AGNICO EAGLE

2AM-MEL1631 Water Licence Amendment

Information Request Responses

Submitted to:

Nunavut Water Board

Submitted by:

Agnico Eagle Mines Limited – Meliadine Division

September 30, 2020

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CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA (CIRNAC)

Interested Party:	**CIRNAC**	**Rec No.:**	**CIRNAC-WL-IR-1**
Re:	**Risk to Fresh Water from Water Pipeline Spill**		

Recommendation Made by Interested Party:
CIRNAC requests that AEM include sufficient information, analysis and mitigation measures in the water licence amendment application package so that the potential risk of pipeline spill can be adequately assessed. The information requested include, but not limited to;

- *Detailed pipeline construction design and operation.*
- *Risks to the water pipeline as a result of road usage, extreme weather condition and wildlife migration.*
- *Potential water pipeline joint failure, leakage prevention and detection, methods to address solid material buildup in pipeline and blockage, and the approach to maintenance.*

Agnico Eagle's Response to Recommendation:
Agnico Eagle refers CIRNAC to the Saline Effluent Discharge to the Marine Environment Application currently under Nunavut Impact Review Board (NIRB) review for additional information related to the alternative of diverting CP1 water into the Waterline. Saline water management is not part of this application and details would be provided on this option as part of the alternative for the NWB application, if the Waterline is deemed approved by NIRB.

Interested Party:	**CIRNAC**	**Rec No.:**	**CIRNAC-WL-IR-2**
Re:	**Amendment to Surface Contact Water Discharge Criterion: Total Dissolved Solids**		

Recommendation Made by Interested Party:
CIRNAC requests that sufficient information be provided by AEM to justify or support the amendment of TDS requirements in the water licence including;

- *Part 1 - Rational and necessity for the amendment.*
- *Part 2 - Description of identified sources of TDS for surface contact water.*
- *Part 3 -Discussion of mitigation measures taken and to be taken to reduce TDS in surface contact water.*
- *Part 4 -Presentation of water quality monitoring and toxicity test results from Meliadine Lake with interpretations and predictions.*
- *Part 5 - Assessment of short-term and long-term impacts and potential alternatives.*

Agnico Eagle's Response to Recommendation:
Part 1

Rationale for a discharge limit of 3,500 mg/L, representing the maximum average concentration (MAC) effluent quality criterion (EQC) was provided in the WQ-MOP Rev3, which was further supported by the WQ-MOP Rev2 (refer to Appendix A of the WQ-MOP Rev3). In these documents, interim thresholds for the discharge (3,500 mg/L) and the edge of mixing zone (1,000 mg/L) were derived using site-specific data and validated using test results from the Emergency Amendment monitoring program, which is on-going. The emergency amendment monitoring program was conducted to validate three criteria:

a. That the effluent was not acutely toxic at concentrations up to 3,500 mg/L

b. That the discharge was rapidly assimilated in the Meliadine Lake receiving environment

c. That concentrations at the edge of the mixing zone were less than TDS concentrations shown to cause adverse effects during chronic toxicity tests

To date, the results of the Emergency Amendment monitoring program have supported the interim MAC discharge limit of 3,500 mg/L, as described in Section 4.0 of the WQ-MOP Rev3. Although TDS concentrations in the EWTP discharge are expected to be less than 3,500 mg/L during most times of the year, the proposed 3,500 mg/L limit provides operational flexibility and avoids circumstances that would require future emergency amendment applications, while still keeping the receiving environment, Meliadine Lake, protected from adverse effects to aquatic life and traditional uses.

Part 2

At surface, TDS in contact water originates from underground mine waste rock and ore. Waste rock and ore that originates from the open pit and surface excavations is unlikely to contribute high amounts of TDS to the contact but will still account for some loading. Material pore water that originates from the underground operations is primarily composed of natural saline groundwater. When brought to surface,

some of the water contained in this material will slowly drain out or be flushed out by precipitation that infiltrates and runs off the stockpiles. As the TDS contained in the material from the underground operations is a function of the water contained and not a function of the geochemical nature of the material, the TDS loadings from this source would be expected to decrease over time based on the precipitation observed on site.

Part 3

As an outcome of the NWB Emergency Amendment, thresholds for monitoring and adaptive management actions and responses were collaboratively developed with Kivalliq Inuit Association, CIRNAC and ECCC for application during 2020; these would also apply to discharges beyond 2020. The thresholds are associated with monitoring data at the end or pipe and at the edge of the mixing zone collected during operational discharge using a tiered system of operating levels ranging from Level 0 (green; normal operating condition) to Level 3 (red; high risk situation). For each threshold trigger level, a list of management strategies and actions for consideration in response to mitigate and/or rectify the condition, if required, was provided to reduce the risk to the receiving environment.

The monitoring thresholds link specifically to water quality (i.e., TDS) and toxicity testing monitoring data collected in CP1 (representing the discharge) and at the edge of the mixing zone that will be compared to the benchmarks that will be ratified by Phase 3 of the WQ-MOP.

An additional future potential adaptive management strategy includes the utilization of an alternative to the water management plan; that is, use of the waterline (if approved by NIRB) as a supplemental option for surface contact water transfer from CP1 to reduce TDS loading in Meliadine Lake. This alternative relates to the management of surface contact water and the potential opportunity to use the proposed waterline, which is new mine infrastructure provided in a Project Certificate Reconsideration Application currently before the NIRB for review. The application of this alternative has the potential to reduce, not eliminate, future CP1 discharges to Meliadine Lake, which is a topic identified by some community members in recent months. However,based on the NIRB process map, the implementation of the Waterline alternative would not happen until after freshet 2022.

Part 4

Preliminary results from the water quality monitoring and toxicity testing conducted as part of the emergency amendment validation monitoring program have suggested that a limit of 3,500 mg/L remains protective of the environment based on the previously agreed upon thresholds detailed in the first bullet of this response. Monitoring is on-going, and the final results from the program will be provided in Revision 4 to the WQ-MOP. Once the monitoring program is completed in October 2020 the report will be provided to the Nunavut Water Board for review prior to the technical meeting.

Part 5

Short-term and long-term impacts as a consequence of the operational discharge are expected to be small, and consistent with those described in the 2014 FEIS for the project. Monitoring in 2020 associated with the Emergency Amendment continues to show that CP1 water discharged to Meliadine Lake is effectively dispersed, meeting edge of mixing zone TDS threshold requirements, and attenuating through

the lake. The results of the 2020 monitoring collected between June and October will be evaluated and reported in Revision 4 of the WQ-MOP, which will validate if the influence of the discharge on Meliadine Lake is still within the short-term and long-term impacts of the FEIS. The alternative of the Waterline is currently assessed as part of the on-going NIRB review. On-going monitoring during mining operations will continue to inform the temporal trends of CP1 water quality and the effectiveness of the discharge into the lake.

ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC)

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-1**
Re:	**Sludge Disposal in CP1**		

Recommendation Made by Interested Party:
ECCC requests an estimate of the timeline for a decision and implementation of sludge diversion. If the Proponent has conducted sludge characterization, ECCC requests the analytical results.

Agnico Eagle's Response to Recommendation:

Sludge exiting the EWTP was sampled to measure conductivity and shown that the conductivity of the sludge is in the same order of magnitude of CP1 water. A more complete characterization of the sludge will be provided prior to the technical meeting.

The current strategy to dispose sludge is direct discharge into CP1. Alternative options is ongoing and additional detail would be provided prior to the technical meeting.

