MEMORANDUM

DATE: **24 June 2016**

TO: **File**

FROM: **Oliver Curran (TMAC), Katsky Venter (TMAC)**

SUBJECT: **Minutes from Doris North Amendment Aquatic Monitoring Workshop June 6th, 2016**

Location: **Executive Royal Hotel, Edmonton/INAC Offices, Iqaluit/Teleconference**

Attendees:

In person Edmonton:

Katsky Venter (TMAC)

Oliver Curran (TMAC)

Mike Henry (TMAC Consultant) (ERM)

John Roesch (KIA)

Deborah Sinclair (KIA Consultant)

Anne Wilson (ECCC)

In person Iqaluit:

John Roberts (TMAC)

Sharleen Hamm (TMAC)

Maritz Rykaart (SRK)

Ian Parsons (INAC)

Amjad Tariq (INAC)

Eva Paul (INAC)

Amanda Weingardner (INAC)

Sarah Forté (INAC)

By phone:

Julie Marentette (DFO)

Sonia Aredes (NWB)

David Hohnstein (NWB)

Mark Dahl (ECCC)

Jane Doucette (AMEC)

Chris Milley (AMEC)

Note: The presentation reviewed during the meeting and cited below was submitted to the Nunavut Water Board (NWB) and meeting attendees on June 5th. The revised Aquatic Effects Monitoring Plan (AEMP) and the proposed Surveillance Network Program (SNP) Revisions were submitted to the NWB and meeting attendees on June 1, and are also available on the NWB website.

Katsky reviews Slides 1, 2, 3, 4, 5, 6, 7 and 8

Anne Wilson (ECCC) : how many years of baseline and what is the last year of baseline? Mike Henry: Describes robust baseline dating back to the 1990's and 2016 will be the last year prior to milling and discharge to TIA.

John Roesch (KIA) : Technical advisory panel: Has an invitation gone for Technical Advisory Panel out and when were submissions made?

Action: TMAC to follow up to ensure John receives necessary correspondence.

Slide 9: Katsky introduces required clarification on marine monitoring and WL.

Dave Hohnstein: Marine monitoring is outside NWB jurisdiction. This would be left to ECCC and DFO.

Anne Wilson (ECCC) : NIRB Project Certificate will capture other items not captured specifically by the MMER.

Action: TMAC (SH) to provide attendees with Project Certificate blackline, highlighting proposed Condition pertaining to marine monitoring

Outcome: Water Licence will not need to capture discharge requirements or monitoring activities in marine environment.

Slide 10: Mike Henry Review

John Roesch (KIA) : What did Inuit advisory say when consultation was taking place? Katsky described that Inuit indicated that there wasn't too much use of the area, but there is limited seal hunting and that seals were very tasty. Fishing for char and seals would typically occur closer to communities. John Roesch describes that people wanting to fish or hunt in the area should contact Alex Buchan and Ikey Evalik in Cambridge Bay to ensure that hunting and fishing can occur safely for all. Oliver mentions that Mines Safety Act also requires a safe distance from infrastructure. Katsky mentions that TMAC has designated a 'no hunting' buffer around site, and this information has been provided to communities to ensure safety of personnel.

Slide 11, 12: Mike Henry Reviews

Anne Wilson (ECCC): How was significance level defined, was a BACI Design used? Mike Henry – Yes, BACI design is used with a mixed model to account for other variables. Level of significance was 0.05.

Slide 13, 14: Mike Henry Reviews.

Main points: 11 years of baseline. Natural drawdown is total of 2.74 meters (0.74 natural water level draw down, 2 meters of ice). TMAC's view is that any draw down below the 2.74 would affect fish habitat.

Katsky indicates that an extensive memo on this topic was previously distributed.

Deborah Sinclair (KIA) : have spawning surveys been done in Doris Lake, and where were they done? Mike Henry - Survey focused on where the fish are rather than looking for egg deposition.

Sharleen (TMAC) : the environmental assessment determined that there was an abundance of habitat and DFO was supportive of this review.

Julie (DFO) : DFO looked at proportion of habitat potentially affected. In the worst case scenario as outlined in previous TMAC submissions, the result would not cause effects to fish habitat in DFO's view.

