Agnico Eagle Mines Limited – Meadowbank Division

Whale Tail Pit Management Plans
AEM RESPONSES TO ECCC & CIRNAC Reply
Waste Rock Management Plan, Water Management Plan, Water Quality and Flow Monitoring Plan

November 23 2018

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ENVIRONMENT AND CLIMATE CHANGE CANADA (ECCC)

Water Quality and Flow Monitoring Plan

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#1**
Re:	**Monitoring Parameters**		

Agnico Eagle's Response to Recommendation:
This revision of the Water Quality and Flow Monitoring Plan was completed to align with recently issued Water Licence 2AM-WTP1826 requirements. Field pH and field temperature are not part of Water Licence 2AM-WTP1826 requirements.

ECCC Response:
Environmental pH and temperature cannot be stabilized in a water quality sample, therefore monitoring the field conditions is necessary to obtain accurate data for these parameters. Accurate pH measurements are important to the overall monitoring program. As pH determines the solubility and biological availability of various water quality parameters (e.g., nutrients and heavy metals), pH data is required in determining the form and toxicity of such parameters. Accurate temperature measurements are necessary for determinations of parameters such as pH, electrical conductivity, and dissolved oxygen, and for the determination of chemical reaction rates and equilibria as well as biological activity.

ECCC recommends as best practice the inclusion of field pH and field temperature in the monitoring program. Inclusion of these parameters is necessary to support the interpretation of monitoring data for various water quality parameters.

Agnico Eagle's Response to Recommendation:
Agnico Eagle agrees with this recommendation and will include field pH and field temperature in the next revision of this management plan.

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#2**
Re:	**Total Suspended Solids/turbidity regression curve**		

Agnico Eagle's Response to Recommendation:

The TSS-turbidity relationship was developed using paired data collected across a range of TSS sources and concentrations. Agnico Eagle is confident that the TSS-turbidity relationship developed will be adequate.

ECCC Response:

Due to the site-specific nature of the relationship between Total Suspended Solids (TSS) and turbidity, it is standard practice to use site-specific data to establish the TSS-turbidity relationship. In lieu of establishing a Whale Tail specific TSS-turbidity relationship, it appears that the Meadowbank relationship will be applied directly to the Whale Tail Project.

ECCC recommends conducting periodic validation of the TSS-turbidity relationship through lab analysis of TSS and turbidity values in order to assess/monitor the validity of the approach proposed by Agnico Eagle.

Agnico Eagle's Response to Recommendation:

Agnico Eagle acknowledges ECCC's response and will validate the TSS-turbidity relationship developed for Meadowbank. The revised relationship for Whale Tail will be provided in the next revision of the *Water Quality Monitoring and Management Plan for Dike Construction and Dewatering*.

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#3**
Re:	**Group 1 Parameters**		

Agnico Eagle's Response to Recommendation:

This revision of the Water Quality and Flow Monitoring Plan was completed to align with Water Licence 2AM-WTP1826 requirements. Agnico Eagle agrees with ECCC's comments, but Group 1 is listed as per Water Licence 2AM-WTP1826.

ECCC Response:

ECCC is satisfied with this response and has no further comments. ECCC recommends that the NWB consider revising the listing of Group 1 parameters.

Agnico Eagle's Response to Recommendation:

No response required from Agnico Eagle.

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#4**
Re:	**Attenuation pond post-treatment characterization**		

Agnico Eagle's Response to Recommendation:

This revision of the Water Quality and Flow Monitoring Plan was completed to align with recently issued Water Licence 2AM-WTP1826 requirements. The monitoring requirements for station "Attenuation pond post-treatment characterization" are parameters from Group 1.

ECCC Response:

The Group 1 parameters are insufficient to appropriately characterize water quality in the attenuation pond. The list should be expanded to Group 2 parameters, which are more comprehensive and more appropriate for monitoring contact water constituents.

ECCC recommends that the NWB consider revising the requirement to Group 2 for the water quality sampling station ST-WT-02.

Agnico Eagle's Response to Recommendation:

No response required from Agnico Eagle.

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#5**
Re:	**Attenuation pond post-treatment monitoring**		

Agnico Eagle's Response to Recommendation:
This revision of the Water Quality and Flow Monitoring Plan was completed to align with recently issued Water Licence 2AM-WTP1826 requirements. BOD5 and bacteriological parameters are not listed as monitoring requirements for either the sewage treatment plant or the attenuation pond prior to release to Mammoth Lake.

ECCC Response:
Monitoring for BOD5 and bacteriological parameters is an important component in assessing the effectiveness of wastewater treatment.

ECCC recommends that the NWB consider revising the monitoring requirements to include BOD5 and bacteriological analyses.

Agnico Eagle's Response to Recommendation:
No response required from Agnico Eagle.

Water Management Plan

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#1**
Re:	**Water Management During Closure**		

Agnico Eagle's Response to Recommendation:

Agnico Eagle does not agree with ECCC's recommendation. Agnico Eagle will monitor untreated contact water during the Closure phase to provide confidence in the consistency of discharge and seepage quality as per Water Licence monitoring requirements. These will be established prior to the Closure phase in collaboration with ECCC and the Nunavut Water Board (NWB).