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-2**
Re:	**CP1 Discharge Volumes**		

Recommendation Made by Interested Party:
ECCC requests clarification of whether the increased freshwater volumes in the application have been included in the water balance, and if so, how the additional process water will affect the water balance and TDS.

Agnico Eagle's Response to Recommendation:
The increased freshwater volumes have not been included in the water balance. The reclaim water from the tailings is recovered by the filter press and the increase in freshwater consumption do not result in additional surface contact water to manage in the Contact Ponds.

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-3**
Re:	**Effluent Discharge Volumes for Average and Wet Years Scenarios**		

Recommendation Made by Interested Party:
ECCC requests clarification for the discrepancy in discharge volumes in Table 6 of the Site Water Balance and Water Quality Model versus Table 13 of the WMP. ECCC also requests clarification for the wet versus dry years discharge volumes for years 2022-2024 and 2028 in Table 12.

Agnico Eagle's Response to Recommendation:
Table 6 and Table 12 of the Site Water Balance and Water Quality Model had typographical errors. Modifications to the tables are highlighted in red below. WMP Table 13 volumes are consistent with model results. We highlighted in bold the two years (2020 and 2025) when water balance was re-run assuming 100-year wet precipitation conditions. This explains why discharge volumes are similar for year 2022 to 2024 and from 2027 to 2028. Higher discharge volumes are observed in year 2021 and 2026 due to the residual water accumulated in CP1 after wet year event being discharged during the following years.

The tables presented below contain the corrected discharge volumes from CP1 to EWTP for the average year and wet year scenarios. The proper discharge values were used in the Site Water Balance and Water Quality Model, therefore the results remain unchanged.

Table 6: Annual discharge from CP1 to EWTP (average year scenario) - m^3/yr

Year	CP1
2020	**872,704**
2021	634,507
2022	598,209
2023	599,536
2024	653,135
2025	**674,411**
2026	689,621
2027	666,985
2028	654,486

Table 12: Annual discharge from CP1 to EWTP (wet year scenario) - m^3/yr

Year	CP1
2020	**1,081,325**
2021	717,659
2022	598,209
2023	599,536
2024	653,135
2025	**914,662**
2026	783,168
2027	666,985
2028	654,486

Table 1: Estimated Effluent Flow Rates over Mine Operating Life

Year	Effluent Released Over the Course of the Month under Mean Climate conditions (m^3)			
	June	July	August	September
1: 2020	330,000	413,012	51,331	78,361
2: 2021	199,726	302,927	50,228	81,626
3: 2022	201,115	275,162	45,487	76,444
4: 2023	191,532	281,612	47,622	78,770
5: 2024	195,151	316,826	53,041	88,116
6: 2025	213,039	317,767	54,251	89,354
7: 2026	215,346	326,998	56,087	91,190
8: 2027	219,018	317,767	48,201	81,999
9: 2028	206,520	317,767	48,201	81,999
10: 2029	-	-	-	-
11: 2030	-	-	-	-

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-4**
Re:	**Effluent Quality Criteria for TDS**		

Recommendation Made by Interested Party:
ECCC requests that the Proponent clarify the need for a discharge limit for TDS of 3500 mg/L, given the predicted concentrations.

Agnico Eagle's Response to Recommendation:
As detailed in the response to CIRNAC-2, the maximum average concentration discharge threshold for TDS of 3,500 mg/L was determined to be protective for the receiving environment of Meliadine Lake based on three criteria outlined in the WQ-MOP Rev3:

1) The effluent was shown to not be acutely toxic at concentrations up to 3,500 mg/L

2) The discharge was shown to be rapidly assimilated in the Meliadine Lake receiving environment

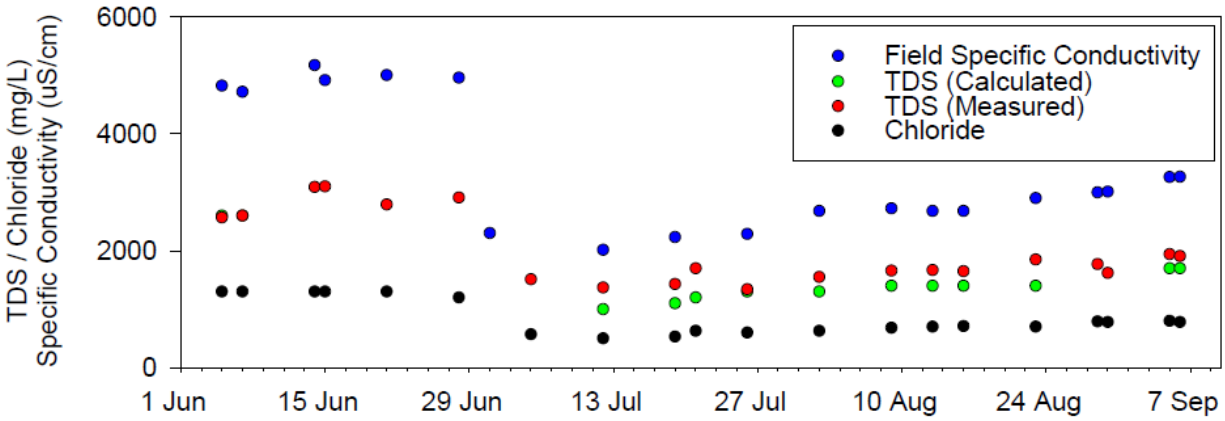
3) Concentrations at the edge of the mixing zone were less than TDS concentrations shown to cause adverse effects during chronic toxicity tests

These assessment criteria are outlined in Section 2.0 of the WQ-MOP Rev 3 (Appendix B of the application) and evaluated in Section 4.0. The results discussed in Section 4.0 are in addition to toxicity test results conducted in support of the Emergency Amendment Application in 2020, and also those conducted on site throughout 2019, as outlined in Appendix A of the WQ-MOP Rev3 (see Table A-2 and A-3 for details). These results were used to support the establishment of the interim discharge threshold of 3,500 mg/L, which has since been validated through testing associated with the 2020 discharge monitoring program.

Although TDS concentrations in the EWTP discharge are expected to be less than 3,500 mg/L during most times of the year, the proposed limit of 3,500 mg/L provides operational flexibility and avoids circumstances that would require future emergency amendment applications.

There is currently a discrepancy between the modelled concentrations and the trends that are seen in the monitoring data. It is important to note that the model uses average monthly values and does not represent the peaks in concentration that may occur on a higher resolution time scale due to variations in weather and site conditions that is captured in the monitoring. Further, the model does not account for ice formation in CP1, which could persist through freshet, and would result in increased concentrations when it is necessary to discharge volume from CP1 to manage contact water on site.

As discussed, the monitoring is highlighted in the figure below that highlites the 2020 TDS measurement in CP1. This is an example of the peaks observed during the discharge season and why the 3500 mg/L TDS discharge threshold remains protective and allows the flexibility for the operation.


TDS / Chloride (mg/L)
Specific Conductivity (uS/cm)
6000
4000
2000
0
1 Jun
15 Jun
29 Jun
13 Jul
27 Jul
10 Aug
24 Aug
7 Sep
Field Specific Conductivity
TDS (Calculated)
TDS (Measured)
Chloride

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-5**
Re:	**Federal TSS Guidelines**		

Recommendation Made by Interested Party:
ECCC recommends that the Proponent update Table 2.1 to reflect the above comment.

Agnico Eagle's Response to Recommendation:
Agnico Eagle agrees with ECCC and will update Table 2.1 within the Erosion and Sediment Control Plan.

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-6**
Re:	**Use of Reverse Osmosis (RO) and Decommissioning of P-area Ponds**		

Recommendation Made by Interested Party:
ECCC recommends that the Water Quality and Flow Monitoring Plan be consistent with current operational plans, or that the Proponent provide clarification for the discrepancies.

