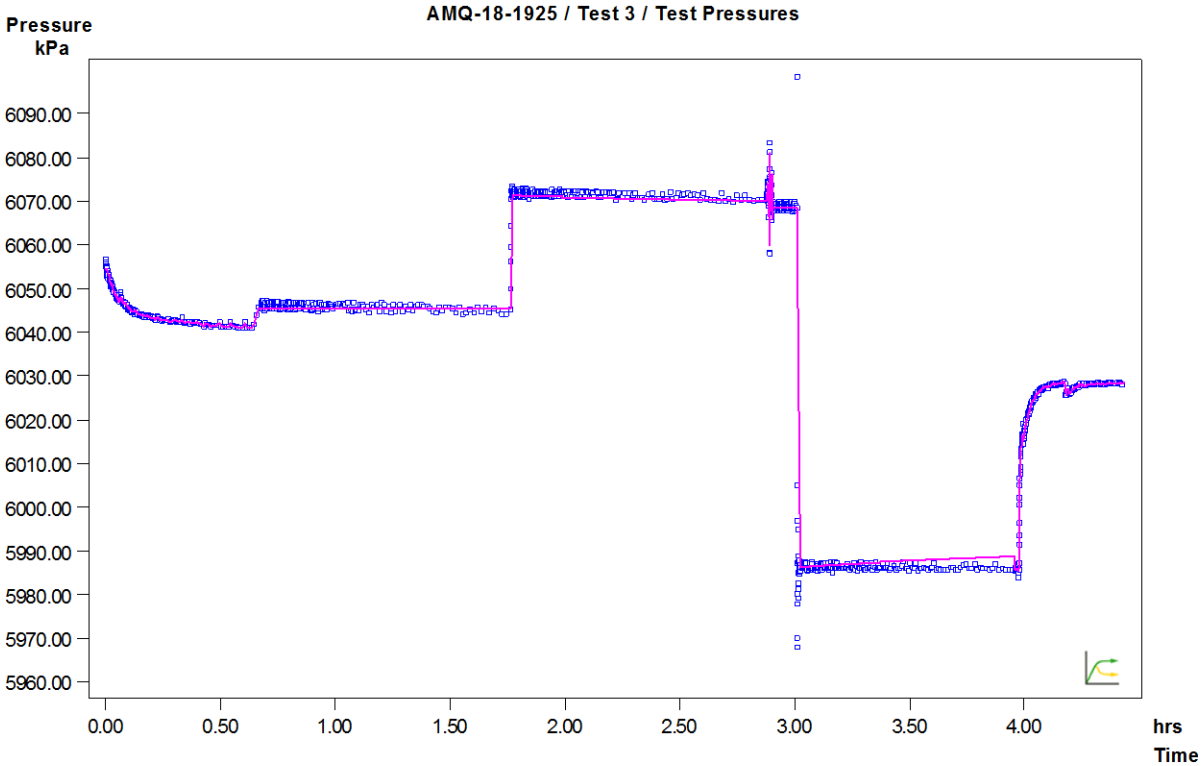


Figure 2: Pressure response (blue) and simulation (pink) cartesian plot

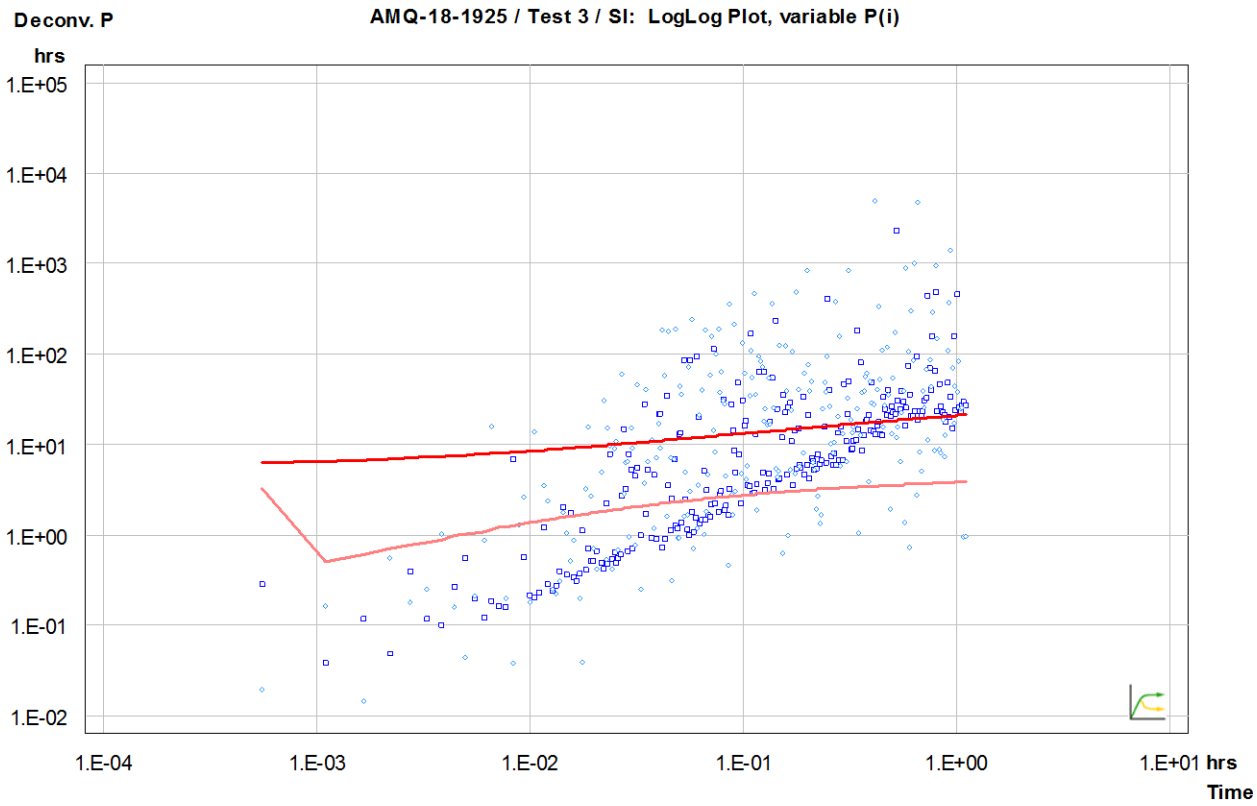


Figure 3: Deconvolved pressure response (dark blue), derivative (light blue) and simulation (red): Log-Log diagnostic plot, SI sequence

HYDROBENCH REPORT

Project	2018 Hydrogeology Program
Site	Amaruq Project Site
Source Well	AMQ-18-1925
Test Name	Test 4
Test Date/Time	
Interval	top: 419.50 m bottom: 699.00 m
Description	Testing: AC Analysis: AC Review: JDJ

Basic Data

Test Interval	279.50 m		
Porosity	0.10		
Well Radius	0.038 m	Tubing Radius	0.023 m
Inclination	24.0 deg		
Test Volume	1261.276 l		
Well Type	Source		

Fluid Properties

Viscosity	0.001 Pa*s
Density	1195.0 kg/m³
Compressibility	2.0e-09 1/Pa

Sequence Definition