ECCC Response:

The quality of the seepage/contact water may vary on a seasonal or precipitation-related basis. To ensure compliance with the Water Licence, as well as the pollution prevention provisions of the Fisheries Act, the quality of such waters entering surface waters will need to be demonstrated to be consistently acceptable prior to terminating treatment in the Closure phase.

ECCC notes that Agnico Eagle has committed to monitor seepage/contact water and treat until the quality of untreated contact water is acceptable for release into surface waters. It is unclear why Agnico Eagle does not agree with ECCC's recommendation as the response provided above by Agnico Eagle is consistent with ECCC's recommendation.

Agnico Eagle's Response to Recommendation:

Agnico Eagle agrees to our initial response to ECCC's recommendation. For clarity, the primary difference is that this will be established prior to the Closure phase in collaboration with ECCC and NWB and not at this stage of the Project.

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#2**
Re:	**Sludge Management**		

Agnico Eagle's Response to Recommendation:

For clarification, Agnico Eagle agreed to dispose of sludge in the Whale Tail WRSF during the Whale Tail Pit final hearings and have updated the Water Management Plan to reflect this commitment. However, Agnico Eagle would like to clarify the Water Treatment Plant described in the previous version of the Water Management Plan is the Construction Water Treatment Plant (CWTP). The CWTP is only used to treat total suspended solids generated during the Construction Phase. The text in the Water Management Plan will be modified to:

> *Sludge water from the Operation Water Treatment Plant (OWTP) will be dewatered with a centrifuge to produce a cake having a density with 20% of solid content. This cake will be stored in the Whale Tail WRSF. The maximum predicted annual volume of cake from the OWTP is approximately 5,760 cubic metres (m3). The OWTP, is designed to treat total suspended solids and arsenic during the Operations Phase.*

ECCC Response:

ECCC is satisfied with this response and has no further comments at this time.

Agnico Eagle's Response to Recommendation:

No response required from Agnico Eagle.

Waste Rock Management Plan

Interested Party:	**Environment and Climate Change Canada (ECCC)**	**Rec No.:**	**ECCC#1**
Re:	**Water Management During Closure**		

Agnico Eagle's Response to Recommendation:

Agnico Eagle does not agree with ECCC's recommendation. Agnico Eagle will monitor untreated contact water during the Closure phase to provide confidence in the consistency of discharge and seepage quality as per Water Licence monitoring requirements. These will be established prior to the Closure phase in collaboration with ECCC and the Nunavut Water Board (NWB).

ECCC Response:

The quality of the seepage/contact water may vary on a seasonal or precipitation-related basis. To ensure compliance with the Water Licence, as well as the pollution prevention provisions of the Fisheries Act, the quality of such waters entering surface waters will need to be demonstrated to be consistently acceptable prior to terminating treatment in the Closure phase.

ECCC notes that Agnico Eagle has committed to monitor seepage/contact water and treat until the quality of untreated contact water is acceptable for release into surface waters. It is unclear why Agnico Eagle does not agree with ECCC's recommendation as the response provided above by Agnico Eagle is consistent with ECCC's recommendation.

Agnico Eagle's Response to Recommendation:

Agnico Eagle agrees to our initial response to ECCC's recommendation. For clarity, the primary difference is that this will be established prior to the Closure phase in collaboration with ECCC and NWB and not at this stage of the Project.

Interested Party:	Environment and Climate Change Canada (ECCC)	Rec No.:	ECCC#2
Re:	Closure and Post-Closure		

Agnico Eagle's Response to Recommendation:

Agnico Eagle does not agree with ECCC's recommendation. For the Whale Tail Pit Project, selected RCPs have been grouped into two unique scenarios (Golder 2018):
Scenario 1: ensemble of all RCP 4.5 and RCP 8.5 model runs considered representative of a RCP 6.0 scenario.
Scenario 2: ensemble of all RCP 4.5 model runs.

This modelling approach was evaluated and approved as part of the NIRB Project Certificate and NWB Water License process.

RCP 4.5 is representative of intermediate emissions levels with greenhouse gas reduction and RCP 8.5 is representative of high emissions levels with no reduction in greenhouse gas emissions. The blend of RCP 4.5 and RCP 8.5 is considered representative of a future with intermediate to high emissions levels, where there have been some reductions in greenhouse gas emissions but not as ambitious as those required by RCP 4.5. The range of projections for Scenario 1 very likely covers the range of projections from RCP 6.0.

General circulation models have inherent limitations that are important to bear in mind when evaluating variability and the rate of climate change, (i.e., when comparing future projections to historical observations). These limitations are dependent on the research institution's approach to overcoming model uncertainty. Since no one model or climate scenario can be viewed as completely accurate, the Intergovernmental Panel on Climate Change (IPCC) recommends that climate change assessments use as many models and climate scenarios as possible. For this reason, the multi-model ensemble approach described above was used to account for these uncertainties and limitations.