Agnico Eagle's Response to Recommendation:
Agnico Eagle will update the Water Quality and Flow Monitoring Plan following the decommissioning of the P-Area.

Interested Party:	**ECCC**	**Rec No.:**	**ECCC-WL-IR-7**
Re:	**Validation of proposed TDS discharge criteria and Site-Specific TDS objective for edge of mixing zone**		

Recommendation Made by Interested Party:
ECCC recommends that the Proponent conduct further evaluation of the proposed TDS limit pending the completion of monitoring and review of all data.

Agnico Eagle's Response to Recommendation:
Further evaluation of the TDS limit for discharge of CP1 water is not necessary. The end of pipe and edge of mixing zone thresholds developed and proposed for the Emergency Amendment remain valid for this 2020 Water Licence Amendment. The end of pipe and edge of mixing zone thresholds were developed following comprehensive evaluation of monitoring and toxicity testing data of CP1 water completed during the winter 2019 and 2020 when TDS level were above 3,500 mg/L. The results of the evaluation have been described in detail in the Water Quality Management and Optimization Plan (WQ-MOP Rev2; Agnico Eagle 2020).

However, Agnico Eagle is continuing to monitor field water quality data, and evaluate water quality and toxicity testing data collected during the 2020 discharge based on the validation program described in the WQ-MOP Rev3, submitted as part of the 2020 Water Licence Amendment. The results of this monitoring and evaluation are expected to support the retention and approval of the proposed TDS limits in the amended licence because they will therefore remain appropriate to keep the receiving environment protected; this detail will be presented in Version 4 of the WQ-MOP, which is expected to be submitted prior to the technical meeting.

KIVALLIQ INUIT ASSOCIATION (KIVIA)

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-1**
Re:	**Proposed TDS targets and alternatives to manage CP1 water**		

Recommendation Made by Interested Party:
Please provide evidence that an increase in discharge criteria is required for the project. This discussion should include an evaluation of improved water treatment in collection ponds that feed into CP1, specifically CP4, CP5 and CP6, so that reviewers can determine Agnico Eagle's capacity to meet the existing 1,400 mg/L TDS discharge criterion for CP1. It should also consider the improvements to water quality that have been achieved by optimizing waste rock deposition, and whether further improvements to water quality could be achieved by diverting high TDS water from the ore storage pads to collection ponds with associated RO treatment systems to reduce TDS loading to CP1.

Agnico Eagle's Response to Recommendation:
Agnico Eagle consider that the KIA-WL-IR-1 should be consider as a technical comment, however the information below is what we have available at this stage of the process.

First, we would like to refer the KivIA to ECCC-IR-4 response for the rational behind the needs to review the TDS discharge threshold in Meliadine Lake.

Secondly, Agnico Eagle evaluated several alternative for reducing the loading in CP-1 as presented in the section 2.4 of the Project Description. The contributions of TDS loading from CP4, CP5 and CP6 have a relatively low impact on the total TDS loading in CP1. Based on our current understanding of the Site Water Quality, removing CP4, CP5 and CP6 loadings from CP1 would reduce the total TDS loading to CP1 by an average of approximately 14% and implementing Reverse Osmosis Treatment would not result in a significant change.

Finally, Agnico Eagle would like to reiterate that the optimization of the water rock deposition is the most promising option to improve water quality in CP1, however the impact of this change would be observed in the next couple of years as:

- Mining of the open pits generate, at first, a large volume of overburden that need to be capped with open pit waste rock for geotechnical stability reasons;
- The flushing of the TDS loading from the underground waste rock is dependent of the precipitation observed on site.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-2**
Re:	**Diversion of CP1 water to waterline**		

Recommendation Made by Interested Party:
Please clarify how Agnico Eagle is moving forward with the option to divert CP1 water into the waterline. To support this approach to water management at the Meliadine site, Agnico Eagle should also provide an updated water balance and water management plan for the Meliadine site that accounts for the diversion of all water to Melvin Bay, and update the application before the NIRB to accommodate diversion of some or all surface contact water in CP1 to the marine environment.

Agnico Eagle's Response to Recommendation:
Agnico Eagle refers KivIA to the Saline Effluent Discharge to the Marine Environment Application currently under NIRB's review as salinewater management is not part of this application and details would be provided on this option if the Waterline is deemed approved by NIRB. The diversion of surface water to the waterline is an alternative within this application but is contingent if the waterline is approved by NIRB.

Based on the NIRB's process map for the Saline Effluent Discharge to the Marine Environment, discharge is now postponed to 2022 and Agnico Eagle would need to discharge the water to Meliadine Lake during the discharge season 2021 and a good portion of the discharge season in 2022 due to the delay on the Waterline file.

These project schedule delays related to the implementation of the Waterline combine with the recent water quality monitoring results in CP1 support the requirement of maintaining the discharge to Meliadine Lake into the Water Licence with an updated TDS threshold discharge criteria. Agnico Eagle needs this flexibility to derisk the operation while maintaining high environmental operational mitigations that are protective of Meliadine Lake and considers that the implementation of adaptive management measures to divert a percentage of CP1 water to the Waterline.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-3**
Re:	**TDS measurements**		

Recommendation Made by Interested Party:
Please clarify whether Agnico Eagle will be relying on measured TDS, calculated TDS, or a combination of the two when evaluating compliance with the discharge criteria and determining when to implement adaptive management strategies. Please include a comparison between the accuracy of calculated vs measured values.

Agnico Eagle's Response to Recommendation:
Agnico Eagle refers KivIA to prior responses provided by Agnico Eagle on this subject, in particular response to KivIA-1 (Maximum Allowable Effluent Concentration) provided in the WQ-MOP Update IR Responses dated June 25, 2020.

It is Agnico Eagle's preference to use calculated TDS to evaluate compliance with thresholds for discharge and at the edge of a mixing zone, and in decision-making with respect to adaptive management. Calculated TDS concentrations account for the contribution of major cations (e.g., sodium, potassium, calcium, and magnesium) and anions (e.g., bicarbonate, chloride, and sulfate), which account for the majority of the TDS in natural waters, groundwater, and Mine water associated with this application, and other specific ions (e.g., fluoride, silica, and nitrate), which also feature as natural and contributing TDS components in these water sources. The derivation of calculated TDS concentrations is from the sum of the analytical results for each of the contributing ions from a water sample using the formula in Standard Methods (Method 1030E, APHA 2012; Eqn 1). The analytical resolution associated with the laboratory analysis of each of the contributing ions results in a very accurate and reliable estimate of TDS.

TDSCalc (mg/L) = (0.6 x Total Alkalinity as $CaCO_3$) + Sodium + Magnesium + Potassium + Calcium + Sulfate + Chloride + Nitrate + Fluoride + Silicate [Eqn 1.]