Anne Wilson (ECCC): Were there any impacts looked at for Doris Creek? Sharleen – Yes, there would be a reduced flow in Doris Creek, and TMAC has committed to further field work and analysis to address this with DFO input.

Deborah Sinclair (KIA Consultant) : I'd like to clarify that this approach appears to be conservative (use of 2.74 m).

Slide 15, 16: Mike Henry reviews

Anne Wilson (ECCC) : Do you measure dissolved oxygen in April? Mike Henry - Yes.

Slide 17: Mike Reviews

Anne Wilson (ECCC) : Will you be looking at metal parameters at Doris North Lake Site? Anne believes that Doris North Site would be a better check on what is happening further in the lake as it is the deepest point in the lake. Mike Henry - No, ST- 7 will serve as the point where metals are monitored. Doris North Site could be captured in the response framework if ST-7 shows some upwards trends.

Deb Sinclair (KIA) : Are we detecting effects at ST-7? ST- 7 is a shallow shoreline site, need to collect sample so that we are not disturbing anything, prefer open water site. Katsky – ST-7 is collected from a water intake line when the pump is in use, so no shoreline effects then. Would only collect from shoreline in open-water months if we are not withdrawing water from the Lake.

John Roesch (KIA): The draw point for water use is approximately 30 meters out from the shore where Lake is approximately 10 meters deep.

Anne Wilson (ECCC): Concerned that dust deposition from TIA or supernatant from TIA could impact Doris Lake? Katsky - At the assessment stage, a great deal of work

showed that all measureable dust deposition would be captured within the basin. Thermistors also show that there is no likelihood for supernatant to flow into Doris Lake (no likelihood for conductivity).

Outcome: Mike Henry - First AEMP report will cover a justification for plan, why monitoring points were chosen, what was screened out at assessment phase. Report will show a time series for data collected and show confidence in ST-7 and comparability to Doris Lake North sampling location. This will enable people to move forward and have comfort in the methods and ability to detect effects moving forward.

Anne Wilson (ECCC): Notes that biological monitoring is only triggered at medium or high action. Do you have sufficient baseline? Mike Henry - Yes, we have baseline since the 1990's. There is a very robust baseline. So if there was any indication of effects to water quality it would be captured there and it could be elevated to biological monitoring if required and in consultation with ECCC. Point sources only come back to limited potential of dust and runoff. No treated sewage, no mine discharge into Doris Lake.

Slide 18, 19: Mike Henry reviews.

Deborah Sinclair (KIA Consultant): Will you append all the data to the AEMP report (including non-CCME parameters), and with a summarization column? Mike Henry - Yes, this was previously agreed to.

Slide 20, 21, 22, 23: Mike Henry reviews

John Roberts (TMAC): Why was 75% percentile chosen for CCME benchmarks? Mike Henry - It was chosen because it is an early warning signal, and although it is conservative, it should give a conservative measure for early warning. TMAC will treat it as an early warning signal. Katsky - The approach in the AEMP will ensure that baseline data will be looked at in conjunction with CCME, so that naturally elevated parameters (within 75% of that observed in past years) can be identified. John Roberts: when is the LAL triggered? Mike Henry: When any parameter exceeded CCME 3 times in a six month period.

Action: John Roberts - This approach of screening using the 75th percentile and baseline in the AEMP needs to be conveyed in very clear language.

Slide 24: Mike Henry reviews

Julie (DFO): Should we not be looking at a cumulative ice thickness and water drawdown instead of looking at them separately?

Action: Mike H and Katsky – Agreed. TMAC will revise approach to utilize a combined average for water and ice thickness level.

Slide 25, 26: Mike Henry reviews

Sarah Forte (INAC): Concerned that biological monitoring is not included early and that downstream effects could be seen from parameters below CCME in Doris Lake. Also, monitoring in Doris Creek should be considered to give comparability after the dam is breched. Also concerned about climate/regional patterns and absence of reference location. Also wondering how groundwater inflow would be quantified and the combined effect of this inflow and natural drawdown/ice.