The WRSF was designed to be physically and chemically stable under above-mentioned Scenario 1. Agnico Eagle will continue to monitor and validate these findings during Operations and Closure phase as per the Thermal Monitoring plan, Waste Rock Management Plan, ARD-ML Sampling and Testing Plan, Water Quality and Flow Monitoring Plan, and Water Management Plan.

Agnico Eagle will continue to use industry standard practices to evaluate the impacts of climate change on the WRSF in collaboration with ECCC and NWB.

ECCC Response:

ECCC is satisfied with Agnico Eagle's commitment to monitor and validate conditions, and to revisit evaluating the impacts of climate change on the WRSF. Depending on monitoring data and WRSF performance, a revised model scenario may be appropriate to run in the future.

Agnico Eagle's Response to Recommendation:

No response required from Agnico Eagle.

Interested Party:	Environment and Climate Change Canada (ECCC)	Rec No.:	ECCC#3
Re:	Onset of Acid Rock Drainage (ARD)/Metal Leaching (ML)		

Agnico Eagle's Response to Recommendation:

For clarification, the estimated field time equivalency of laboratory weathering tests is explained in the Final Environmental Impact Statement (FEIS) Appendix 5E Sections 2.2.4.2 and 3.5.1.1 as follows:

From Section 2.2.4.2
The 1-kg HCT is an accelerated weathering test meant to speed up the process of sulphide mineral oxidation to facilitate the measurement of weathering and its products on a shorter time scale than might occur in reality. This is achieved by forcing a rapid succession of alternating wet and dry cycles, and by actively flushing out the weathering products through the use of a high liquid to solid ratio (1:1 water to rock proportion by weight). The HCT test method (ASTM D 5744-07), is typically observed to be many times faster than rates inferred from field observations of drainage from the toe of waste rock piles (e.g., Malstrom et al., 2000).

In practice, many factors will influence weathering characteristics of the exposed mined materials and the rate of chemical release at site. Of importance are site climate on mineral reaction rates, availability of liquid water to transport weathering products, and pile hydrology (wetting and flow of water in pile pore spaces) which in turn also affects the water-to-solid contact and the rate of chemical reactions.

The Whale Tail and IVR waste rock will be piled and will be exposed to far less precipitation than both HCT and leaching columns. The average annual rainfall is 145 mm over 4 frost-free months (average of 36 mm/month), while each of the HCTs receive the equivalent of 127mm/week (508 mm/month), and the leaching columns receive the equivalent of between 63 and 122 mm/week (254 and 488 mm/month). Each weekly cycle represents more flushing than one average summer month at site. Thus conservatively, one leaching cycle can be said to represent 1 month of leaching at site. Comparatively, a 10-fold weathering rate acceleration (estimated from findings in Malstrom et al., 2000) would equate to 1 weekly leach cycle representing 2.5 months of weathering in the field. In addition, as observed at Meadowbank, freezing conditions prevail for 8 months of the year in the surficial active thaw depth of the rock storage facility. The deeper portion of the pile remains frozen. The frozen winter conditions are not represented in laboratory leaching cycles. Laboratory tests simulate frost-free periods only (the four summer months).

Consequently, 4 leaching cycles can be considered to represent the four months of active water ingress into the waste rock pile, or one year at site, insofar as 4 months in the field constitutes the frost-free summer period where water can seep through the waste rock pile. By extension, a 20-cycle kinetic test would represent approximately 5 years at site.

From Section 3.5.1.1

Mineral depletion calculation results are in general agreement with the static ABA results indicating that the ultramafic, iron formation, mafic volcanic and intermediate intrusive lithologies will remain buffered with carbonate minerals, and largely outlast the time required for complete oxidation of sulphide minerals in these samples.

Conversely, the chert samples could acidify in the HCT in another year, and in 2 years in the leaching column. The PAG greywacke leaching column would be amenable to acidification in more than 4 years under laboratory conditions. This time frame for the laboratory leaching columns (1.5 to 5 years or 78 to 260 weeks) represents more than a decade in the field (Section 2.2.4.2). Furthermore, this period of time could be underestimated because it does not consider 1) the buffering capacity afforded by the other waste rock with which it will be mixed in the pile, 2) slower sulphide mineral oxidation kinetics at lower site temperatures (according to Arrhenius equation) and 3) the 8 months of freezing conditions and lower rock to liquid ratio in the field that slows the rate of buffering mineral dissolution (consumption).

In summary, the calculated delay to the onset of ARD in PAG samples is substantially longer than the 7 years of mine construction, operations and closure, with the possible exception of the upper tier high sulphur – low buffering capacity greywacke or chert rock.

ECCC Response:
ECCC is satisfied with Agnico Eagle's response and has no additional comments on Onset of Acid Rock Drainage (ARD)/Metal Leaching (ML) at this time.

Agnico Eagle's Response to Recommendation:
No response required from Agnico Eagle.

CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA (CIRNAC)

Interested Party:	**Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)**	**Rec No.:**	**CIRNAC#1**
Re:	**Justification for AEM not satisfying NIRB Project Certificate Term and Condition #15**		

Concern:

The NIRB Project Certificate Term and Condition #15 requires:

- *"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"*

The expectation of CIRNAC and parties as agreed to by AEM was that additional site specific hydraulic data to define the vertical and horizontal groundwater flows would be collected in the critical pre-development period during the summer 2018 field season. CIRNAC was informed on October 17, 2018 that AEM had not installed the new groundwater monitoring wells as required in the NIRB Project Certificate. Further, AEM indicated that the only pre-development water monitoring information would be from the Westbay multiport well. AEM indicated that the data collection was delayed and additional data is still to be collected in November 2018. Additionally, the Groundwater Monitoring Plan does not contain any reference to future sampling from any groundwater wells currently installed at the site.

CIRNAC is seeking explanation from AEM to justify their rationale for the alternative approach and for not complying with NIRB Project Certificate Term and Condition #15.

Agnico Eagle's Response to Recommendation:

Agnico Eagle is of the view that it is in compliance with NIRB Project Certificate Term and Condition #15:

> *"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.*

With respect to the first bullet, while installation of new wells is given as an example as to how Agnico Eagle may undertake "*collection of additional site-specific hydraulic data"*, it is not presented as the only option to fulfill this requirement. What follows provides a detailed summary of Agnico Eagle's efforts to collect additional site-specific hydraulic data since the Project Certificate was issued and how it plans to continue to do so during the project phases.

Agnico Eagle completed the Whale Tail Post-Closure Pit Lake Thermal Assessment and updated the hydrogeological assessment and modelling. The results of these studies were presented to CIRNAC in July 2018 and confirmed the insignificant horizontal groundwater flows observed at the Whale Tail Site.

As per the October 2018 meeting, Agnico Eagle committed to the collection of additional hydraulic data from the Westbay multiport well but not to the installation of additional wells.

Vertical flow gradients are effectively evaluated with the Westbay well system installed at the Site, which allows the measurement of hydraulic head below Whale Tail Lake at multiple depth intervals in the unfrozen bedrock. Sampling of the groundwater and measurement of the vertical gradient was completed in November 2018 and will be included in the annual report.

Horizontal flow gradients within the talik underlying Whale Tail Lake are negligible, and groundwater flow is controlled by vertical movement of flow from the lake to the sub-permafrost groundwater flow system. Horizontal flow is negligible because very low permeability permafrost underlies the land surrounding the lake, which prevents the lateral flow of groundwater to the talik. Recharge to the talik is from the overlying lake and not from precipitation on the surrounding land, which is underlain by very low permeability permafrost. Installation of additional wells below Whale Tail Lake to quantify a horizontal flow gradient that is expected to be negligible would not be relevant. The measurements would be dominated by vertical gradients and if an apparent horizontal gradients was measured in these wells it would be the result of data noise introduced from the resolution of the measurement method, vertical variations in the screen elevation introduced by deviations in the borehole angle during drilling, and the influences of the vertical hydraulic gradient associated with those vertical variations in screen elevation. In short, additional wells would not add to the understanding of the groundwater flow conditions that are relevant to the assessment of the effects to the environment.

Horizontal groundwater flow would be expected below the sub-permafrost (at depths of 425 to 495 m bgs). This flow system are and will be controlled by the regional lakes with open taliks and is effectively estimated by lake elevations (in areas of continuous permafrost these lakes act as large diameter monitoring wells) and numerical modelling undertaken to date. The flux of groundwater between Whale Tail Lake to this sub-permafrost flow system can be estimated by the calculation of the vertical flow rate through the talik connecting the Lake to the sub-permafrost flow system, which in turn has been predicted using numerical modelling and will be field verified using the November 2018 hydraulic gradient estimated from the Westbay well system, in combination with the site-specific hydraulic conductivity measurements.

The installation of additional wells outside of the Westbay is not necessary to further characterize baseline conditions and reduce uncertainties on potential environmental effects of the project on the groundwater flow system. Long-term predicted groundwater flow rates from pit lakes are approximately $2m^3$ per day in comparison to the average $8,200m^3$ per day of surface water exchanged during post-closure when flows are re-established, based on average climate year watershed runoff. Agnico Eagle considers the groundwater inflows to be insignificant as they are representing less than 0.025% of the annual flows reporting to the Whale Tail Lake. Based on these conclusions, Agnico Eagle has confidence in the monitoring plans developed to gather additional site-specific hydraulic data, monitor both horizontal and vertical groundwater flows and considers term and condition 15 of the NIRB Project Certificate fulfilled with this approach.

Interested Party:	Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)	Rec No.:	CIRNAC#2
Re:	Waste Rock Segregation Plan		

Concern:
CIRNAC and AEM agree that based on AEM's model predictions, the waste rock storage facility (WRSF) cover needs to be at least 4.7 meter thick and be constructed with 100% "clean" waste rocks (i.e. Non Potential Acid Generation (NPAG) and Non Metal Leaching (NML) waste rocks) or be contaminant-free (i.e. free of any Potential Acid Generation (PAG) waste rocks and free of any Metal Leaching (ML) waste rocks). The Whale Tail Waste Rock Management Plan needs to be developed such that, if implemented, no PAG waste rocks or ML waste rocks would be misidentified and misplaced in the cover.