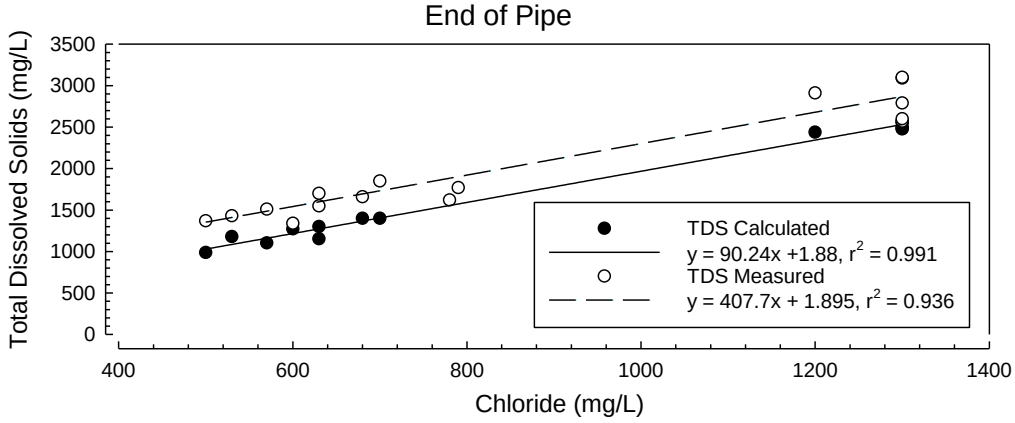
Where: Nitrate is the NO_3^- anion (multiply nitrate as nitrogen result by 4.427); Silicate is the SiO_3^{2-} anion (multiply reactive silica as SiO_2 result by 1.266).

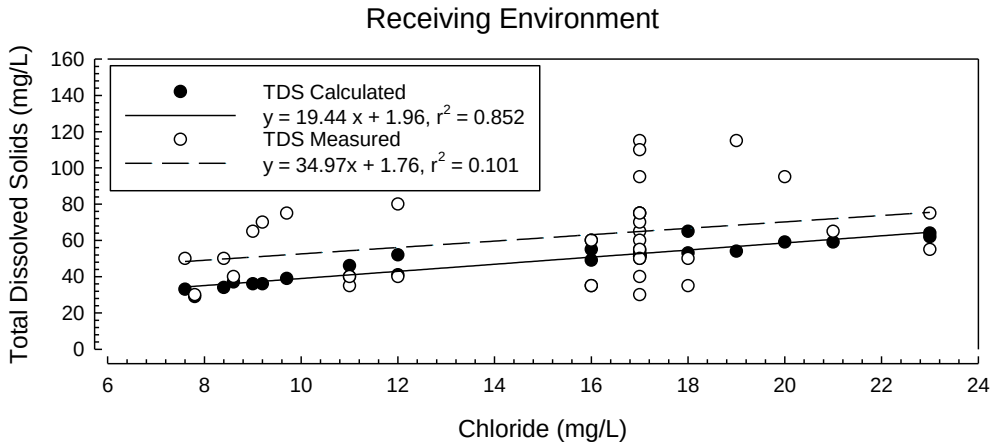
Measured TDS is a specific analysis provided by analytical laboratories, and therefore, like each of the analyses undertaken to measure the concentration of ions in a water sample, is also a certified or accredited analysis. The basis for this analysis is the evaporation of a known volume of filtered water sample at a specified temperature and measuring the dried residue, which constitutes the TDS. This method is subject to laboratory interferences that can reduce the accuracy of this measurement, especially in waters that have low TDS. For example, waters with proportionately high calcium, magnesium, and chloride concentrations, such as those associated with Meliadine Mine, can form a hygroscopic (i.e., absorbs ambient water) residue that will continue to absorb water under normal laboratory conditions, thereby biasing the measurement higher than actual (APHA 2005; Evaristo-Cordero pers. comm. 2011).

Figure 3-1 show summary data that supports Agnico Eagle's position. The box and whisker plot shows a more consistent relationship between chloride with calculated TDS concentrations compared to

measured TDS concentrations in discharge from CP1 and Meliadine Lake (i.e., the edge of mixing zone, mid-field, and reference locations; the receiving environment) from data collected during the Emergency Amendment to Meliadine Lake (June to August 2020).

Figure 3-1 Relationship between chloride and calculated TDS, and chloride and measured TDS, in discharge from CP1 (End of Pipe) and in Meliadine Lake (Receiving Environment) during the 2020 discharge period.





Notes:

End of Pipe – n = 14 for TDS Calculated data, and n = 16 for TDS Measured and Chloride data

Receiving Environment – n = 35 for TDS Calculated data, TDS Measured, and Chloride data

Using calculated TDS concentrations means that changes in the amount of TDS in waters associated with Meliadine Mine will be detected with more certainty than if measured TDS concentrations are used. Therefore, the use of calculated TDS concentrations is expected to provide more consistent and reliable results when tracking temporal and spatial trends and assessing conformity to thresholds.

From the perspective of other northern mining operations, calculated TDS is used rather than measured TDS for the Snap Lake AEMP consistent with recommendations in the Water Licence (MVLWB 2012). Rationale for the application of calculated TDS in the Snap Lake AEMP is provided in Golder (2013).

References:

APHA (American Public Health Association). 2005. Standard Methods for the Examination of Water and Wastewater, 21st Edition. Washington, DC, USA.

APHA. 2012. Standard Methods for the Examination of Water and Wastewater, 22nd Edition, with updates to 2015. Washington, DC, USA.

Evaristo-Cordero, C. 2011. Senior Account Manager. ALS Laboratory Group, Edmonton, AB, Canada. Email to Tasha Hall (Golder Associates Ltd). September 30, 2011.

Golder (Golder Associates Ltd.). 2013. Snap Lake Mine Aquatic Effects Monitoring Program – 2012 Annual Report. May 2013.

MVLWB. 2012. Mackenzie Valley Land and Water Board Water Licence # MV2011L2-0004. Yellowknife, NWT, Canada.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-4**
Re:	**Chronic toxicity monitoring results**		

Recommendation Made by Interested Party:
Please clarify that samples collected for chronic toxicity testing at the edge of the mixing zone were done so at the depth with the highest conductivity and identify that depth with reference to concurrently collected water column profiles.

Agnico Eagle's Response to Recommendation:
As stated in the WQ-MOP (Versions 2 and 3), samples for water quality and chronic toxicity testing at the edge of mixing zone stations are to be collected at the depth within the water column at these stations with the highest specific conductivity measurements. Agnico Eagle can confirm that this protocol was followed on each of the sampling occasions (see below, Table 4-1). It is noted, however, that if the highest specific conductivity was measured at the bottom depth of the water column, the sample was collected at the preceding depth (i.e., 1 m above the bottom measurement). This reduced the potential for the water sample to be influenced by lakebed disturbance resulting from the water column measurements and/or use of the water sample collection device in collecting water from that bottom depth.

Table 4-1 Water column specific conductivity measurements (µS/cm) at the edge-of-mixing zone stations, with the water sampling location highlighted in yellow

Water Column Depth (m)		Edge of Mixing Zone Stations											
		13-01				13-07				13-10			
	Jun	Jul	Aug	Sep	Jun	Jul	Aug	Sep	Jun[2]	Jul	Aug	Sep
0.2	-[2]	99.8	-	129.9	-[2]	115.8	-	123.5	-	91.1	-	128.5
0.5	-[2]	99.8	112.8	129.7	-[2]	118.3	114.5	123.1	-	103.4	109.8	126.1
1	18.5	99.8	112.4	129.6	22.8	117.1	114.7	129.3	-	108.8	109.6	128.2
2	111.2	106.3	111.0	129.8	125.0	119.1	114.4	126.1	-	108.2	109.5	135.0
3	127.8	105.3	110.4	130.0	127.4	118.7	114.3	132.3	-	110.8	109.4	136.8
4	129.2	108.4	109.6	129.2	149.8	120.1	114.4	130.2	-	110.4	109.4	137.7
5	133.9	118.6	109.5	133.1	166.5	119.9	114.6	135.0	-	110.3	109.4	137.8
6	173.0	119.4	109.5	139.6	194.8	120.3	114.6	168.0	-	110.8	109.4	139.2
7	179.4	121.0	110.1	148.6	202.9	126.1	114.6	183.0	-	111.1	109.4	145.0
8	186.3	120.6	110.6	161.9	-	125.9	114.5	-	-	111.2	109.6	153.7
9	193.3	120.4	-	-	-	-	-	-	-	106.4	110.5	164.5
10	-	-	-	-	-	-	-	-	-	124.5	128.2	-

[1] – Samples not able to be collected at 13-10 due to unsafe conditions at the time of sampling

[2] – Surface samples (to 1 m) not collected due to ice-cover conditions

- = No Specific conductivity measurements collected at this depth

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-5**
Re:	**Consideration of IQ in closure objectives**		

Recommendation Made by Interested Party:
Please clarify how IQ has been incorporated into the closure objectives and criteria for all project areas with a particular focus on new project components currently under review by both the NWB and the NIRB.