Amanda Weingardner (INAC): What about a reference site? And what about point and non point source from nutrients? It would be beneficial to maintain the Doris North monitoring station. Mike H – lake is well mixed and sampling Doris North site doesn't provide additional value. We have previously shown that the water chemistry collected from the deep waters of Doris Lake North is statistically similar to the shallow waters, confirming that the lake is well mixed. With respect to nutrients, the dissolved oxygen and organic carbon should indicate any problems with nutrients. The largest potential impacts for nutrients have already occurred with quarry development, underground blasting, portal development, surface construction etc., so the linkage to project effects has diminished. Adding reference sites, adds very little to statistical design in this case, where there is a robust 'before' dataset, frequent ST-7 data collection, and infrequent reference data collection historically (4 x per year). Further, the response framework does include the ability to add a reference site in the future. So it is addressed. Katsky - TMAC is confident that there will be not be an effect and therefore is ok with not initially having a reference site for the purpose of screening out potential effects on Doris Lake. This means that the frequency of thinking that there may be an effect when there is none is slightly increased, however, this plan does have the mechanism to resume reference lake sampling in the future if thought beneficial.

Mike Henry: with regards to biological sampling and monitoring, CCME guidelines are already very conservative for the protection of aquatic life, so therefore the logic is very sound and scientifically defensible in that TMAC will bench mark against CCME to ensure that no effects to aquatic life are occurring. At the 75th percentile, an extra level of conservativism is built in as an early warning.

Mike Henry: For downstream monitoring, water quality should be even more dilute than Doris Lake, so no monitoring is required for water quality effects. The AEMP would support additional monitoring through the response framework, if required.

Amanda Weingardner: What about Chlorophyll A, can be a good indicator of pollution. Mike Henry-if nutrients and DO are OK, then don't see a need for chlorophyll A. Sarah Forte – because of detection limits it can be easier to detect with chlorophyll? Amanda – Chlorophyll A gives community assemblage info. Mike Henry – Chlorophyll A doesn't provide information about primary producer community assemblages just overall community biomass, and no effects to Chl a were seen in Doris Lake or elsewhere in the original AEMP. Primary producer taxonomy hasn't been required in the past [the original AEMP], so we will not be characterizing the primary producer community in the amended Doris AEMP.

Maritz Rykaart: Post closure starts after dam is breached. Prior to breaching, water is drawn out of TIA and discharged into Roberts Bay over an 18 month period.

Katsky: as stated in the AEMP submitted June 1, a revised AEMP would be submitted prior to closure if needed.

Sonia Aredes (NWB): How is water infiltrating in Mine measured? How annual influences of climate considered? How is Doris draw down and ice thickness measured in relation to natural fluctuation? John Roberts: TMAC tracks precipitation and we have a hydrographic meter in Doris Creek. So we have a good idea of the water balance. Water in the mine will be measured as it is pumped out. Maritz R – the groundwater water balance has already been completed and reviewed in the assessment phase. Groundwater is 70% Doris Lake water and 30% regional groundwater in origin.

Overall Questions/Clarifications

Amjad Tariq (INAC): Why is 75 percentile used on CCME data? John R and Katsky - CCME is already conservative and taking 75 percentile adds conservatism. Mike H – based on sensitivity analysis run for the Water and Load Balance Model. Amjad Tariq: Agrees to approach.

John Roesch (KIA): Re-iterates that initial report under AEMP should provide good comparisons from baseline and justify approaches for monitoring stations.

Afternoon Discussion on SNP (1pm EST)

Slide 32, 33: Katsky review

Deborah Sinclair (KIA Consultant): Agrees to changes to Slide 33 pertaining to methods of determining a measure of coliforms – has also observed this methodological change with a Canadian Lab. **Action: Correct typo - change from MFU to MPN.**

Slide 34, 35, 36, 37: Katsky Review

Maritz Rykaart: noted that flotation tailings going to the TIA would not contain CN. The 6% of tailings that have CN go through the CN destruct process, with water being reused and these tailings going underground. Water residual CN concentration would be about 0.1 mg/L.

Anne Wilson (ECCC): Anne asked about reporting information on the system performance. Anne suggests that there may be a need to characterize effluents going into the TIA due to concern for spills and contingency planning. Support keeping in the SNP to have placed on the public registry in monthly monitoring reports.

John Roberts: We will characterize the water in TIA and ensure it is made available publically via the Water Management Plan and related annual reporting, so it can be used to inform any spill response or potential effects to wildlife.