AEM has set a high standard for "clean" waste rock for the Whale Tail project WRSF cover. However, AEM continues to submit the Meadowbank Waste Rock Segregation plan which CIRNAC has made clear is not site specific to the Whale Tail Pit project geology and geochemical concerns. AEM acknowledges that waste rocks from the Whale Tail pit have much higher metal leaching potentials than those from the Meadowbank pits. CIRNAC asserts that the Meadowbank Waste Rock Segregation Plan does not provide enough detail or assurances that AEM can achieve its goal with the plan (e.g. the plan does not prescribe how ML waste rocks would be segregated from NML waste rocks).

CIRNAC is requesting a site specific Waste Rock Segregation plan with additional detail on AEM's methodology and practices to achieve the goal of constructing a contaminant-free WRSF cover.

Agnico Eagle's Response to Recommendation:
As discussed previously, we feel the best format is to have this segregation plan in one location as it will be easier to update if required. For your reference, please find below the excerpt from initial Agnico Eagle response to CIRNAC:

> Agnico Eagle […] refers CIRNAC to the ARD-ML Sampling and Testing Plan Appendix B "Flow *Chart for Waste Rock delineation and segregation*" shown below. Step 4: Rock segregation and management gives implementable details on how the two (2) different types of waste (i.e. NPAG and NML and PAG and/or ML) will be disposed of during Operations. Agnico Eagle would like to clarify that waste rock segregation is not based only on rock type or lithology but rather on operational ARD-ML testing results. […]

Agnico Eagle requests the NWB to make a final decision on this as this question has already been responded to CIRNAC multiple times.

ARD/ML Plan Attachment B: Flow Chart

1789310/3000
May 2018

STEP 1: SAMPLE COLLECTION[1,2]
Responsibility: Geology Superintendent

1. Identify rock types to be excavated using block model
2. Define sample frequency per Table
3. Plan and map sample locations to ensure an even distribution throughout the planned blast area, sufficient for packet definition

Rock Type	Rock Unit Code	Sampling Frequency
Komatiite North	V4a – 0a	Every 4th hole
Komatiite South	V4a – 0b	Every 4th hole
Greywacke Central	S3C – 3b	Every 4th hole
Greywacke South	S3S – 3b	Every 4th hole
Chert	S10 – 3b	Every 4th hole
Iron Formation	S9E – 3b	Every 4th hole
Basalt	V3 – 1b	Every 4th hole
Diorite	I2 – 8b	Every 4th hole

4. Collect each sample from drill cuttings (>1 kg) and label using production drill hole numbers
5. Document for each sample:
   - Date
   - Blast pattern / GPS location
   - Sample ID
   - Rock Type
6. Submit samples to Assay Lab Manager for analysis.
   - Include documentation (Step 2)
   - CC the Environmental Coordinator on submission

STEP 2: LABORATORY ANALYSIS[1,2]
Responsibility: Assay Laboratory

1. Prep samples (crush and homogenize)
2a. Initiate on-site analysis:
   - Total Sulphur (S)
   - Total Inorganic Carbon (TIC)
   - Total Arsenic
3. Quarterly analysis (minimum of 75 duplicate samples). Send subset of samples to off-site laboratory for QA/QC:
   - Tests: ABA, Bulk Metals, SFE
   - Include Chain of Custody

Copy Environmental Coordinator on COC

STEP 3: DATA EVALUATION AND ROCK CLASSIFICATION[1]
Responsibility: Geology Superintendent

1. Compile on-site data with sample information:
   - Total Sulphur
   - Total Inorganic Carbon
   - Total Arsenic
   - Sample documentation
2. Compare Total Sulphur with Cut-off (0.1%)
3. Calculate NPR from Total Sulphur (S) and Total Inorganic Carbon (TIC) to determine ARD potential:

   NPR = [TIC%*16.67] / [S%*31.25]
4. Evaluate arsenic leaching potential with Total Arsenic (As)

- Total S < 0.1% = **NPAG**
- Total S > 0.1% *and* NPR>2 = **NPAG**
- Total S > 0.1% and 1≤ NPR<2 = **Uncertain**
- Total S > 0.1% and NPR<1 =**PAG**
- Total As < 75 ppm =**NML**
- Total As > 75 ppm = **ML**

Send compilation to Environmental Coordinator

NPAG/NML Samples | Uncertain Samples | PAG/ML Samples

Data QA/QC See Page 2 (reverse)

STEP 4: ROCK SEGREGATION AND MANAGEMENT[1]
Responsibility: Geology Superintendent, Engineering, Environmental Coordinator, Construction Supervisor

1. Log results in database. Map the distribution of samples and define the groups of material for each blast

NPAG and NML Material
- ≤1 PAG sample per 8 NPAG samples
- ≤1 Uncertain sample per 8 NPAG samples
- Average total arsenic <75 ppm