Agnico Eagle's Response to Recommendation:
At this stage of the Meliadine Mine operation and approval process for the current Water Licence Amendment, an ICRP is required for the NWB and the NIRB. As outlined in Section 2.4 of the ICRP, Agnico Eagle will continue engagement throughout the mine life and closure phase. IQ solicited throughout these phases, as well as ongoing monitoring programs, will inform final closure and will be provided in the Final Closure and Reclamation Plan. Agnico Eagle is committed to continued consultation during operations to support closure objectives and goals.

Interested Party:	KivIA	Rec No.:	KIA-WL-IR-6
Re:	Evaluation of impacts to Meliadine Lake water levels from alternative water management approaches		

Recommendation Made by Interested Party:
Please clarify whether Appendix H characterizes the diversion of all water in CP1 to Melvin Bay. If it does not, please update the evaluation of water levels in Meliadine Lake to account for that scenario.

Agnico Eagle's Response to Recommendation:
Agnico Eagle confirms that the diversion considered in the assessment was based on the surface runoff diverted away from Meliadine Lake and not on the projected contact water volumes from CP1.

The baseline water levels of Meliadine Lake are primarily influenced by surface runoff. The contact water volumes at CP1 comprise both surface runoff and contact water inflows from the pits. The pit contact water inflows is expected to be small relative to the surface runoff component. Thus, the assessment considered the diversion of surface runoff only. As stated in the assessment, the diverted area was assumed to include the entire A and B sub-watershed areas (i.e., 32 km^2), while the actual diverted area is expected to be smaller (i.e., 4.8 km^2). This results in a conservative assessment of the potential impacts of the diversion on the baseline water levels of Meliadine Lake, as concluded.

Under baseline conditions, water levels in Meliadine Lake vary by approximately 30 cm under average conditions during the open water season. The impacts of the diversion are not expected to be measurable (i.e., a decrease of 1 cm during the open water season is expected compared to baseline conditions). .

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-7**
Re:	**Design capacity for CP1 and D-CP1**		

Recommendation Made by Interested Party:
Please provide:

- *a rationale to support the use of a 1:100 wet year spring freshet, or a 1:2 mean year spring freshet in combination with a 1:1000 return 24-hour extreme rainfall design criteria,*
- *an analysis of the resilience of current water management infrastructure using 2019 precipitation data preceded by a 1:100 year freshet to demonstrate Agnico Eagle's capacity to ensure CP1 and D-CP1 will not be at risk under similar circumstances, and*
- *discuss the feasibility of upgrading the capacity of D-CP1 and CP1 to increase infrastructure resilience to extreme wet years.*

Agnico Eagle's Response to Recommendation:
Agnico Eagle consider that the KIA-WL-IR-7 should be consider as a technical comment, however, at this time we have provided additional information below..

First, Agnico Eagle would like to clarify that storage should not being considered as a viable alternative for the management of surface contact water. This would not resolve the water management challenges related to elevated TDS concentration in CP1 and storing more water in CP1 could lead to degradation of permafrost in the CP1 vicinity and additional risks to manage.

Secondly, Agnico Eagle would like to inform KivIA that the rationale behind the use of a 1:100 wet year spring freshet, or a 1:2 mean year spring freshet in combination with a 1:1000 return 24-hr extreme rainfall design criteria for Dike D-CP1 is outlined in the approved design report for the facility (Tetra Tech EBA, 2016).

Section 4.2 (Dike Classification and Consequence of Failure) of Tetra Tech EBA, 2016 states:

"*CDA (2007) provides recommendations and directions for dam/dike classification based on the consequences of failure. The consequences of dam/dike failure are evaluated in terms of loss of life, environmental and cultural values, and infrastructure and economics. The dike classification for D-CP1 is determined to be "Significant" due to the following consequences of failure:*

- *Loss of Life: None or unspecified due to no permanent resident downstream of D-CP1;*
- *Economic/Social Losses: This dike only; no temporary or permanent infrastructures downstream of D-CP1; and*
- *Environmental/Cultural Losses: Potential of temporary deterioration of fish habitat in Lake H1 and a small portion of Meliadine Lake due to release of a moderate volume of contact water collected in the CP1 pond."*

Section 4.3 (Inflow Design Flood and Earthquake Levels) further explains:

"Extreme wet year spring freshet from snow-melt or high-intensity short-term rainfall events are normally critical to the design of a dike with a limited short-term discharge capability, which is the case for D-CP1. The resulting water level rise in the pond from a short-term flood event tends to be greater than that under a longer precipitation event. The longer event allows time for excess water to be pumped to a water treatment plant from where the water is treated and discharged.

The inflow design flood (IDF) for a given classification is suggested in CDA (2007). Based on a classification of "Significant", the annual exceedance probability (AEP) of between 1/100 and 1/1,000 is recommended in CDA (2007). For the design of D-CP1, it has been assumed that no water would flow or be pumped out from the CP1 pond during spring freshet or during an extreme rainfall event. The IDF adopted for D-CP1 meets the most critical of the following cases:

- *Spring freshet for a 1 in 100 return wet year;*
- *Spring freshet for a mean (1 in 2 return) year plus a 1 in 1,000 return 24-hour extreme rainfall event;*
- *Maximum monthly total rainfall for a mean (1 in 2 return) year plus a 1 in 1,000 return 24-hour extreme rainfall event; or*
- *Maximum monthly total rainfall for a 1 in 100 return wet year."*

The Meliadine Independent Review Board (MIRB) made no specific comment regarding the CDA classification or IDF evaluation of D-CP1 during their first annual review in 2019, although they did concur with the overall design approach of the structure.

The primary seepage control measure for D-CP1 (what stops water from flowing through the dike) is a geomembrane liner system that is keyed in under the original ground to the bedrock and/or competent permafrost (key trench). The remainder of the dike consists of various rockfill and esker materials, none of which are impermeable (water can penetrate this material) when unfrozen. This material protects the liner system and keeps the foundation of the dike and the ground underneath below a temperature of zero Celsius.

Therefore, the only way for the dike to hold more water is to increase the top elevation of the liner. This is not possible without considerable risk of damaging the existing liner system, downstream seepage control structures and critical instrumentation. In addition, raising the liner elevation would increase the risks to the dike by increasing the possibility of thawing the ground underneath. If the foundation of the dike unfreezes, the liner could settle and possibly break, which could result in a failure and permanent damage to the dike.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-8**
Re:	**Groundwater inflows and storage capacity**		

Recommendation Made by Interested Party:
Please clarify how the predicted groundwater inflow values have compared to actual inflows and provide a discussion as to the conservativeness of the predicted daily inflow values.

Please summarize the saline groundwater storage capacity for each year of the mine life and compare these values to the predicted annual inflow. Note that these comparisons should be made both without access to the waterline (i.e. the short- and medium-term management strategies) and with access to the waterline (i.e. the long-term management strategy).