Name	Category	t(o) [hrs]	P(o) [kPa]	P(i) [kPa]	Rate [l/min]	C [m³/Pa]
COM1	Variable Pressure	0.00000	4017.01			1.6e-07
PSR	Recovery	1.54056	4035.07			1.6e-07
SI-INIT	dP-Event	2.19222	4034.50	-96.6 *		1.6e-07
SI	Slug	2.20556	4131.15	4034.5		1.6e-07
SW-INIT	dP-Event	3.00722	4129.94	101.2 *		1.6e-07
SW	Slug	3.05389	4028.74	4129.9		1.6e-07
PSR2	Recovery	3.56389	4028.94			1.6e-07
COM2	Variable Pressure	4.06611	4029.07			1.6e-07

Analysis Results

Analysis "SI"

Static Pressure: 4034.44 kPa

Shell Parameters:

Name	Transmissivity [m²/s]	Storativity [-]	Radius [m]	Flow Dimension [-]
Shell 1	2.1e-09	5.5e-04	- -	2.0

Sequence Parameters:

Name	Wellbore Storage [m³/Pa]	Skin [-]
COM1	1.6e-07	0.0
PSR	1.6e-07	0.0
SI-INIT	1.6e-07	0.0
SI	1.6e-07	0.0
SW-INIT	1.6e-07	0.0
SW	1.6e-07	0.0
PSR2	1.6e-07	0.0
COM2	1.6e-07	0.0