PAG and/or ML Material
- ≥2 PAG samples per 8 NPAG samples
- ≥2 Uncertain samples per 4 NPAG samples
- Average total arsenic >75 ppm

2. Field Segregation of Waste Types:
   - Outline dig limits using stakes, wire flags, and flagging tape
   - Track in WENCO
3. Record the following with each Packet:
   - Packet number
   - Sample Results (Total S, TIC, As, NPR)
   - Block model rock type
   - Final location in WRSF

No Restrictions for Re-Use as Construction and/ or Cover Material

Suitable for the following:
- Pads
- Roads
- Dykes
- WRSF sides and cover material

Not Approved for Re-Use; must be managed to control ARD/ML

Disposal and Management Requirements:
- Encapsulated within NPAG/NML rock that hosts the thawed layer, and encouraged to freeze
  - Placed on a pad of NPAG/NML rock
  - Placed in centre of the pad (≥4m from edge)
  - Covered with ≥4 m of NPAG/NML rock
- Placed away from permanent water contact
- Monitor temperature and seepage quality

License B WRSF
Whale Tail WRSF

Page 1

ARD/ML Plan Attachment B: Flow Chart

AGNICO EAGLE GOLDER 1789310/3000 May 2018

STEP 3a. DATA QA/QC – EXTERNAL LABORATORY
Responsibility: Geology Superintendent / Environmental Coordinator

1. Confirm ARD Potential using external lab results (ABA). Calculate NPR using the Total Sulphur and Total Inorganic Carbon reported by external lab to compare directly with Meadowbank assay lab data.

↓

2. Confirm arsenic leaching potential using external lab results.

Arsenic leaching potential is considered high if:
- Total arsenic > 75 mg/kg

and
- Leachable arsenic (SFE) > 0.1 mg/L

↓

3. Complete QA/QC of data against onsite results by calculating an RPD value. RPD values below 35% are considered acceptable[3].

↓

4. If the ARD and/or ML designation determined by the external lab data are different than that determined by the onsite lab, a more rigorous QA/QC program is required and refinements must be considered in the block model designation.

↓

5. If required, revisit the cut-off criteria for total arsenic based on updated leach test data.

LIST OF ACRONYMS

ARD: acid rock drainage
PAG: potentially acid generating
NPAG: not potentially acid generating
NPR: net potential ratio
ML: metal leaching
NML: not metal leaching
ABA: acid base accounting
Bulk metals: total metals by ICP
WRA: whole rock analysis
SFE: metal leaching by shake flask extraction
XRF: x-ray fluorescence
ppm = parts per million
S = sulphur
C = carbon
As = arsenic

LIST OF ANALYTES AT EXTERNAL LAB

ABA: acid base accounting by Modified Sobek method. Includes paste pH, Bulk NP, analysis of total S and Total C by C/S analyzer (LECO Furnace), Acid Leachable Sulphate and Sulphide by difference.

Bulk metals: trace metals scan by aqua regia digest and analysis by ICP-MS and ICP-OES. Includes Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, U, V, Zn

WRA: whole rock analysisor major oxides by Borate Fusion XRF. Includes SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, TiO_2, P_2O_5, MnO, Cr_2O_3, V_2O_5, LOI

SFE: metal leaching by shake flask extraction, 24 hr leach extraction using DI water at 4:1 L/S ratio, and filtered leachate through 0.2 micron filter. Analysis of leachate includes pH, alkalinity, conductivity, anions (Cl, SO_4, NO_2, NO_3, Br), ortho-phosphate, fluoride, mercury (by CVAAS), and trace metals by ICP-MS and ICP-OES (Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, Sr, Ti, Tl, U, V, Zn).

Interested Party:	**Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)**	**Rec No.:**	**CIRNAC#3**
Re:	**Hydrogeological Characterization**		

Concern:
AEM used regional sub-permafrost groundwater flow system calculations, based on regional lake water levels, to determine the site specific Whale Tail Pit project hydrogeological characterization. Based on the site specific concerns for long-term arsenic leaching at the Whale Tail Pit project, CIRNAC views the regional approach alone without Whale Tail site specific field data to substantiate the hydrogeological modeling and validate the underlying hydrogeological assumptions to be lacking. In the absence of the site specific data, CIRNAC would request AEM provide data to validate the talik below Whale Tail Lake is open to the sub-permafrost groundwater flow system.

Agnico Eagle's Response to Recommendation:
The width and shape of lakes in the Hydrogeology Baseline Study Assessment were reviewed as part of the Approved Project to estimate if open taliks could be present below the lakes. Based on analytical solutions presented in Burn (2002), Golder estimated that open taliks could be present for circular lakes with a radius of greater than about 300 m and for elongated lakes with a half-width of greater than about 150 m, which includes Whale Tail Lake.

For the Whale Tail Lake area, thermal data is presently available from 10 thermistors (Knight Piésold 2015; Golder 2017, 2018). Data from thermistor AMQ17-1265A indicates that the talik near the central portion of the North Basin of Whale Tail lake extends about 112 m below the lake water level of 152.5 masl. Figure 1 and 2 are presenting readings of the thermistor AMQ17-1265A and the location of the thermistors installed at the Whale Tail site. Toward the South Basin, the closed talik below the North Basin is predicted by thermal modelling to transition to an open talik with direct connection to the sub-permafrost groundwater flow system.