Agnico Eagle's Response to Recommendation:
Agnico Eagle refers KivIA to the Saline Effluent Discharge to the Marine Environment Application currently under NIRB's review for additional information related to the alternative of diverting CP1 water into the Waterline. Saline water management is not part of this application and details would be provided on this option if the Waterline is deemed approved by NIRB.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-9**
Re:	**Viability of medium-term strategy to manage saline groundwater**		

Recommendation Made by Interested Party:
Please clarify Agnico Eagle's capacity to implement the medium-term strategy to manage saline groundwater without exceeding the current discharge limit to Melvin Bay of 1,600 m3/day. Please outline contingencies to manage saline groundwater in the medium term until the waterline has been permitted and brought online (i.e. 2022 at the earliest) with a particular focus on saline groundwater management in 2021.

Agnico Eagle's Response to Recommendation:
Agnico Eagle refers KivIA to the Saline Effluent Discharge to the Marine Environment Application currently under NIRB's review for additional information related to the alternative of diverting CP1 water into the Waterline. Saline water management is not part of this application and details would be provided on this option if the Waterline is deemed approved by NIRB.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-10**
Re:	**Future freshwater management**		

Recommendation Made by Interested Party:
Please clarify how freshet will be effectively managed and the integrity of CP1 and D-CP1 preserved once the P-area has been decommissioned (i.e. Freshet 2021).

Agnico Eagle's Response to Recommendation:
The storage capacity of CP1 and design of D-CP1 incorporate the catchment area of the entire site, including that of the P-Area. Therefore, decommissioning of the P-Area will not change the volume of water reporting to CP1 as runoff from the P-Area watershed will still report to CP1.

Agnico Eagle will update the Freshet Management Plan prior to the 2021 freshet to reflect the decommissioning of the P-Area.

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-11**
Re:	**Berms are constructed with entirely till core**		

Recommendation Made by Interested Party:
The KIA requests that the proponent provide the technical details of installing an impervious liner system in Bern CP-2 to help ensure that contact water from WRSF 3 does not enter Meliadine Lake.

Agnico Eagle's Response to Recommendation:
Agnico Eagle consider that the KIA-WL-IR-11 should be consider as a technical comment, however information highlighted below is being provided to KivIA.

Agnico Eagle would like to explain that although the detailed design of Pond CP2 and Berm CP2 has not yet been started, it is expected that these structures will function in an identical manner as to the three (3) other approved Collection Pond/Thermal Berm facilities on site: Pond/Berm CP3, Pond/Berm CP4 and Pond/Berm CP6. Contact water from the associated waste facilities flows to the collection pond (TSF to CP3, WRSF1 to CP4 and WRSF3 to CP6). Each collection pond is designed for short-term water storage only, with a capacity for 3/7 of a 1:100 wet precipitation year freshet with designed pumping capacities to support the maximum operating levels. Minimal water is stored in the CPs after the spring freshet is pumped to CP1, with water levels kept below the low point of bedrock, so that each CP retains the capacity for an extreme rainfall event.

The thermal berms associated with collection ponds CP3, CP4 and CP6 were not designed to impound water. Each thermal berm was designed to aggrade or preserve the permafrost in the original ground below the center of each berm to a top permafrost elevation of at least 2.0 m higher than the maximum operating water elevation in the collection pond. Therefore, it is the preservation or aggradation of the permafrost underlying each berm that reduces the potential seepage, not the physical material of the berm. The monitoring of thermistors installed in each thermal berm provide assurance that the design intent of the structures is being fulfilled.

As CP3, CP4 and CP6 have all shown to be successful approaches to the management of site contact water from our waste facilities, Agnico Eagle and the designer feel comfortable advancing the same design approach for CP2 at this stage of the process. However, a detailed geotechnical investigation will be conducted prior to detailed design and adjustments to the design philosophy, such as the addition of a liner system, may be made after analysis of the results.

Please refer to the approved "Design Report for CP3, CP4, CP Berms, Berm2, Channel3 and Channel4, Meliadine Project, Nunavut" (Tetra Tech, 2018) and "Design Report for CP6 and CP6 Berm, Meliadine Project, Nunavut" for further details regarding the approved design basis of these structures.

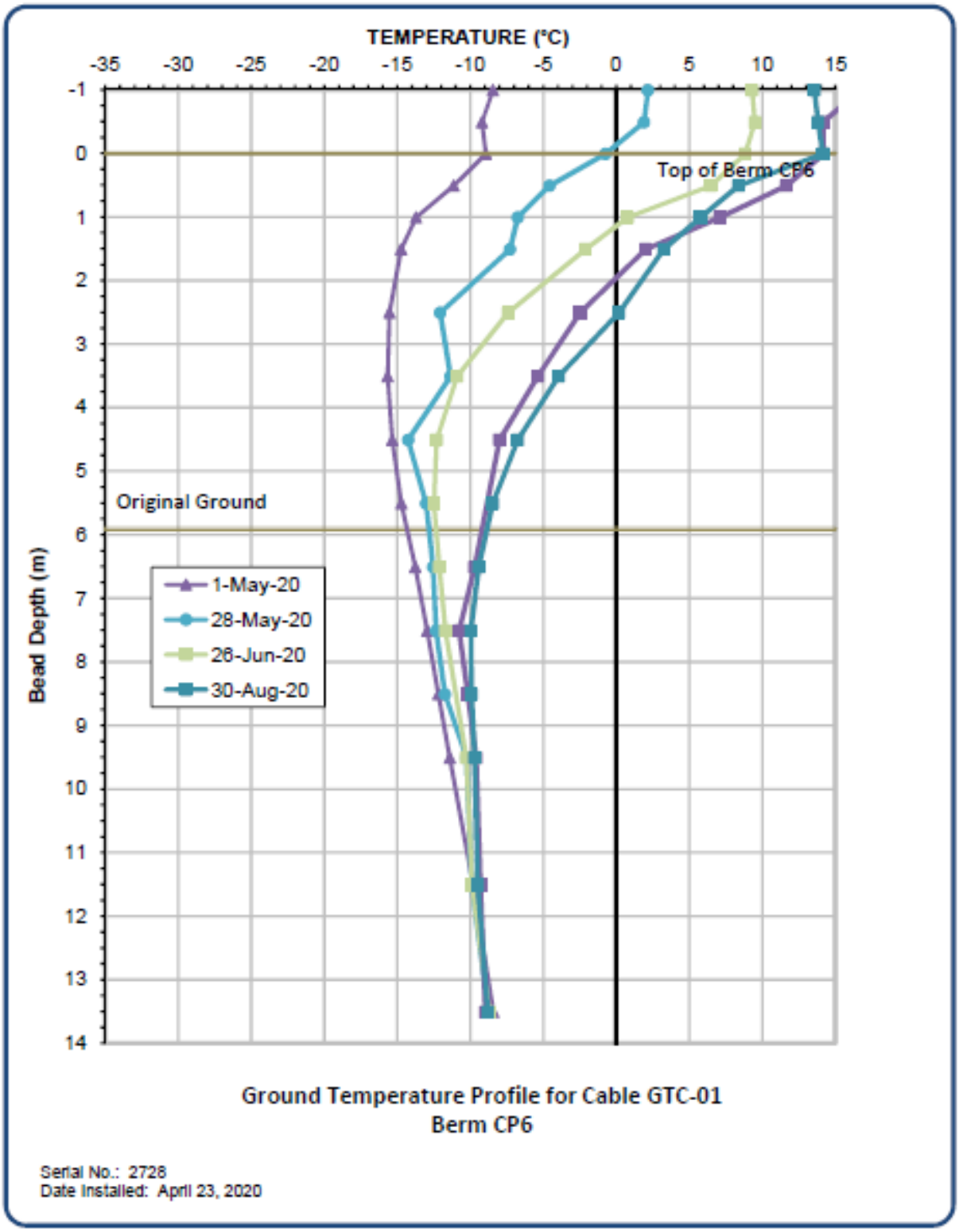
Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-12**
Re:	**Thermal monitoring**		