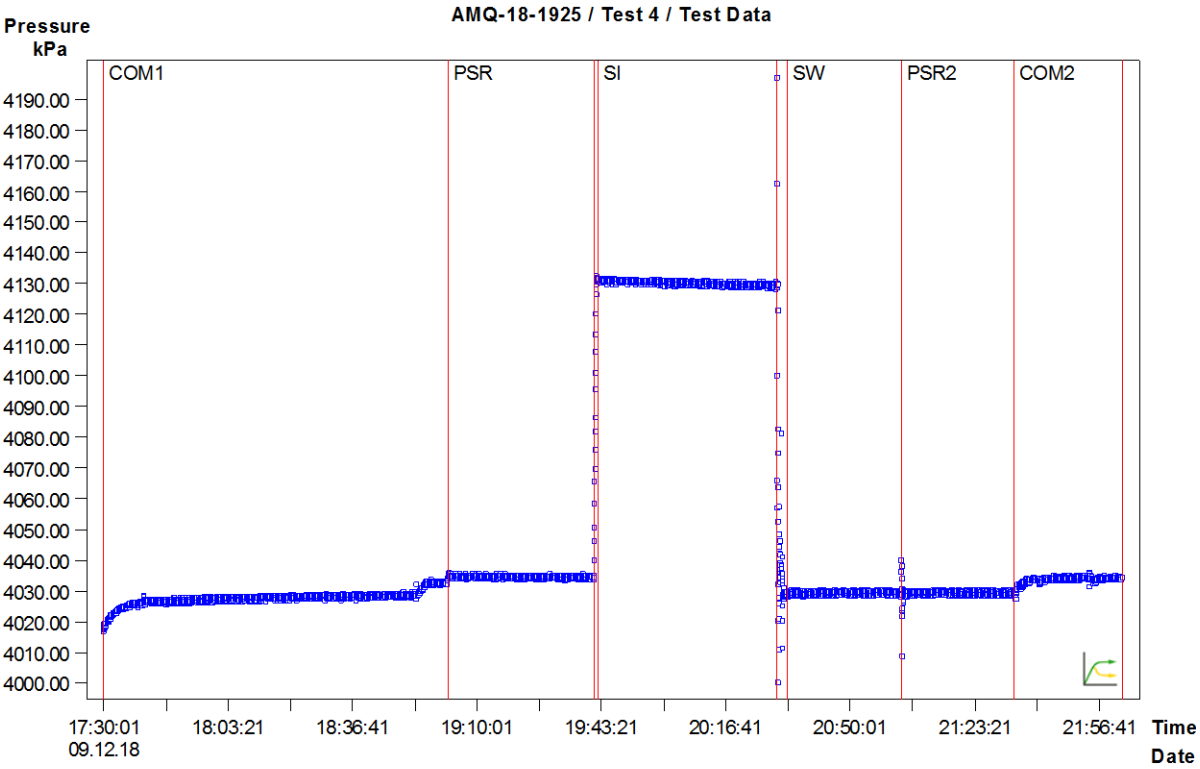


Figure 1: Pressure response and sequence definition

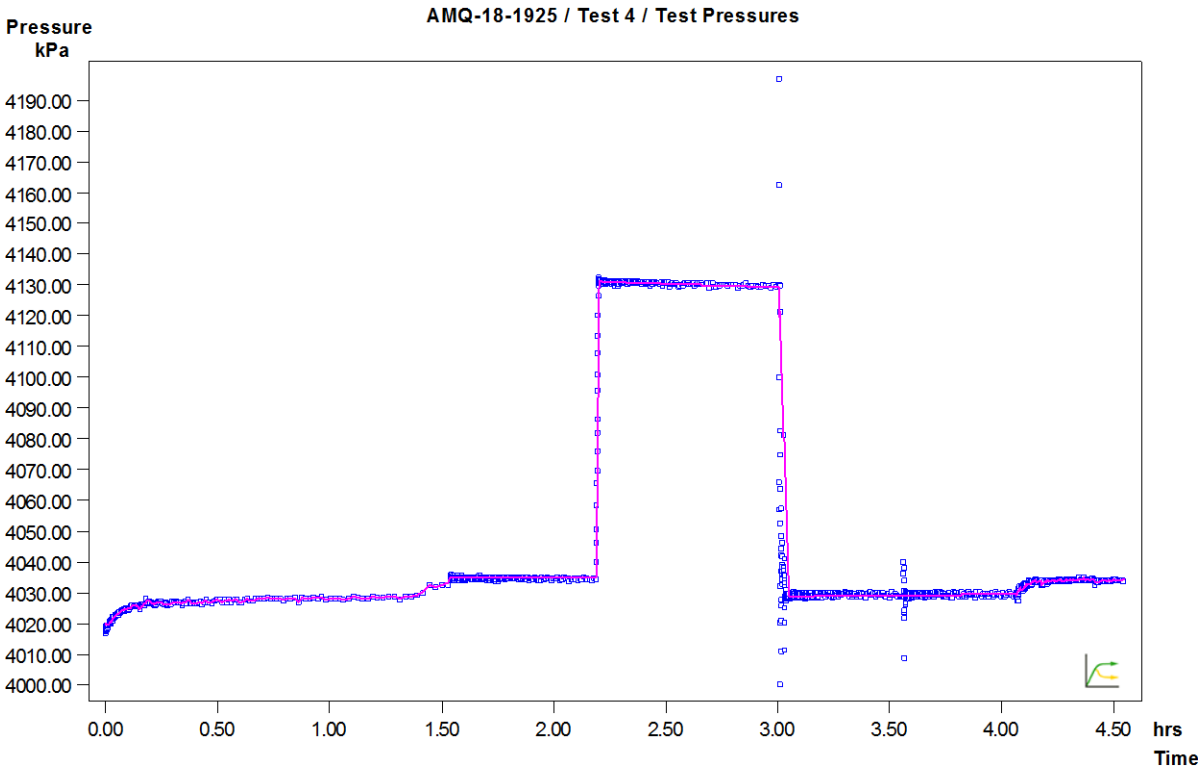


Figure 2: Pressure response (blue) and simulation (pink) cartesian plot