Although direct thermistor measurements are not available for the inferred open talik area in the South Basin of Whale Tail Lake, analytical models for circular and elongated lakes and 2-D numerical thermal analysis predict an open talik would be present. The assumption of an open talik below the South Basin is conservative with respect to the prediction of potential groundwater inflow to the dewatered open pit, as it allows for higher inflows and the potential inflow of deeper saline groundwater into the open pit. If an open talik is not present, groundwater inflows could be less than predicted and of lower TDS.

Long-term post-closure predictions of groundwater flow to the Whale Tail North Basin area of the Pit Lake would not be expected to be affected by the assumption of an open or closed talik, as the permafrost will eventually degrade below the pit footprint and connect the shallow talik to the deeper sub-permafrost flow system. Long-term predicted groundwater flow rates from pit lakes are approximately $2m^3$ per day in comparison to the average $8,200m^3$ per day of surface water exchanged during post-closure when flows are re-established, based on average climate year watershed runoff. Agnico Eagle considers the groundwater inflows are insignificant as they are representing less than 0.025% of the annual flows reporting to the Whale

Tail Lake. These groundwater flow predictions are reasonable considering the low hydraulic conductivity of the competent bedrock and the small hydraulic gradients that are present between the regional lakes and Whale Tail Lake. This indicates that the long-term lake level in the Pit lake will not be affected by the permafrost degradation, regardless of the current presence or absence of an open talik beneath the lake.

Figure 1: Thermistor AMQ17-1265A readings

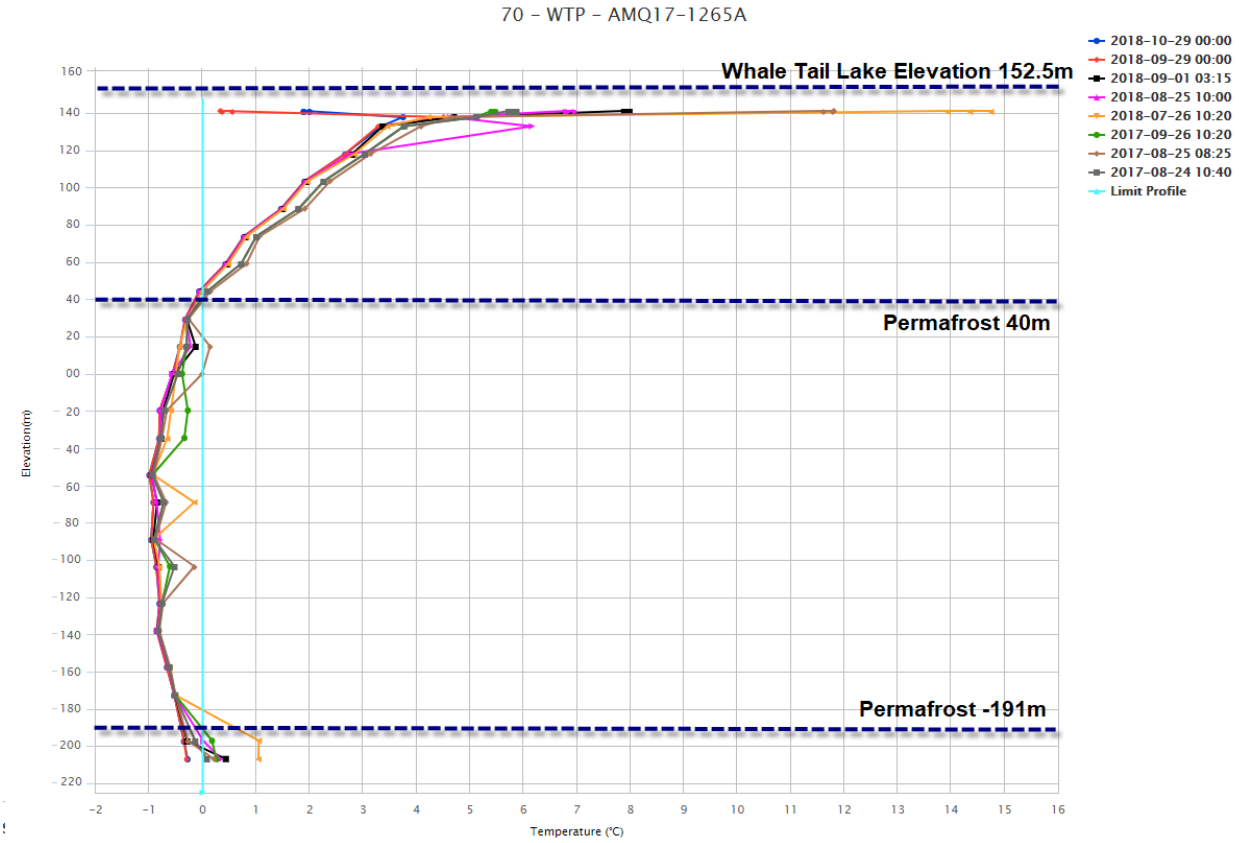
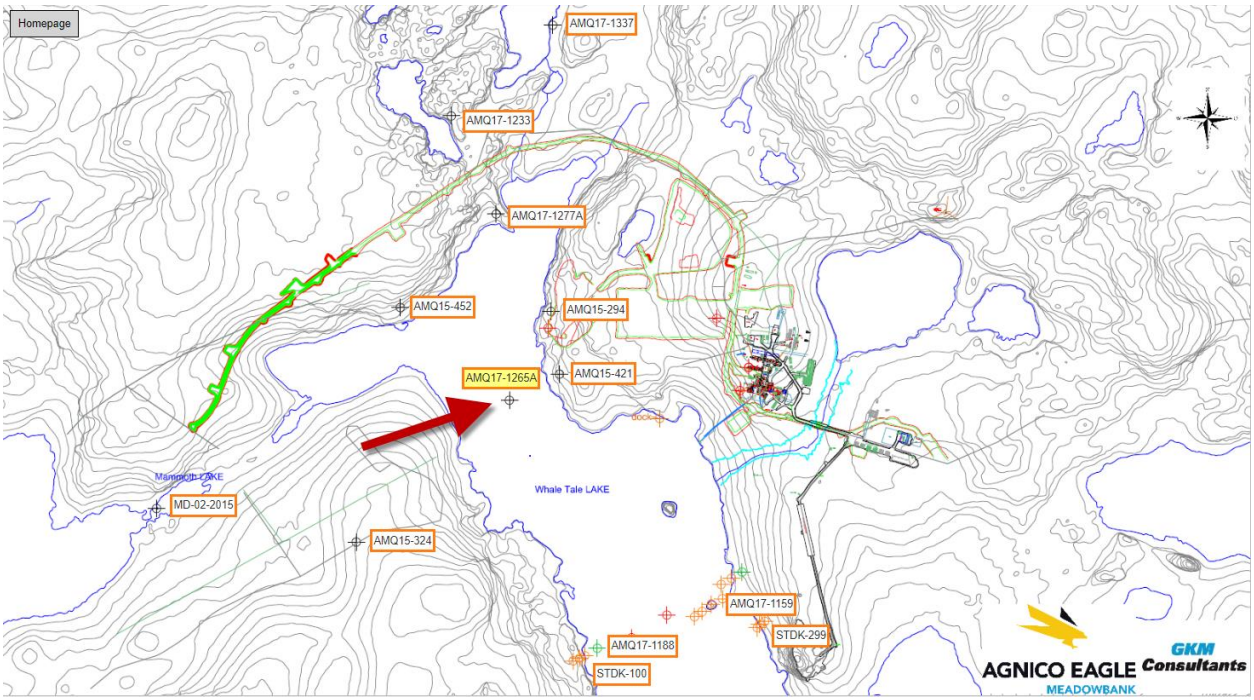