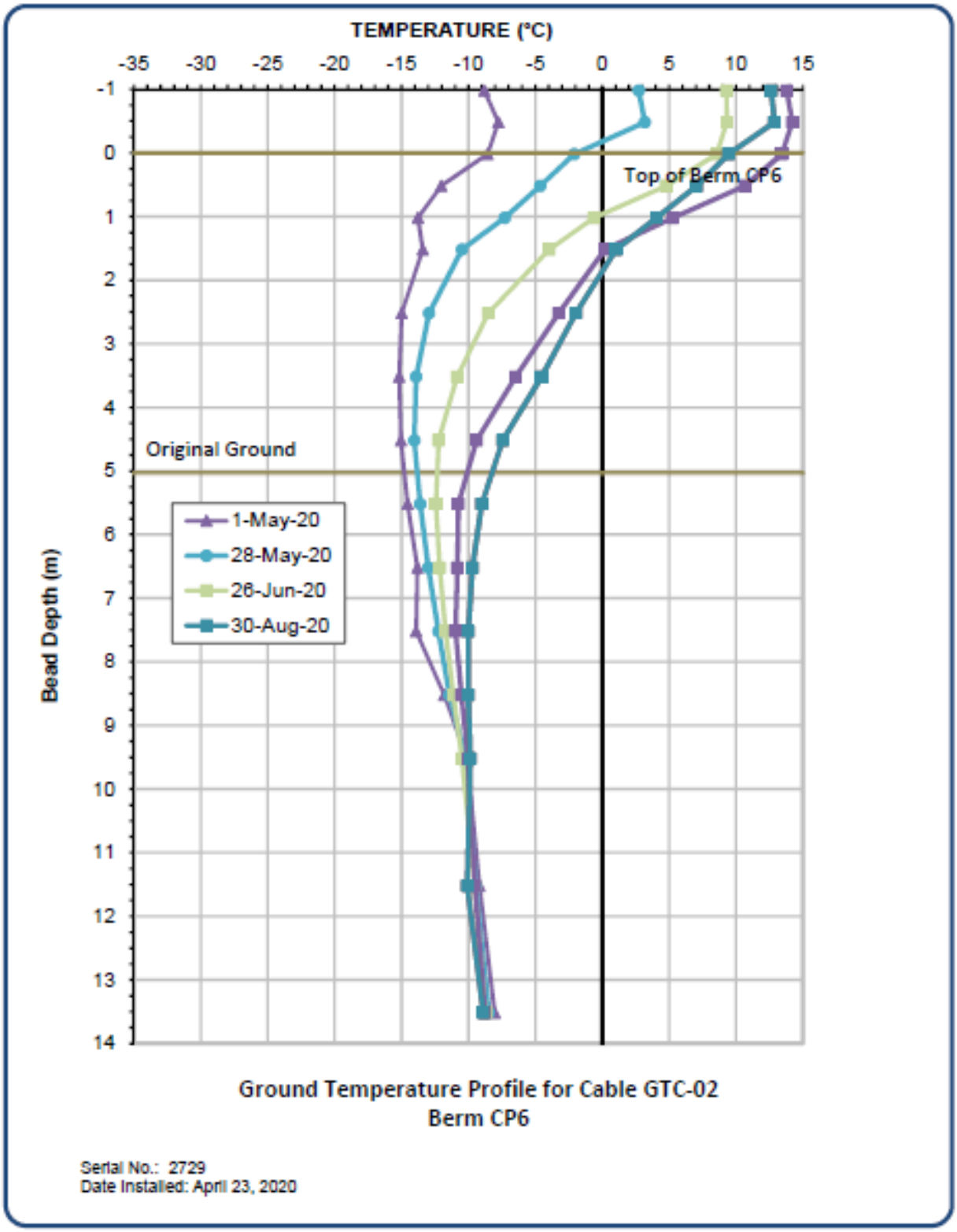
Recommendation Made by Interested Party:
The KIA requests that the proponent provide the current thermal data available for the area downslope of WRSF 3, Berm CP-2 and Berm CP-6 to the edge of Meliadine Lake.

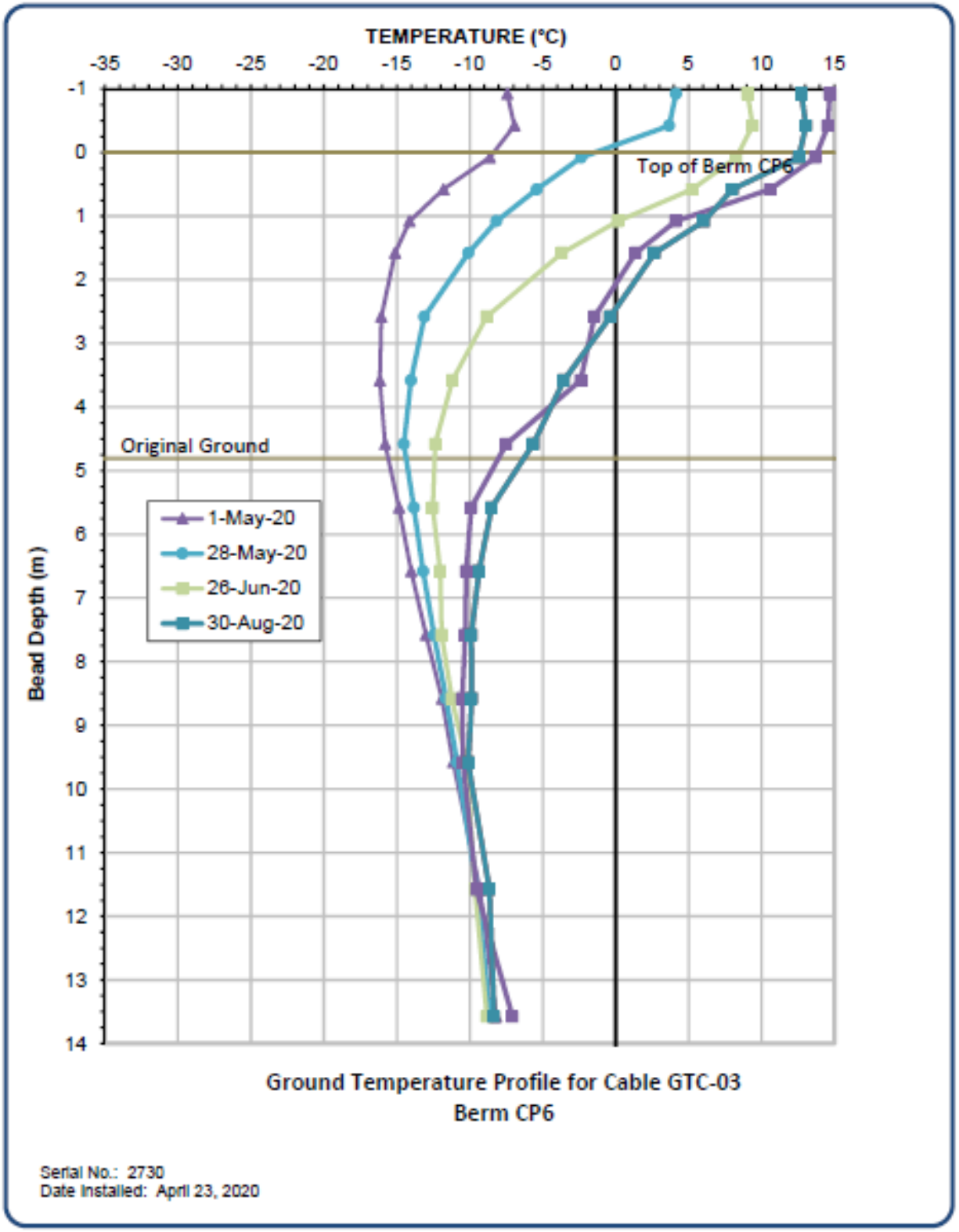
Agnico Eagle's Response to Recommendation:
Agnico Eagle would like to clarify that talik conditions surrounding Lake B7, as well as under former Lakes H19 and H20 were suspected preceding the detailed design of CP3, CP4 and CP6. As such, single bead thermistors were installed during the geotechnical drilling campaigns in order to guide their detailed design.