Outcome: David Hohnstein: Confirms that no water licences currently have discharge criteria for the marine environment and no criteria will be required for discharge in this licence. However, monitoring to characterize water and inputs into the TIA would fall under the NWB jurisdiction. This monitoring requirement could be included within a management plan or the Monitoring section of the Water Licence.

Slide 38:

Action: Remove free cyanide from monitoring requirement as this is pre milling.

Slide 39:

Action: David Hohnstein to confirm if Total Oil and Grease is requirement in the licence for TL-3 and related sampling points.

Amanda Weingardner (INAC): Typically most licences requires twice annual sampling in post-closure, not just once.

Action: TMAC will re-visit this in the future after years of monitoring prior to closure, likely coincident with Water Licence renewal in 2023.

Slide 40:

No changes

Slide 41:

Action: Based on todays discussion, the characterization of inputs into the TIA would be addressed under the Water Management Plan with a revised plan being issued in September 2016.

Slide 42:

No changes

Slide 43 (TL-7):

No changes

Slide 44 (TL-8)

Characterization of re-circulation water is not required in the WL. No comments/concerns.

Slide 45 (TL-9)

Anne Wilson (ECCC): Is there any liquid waste from cyanide destruction that will be tested to confirm destruction?

Action: John Roberts to confirm [has subsequently been confirmed that there is no barren bleed in the new mill system – information provided to Anne and NWB].

Slide 46 (TL-10)

No changes

Slide 47 (TL-11)

Monitoring seepage from backfilled stopes to be captured in the Groundwater Management Plan.

Slide 48 (TL-12)

Sonia Aredes (NWB): It would be good to characterize conductivity, pH, sulfide.

John Roberts: TMAC disagrees with this being in the water licence, but rather be captured under a management plan.

Anne Wilson (ECCC): Nitrate, ammonia and major ions monthly should be monitored as this is important for MMER characterization related to use of explosives underground.

Katsky Venter (TMAC): the problem with this approach is that once it is in the licence the proponent is required to monitor with no ability to scale down with justification without having to file an amendment. Suggest such characterization be done under site management plans.

Anne Wilson (ECCC): all other licences she has seen have a clause that enable the proponent to seek approval from the board to make changes to SNP and monitoring tables with justification.

David Hohnstein (NWB): I agree but I don't see this clause in TMAC's licence.

Group: All search for a condition in the licence allowing TMAC to request a modification to SNP tables and monitoring tables and none is found. All agree that amending the licence to provide this clause to allow the proponent to request amending SNP and monitoring tables with justification would be a good solution in addition to enabling some monitoring to occur in management plans.

Slide 49 (ST-1)

No changes

Slide 50 (ST-2)

No changes

Slide 51 (ST-3)

Anne Wilson (ECCC): Can cyanide be removed from the parameter list?

Action: Remove CN from the list.

Katsky Venter (TMAC): suggest reduction in frequency of monitoring during discharge for this site and other berm effluents.

Dave Hohnstein (NWB): question on homogeneity of berm water in the berm and over the period of discharge, and length of discharge period. Katsky: compliant berm water is either discharged or used for dust suppression. This may take 1-2 days to a week or more. Confirmed each berm only has a single sump so water is connected and relatively well-mixed. Quality may vary with wind (TSS), but no noted other changes over discharge period.

Dave Hohnstein (NWB): question to Eva on thoughts on reducing discharge monitoring frequency. Eva (INAC): indicated no concerns and little benefit of daily monitoring.

Action: Reduce sampling to once prior to discharge only.

Slide 52 (ST-4)

Action: Reduce sampling to once prior to discharge only.

Slide 53 (ST-5)

Action: Reduce sampling to once prior to discharge only.

Slide 54 (ST-6a and 6b)

Action: Reduce sampling to once prior to discharge only.

Slide 55 (ST-7)

Anne Wilson (ECCC): Not concerned with the suggested changes.

Slide 56 (ST-7a)

No changes

Slide 57 (ST-8)

No changes

Slide 58 (ST-9)

No changes

Slide 59 (ST-10)

No changes

Slide 60 (ST-11)

Action: Reduce sampling to once prior to discharge only.

Slide 61 (ST-12- NEW)

No changes

Slide 62 (ST-13-NEW)

No changes

Meeting end.