Figure 2: Whale Tail Project thermistors map



References

Knight Piesold. 2015. Agnico Eagle Mines Ltd.: Meadowbank Division – Whale Tail Pit – Permafrost and Hydrogeological Characterization. Submitted 24 November 2015

Burn, C.R. 2002. Tundra lakes and permafrost, Richards Island, western Arctic coast, Canada. Can J Earth Sci 39: 1281-1298.

Golder Associates Ltd. 2017. Whale Tail Lake Thermal Assessment. 22 February 2017.

Golder Associates Ltd. 2018. Whale Tail Pit Post-Closure Pit Lake Thermal Assessment. Dated 30 July 2018

Interested Party:	**Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)**	**Rec No.:**	**CIRNAC#4**
Re:	**Mitigation Measures and Adaptive Management**		

Concern:

In the October 17 and 18, 2018 meeting with AEM, it was agreed that AEM would provide options available for mitigation if arsenic concerns materialized. AEM would incorporate these mitigation measures in the plans. The current version of the plans lacks this information.

Further, the NIRB Project Certificate Term and Condition #15 further requires that the plans include:

> *"thresholds that will trigger the implementation of adaptive management strategies that reflect site-specific conditions encountered at the project site."*

CIRNAC supports the NIRB requirement for thresholds which are requirements of the adaptive management process to mitigate uncertainties and address emerging conditions. CIRNAC maintains that the establishment of thresholds and the identification of the mitigation measures available would the thresholds be met need to be presented by AEM in their management and monitoring plans. The current version of the plans lack this information.

As agreed the monitoring plans need to be updated to incorporate mitigative measures (including thresholds) that AEM would be able to use in the event that arsenic levels are trending higher than predicted in the Whale Tail Pit or the WRSF effluent.

Agnico Eagle's Response to Recommendation:

As NIRB Project Certificate No.008 Term and Condition #15 is linked to the Groundwater Monitoring Plan, Agnico Eagle is referring CIRNAC to the Groundwater Monitoring Plan for arsenic thresholds.