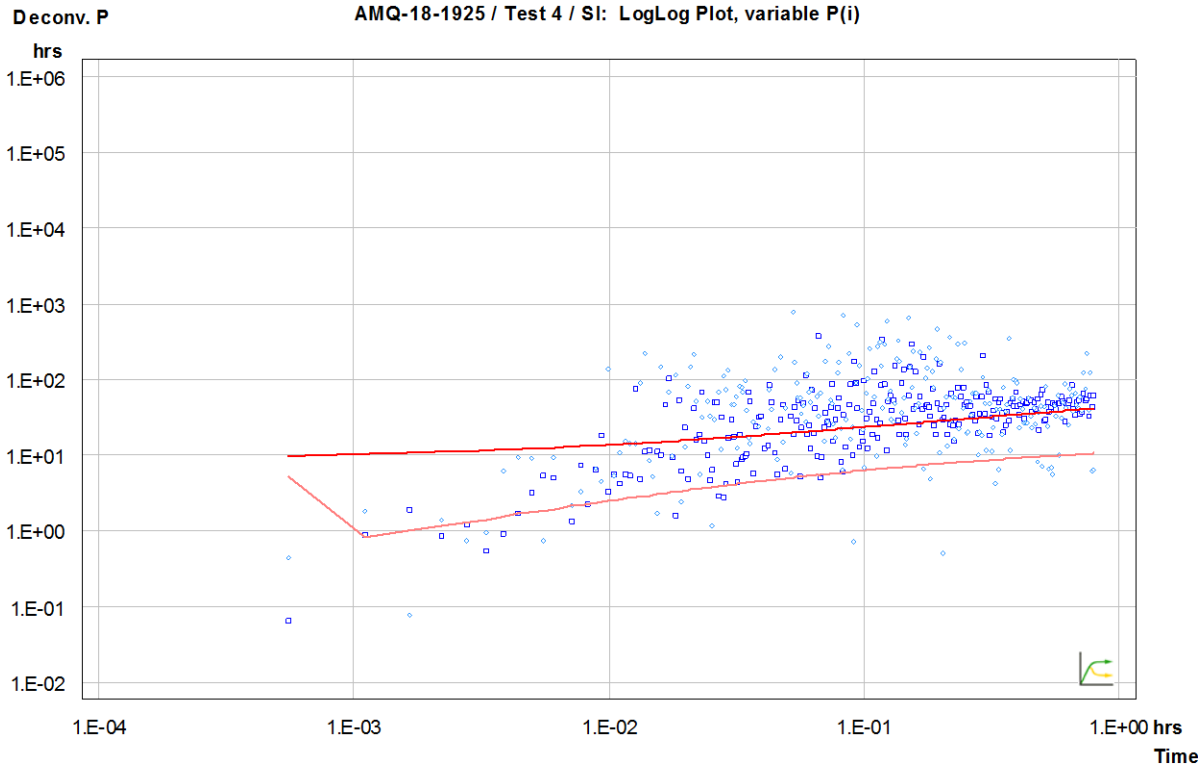


Figure 3: Deconvolved pressure response (dark blue), derivative (light blue) and simulation (red): Log-Log diagnostic plot, SI sequence