A similar approach is planned prior to the detailed design of Pond/Berm CP2: a geotechnical investigation will classify overburden in the vicinity, determine depth to bedrock and thermistors will be installed to assess permafrost conditions.

The figures below present the thermistor data located in the downstream slope of Berm CP-6. It should be note the thermistors haven't been in place for a full year, however to date the berm appears to be fulfilling its function and the underlying ground has remained frozen.


TEMPERATURE (°C)
-35 -30 -25 -20 -15 -10 -5 0 5 10 15
-1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Bead Depth (m)
Top of Berm CP6
Original Ground
1-May-20
28-May-20
26-Jun-20
30-Aug-20
Ground Temperature Profile for Cable GTC-01
Berm CP6
Serial No.: 2728
Date Installed: April 23, 2020


TEMPERATURE (°C)
-35 -30 -25 -20 -15 -10 -5 0 5 10 15
-1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Bead Depth (m)
Top of Berm CP6
Original Ground
1-May-20
28-May-20
26-Jun-20
30-Aug-20
Ground Temperature Profile for Cable GTC-02
Berm CP6
Serial No.: 2729
Date Installed: April 23, 2020


TEMPERATURE (°C)
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-30
-25
-20
-15
-10
-5
0
5
10
15
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Top of Berm CP6
Original Ground
1-May-20
28-May-20
26-Jun-20
30-Aug-20
Bead Depth (m)
Ground Temperature Profile for Cable GTC-03
Berm CP6
Serial No.: 2730
Date Installed: April 23, 2020

Interested Party:	**KivIA**	**Rec No.:**	**KIA-WL-IR-13**
Re:	**Lessons learned from other Projects**		

Recommendation Made by Interested Party:
The KIA requests that a more in-depth "Lessons Learned" of permafrost development in WRSF, the water retention dikes and berms that collect the WRSF contact water be made available. In addition, the proponent should show how these "lessons Learned" have been used to better inform the design, construction and monitoring of the WRSF 3, Berm CP-2 and Berm CP-6.

Agnico Eagle's Response to Recommendation:
Agnico Eagle has been actively committed to Mine Dike Review Boards, geotechnical inspections, 3rd party reviews, adaptive management and research for the design, construction and monitoring of all waste and water infrastructures. Detailed design of all water and waste management infrastructure at Meliadine has been completed by Tetra Tech and utilizes the company's more than 50 years of permafrost engineering experience.

Agnico Eagle will consider KIA's recommendation in the final design of WRSF3 and Berm CP-2. It should be noted that the design of Pond/Berm CP-6 was approved by the NWB in March 2020 and the as-built report was submitted September 2020.

NUNAVUT WATER BOARD (NWB)

Interested Party:	**NWB**	**Rec No.:**	**NWB-WL-IR-1**
Re:	**Operational State of all Treatment Plants on Site**		

Recommendation Made by Interested Party:

Please provide a short summary discussing the operational state of all treatment plants on site: EWTP, SWTP, SETP, RO, STP. This summary can be presented in a form of a table and should specify whether the treatment plant is operational (and if not, when it is anticipated to be in operation), as well as include the information on the designed treatment capacity (Volumes, TDS/ TSS) vs. actual treatment capacity, along with a discussion on how any deficiencies identified to date are planned to be improved.

Agnico Eagle's Response to Recommendation:

The following table presents the status of water treatment plant on site.

Plant	EWTP	SWTP	SETP	RO	STP
Design Flow rate (m3/day)	Max 28 000 m^3/d [1]	120 m^3/day	Max 1600 m^3/day after upgrade	2000 m^3/day approximately[3]	216 m^3/Day upgraded to 299 m^3/day
Status	Operational	Non-operational[2]	Operational	Operational	Operational
Next action	Non-applicable	Planning the decommissioning of the plant[4]	Upgrade ongoing	Periodic membrane change	Upgrade ongoing
Inspection/follow-up during the operation	Several inspections by operator daily to follow up the process of all water-treatment plant. Operators are dedicated to these plants.				
Notes	[1] Maximum hydraulic design of clarification system [2] Root cause of low efficiency: • The technology isn't as efficient as expected in Arctic climates; • In wintertime, safety issues were brought forward due to generation of vapor; • The field TSS concentration negatively affects the system and increases the downtime period; • The sole filtration system mesh wasn't appropriate to contain salt efficiently; • The crusting phenomenon inside the SWTP was higher than expected and led to increased downtime period and intensive cleaning efforts. As short-term solutions, a microfilter was added to the bag filtration system, the packing was changed to Teflon, but the plant still experienced a major derating (range 0 to 82 m^3/day, average 39 m^3/day in steady state operation when it was supposed to operate at 120 m^3/day). [3] Depend on feed water TDS and recovery required (design between 1400 and 10 000 mg/L TDS) [4] The capacity of the SWTP is not a solution for long term saline water management				

Interested Party:	**NWB**	**Rec No.:**	**NWB-WL-IR-2**
Re:	**Water Balance on Site**		

Recommendation Made by Interested Party:

- *Provide some clarification on the EWTP to SP3 outflows;*
- *Provide clarification on the CP1 water to be reused in the process plant;*
- *Provide clarification whether the exploration camp sewage was accounted for in the model.*

Agnico Eagle's Response to Recommendation:

The outflow from the EWTP to the Saline Pond 3 (SP3) over the months of June – September indicated in the water balance information provided in the document entitled Meliadine Site Water Balance and Water Quality Model is intended to be a contingency for water management on site regardless of TDS concentrations in CP1.

The recirculated flow from CP1 to the process plant was not included in the model. This is considered to be conservative from a water management perspective.

The volumes coming from the STP include only the sewage coming from the Main Camp.

Interested Party:	**NWB**	**Rec No.:**	**NWB-WL-IR-3**
Re:	**Saline Water Management**		

Recommendation Made by Interested Party:

- *List all long-term strategies that were considered in response to the increased groundwater inflow rates;*
- *Comment on the integrity of the infrastructure due to delays in the waterline approval;*
- *Provide more information regarding the possibility to stop mining at the Tiriganiaq Pit 2 in order to accommodate the excess saline water.*

Agnico Eagle's Response to Recommendation:

Agnico Eagle refers NWB to the Meliadine Project Annual Report response due on October 9 as this information request is similar to the annual report NWB recommendation #4 and saline water management is not part of this application. Agnico Eagle commits to comment on the integrity of the infrastructure due to delays in the waterline approval as per Annual Report response.