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Derek Donald
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Nunavut Water Board
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Sent via Email: licensing@nwb-oen.ca; derek.donald@nwb-oen.ca

Re: 2018 Annual Geotechnical Inspection Tailings Impoundment Area Hope Bay Project, Hope Bay, Nunavut

Dear Mr. Donald,

TMAC Resources Inc. (TMAC) is pleased to present the 2018 Annual Geotechnical Inspection Tailings Impoundment Area report for the Hope Bay Project in accordance with stipulated water licence conditions. TMAC is also providing responses to recommendations made in the report which can be found in Table 1 below.

A hardcopy of this letter and TMAC responses to recommendations will be sent to you separately.

Should you have any further questions please feel free to contact me at oliver.curran@tmacresources.com.

Sincerely,

Oliver Curran

Vice President, Environmental Affairs, TMAC

Cc:

Ida Porter (NWB)
Kyle Conway (TMAC)
Sarah Warnock (TMAC)

Jerome Girard (TMAC)
Dan Gagnon (TMAC)

Table 1 *2018 Annual Geotechnical Inspection Tailings Impoundment Area Recommendations and TMAC Response*

Inspection Item	2018 Recommendations	TMAC Response
Third Party Dam Safety Review	Conduct an independent third party Dam Safety Review for both the North and South Dams in the summer of 2021.	TMAC will contract a third party to conduct a independent Dam Safety Review in 2021.
Tailings Operating, Maintenance and Surveillance (OMS) Manual	An update to the Tailings OMS Manual is required to reflect the operational, personnel and monitoring changes that are in effect. This update should build on the 2017 edition of the OMS Manual which considers the Phase 2 project as opposed to the Phase 1 project. As part of the update attention needs to be paid to defining Quantifiable Performance Objectives (QPOs) and including Trigger Action Response Plans (TARPs). TMAC should ensure all staff are properly informed and trained about the contents of the Tailings OMS Manual. An annual refresher training session prepared and presented by the EOR as part of the AGI is recommended.	TMAC will work with SRK on updating the TIA OMS 2017 to incorporate Phase 2 operational modifications. TMAC will ensure the revision is communicated to all staff involved in the operation, maintenance and surveillance of the TIA, and that all roles and responsibilities are communicated and understood.

TIA Responsible Parties	TMAC must agree on the lines of responsibility of the TIA, document that in the OMS Manual, train and inform personnel of their duties, and operate the facility accordingly.	TMAC will operate, perform maintenance and surveillance as per the TIA OMS 2017. Upon completion of the TIA OMS update, TMAC will ensure the revision is communicated to all staff involved in the operation, maintenance and surveillance of the TIA, and that all roles and responsibilities are communicated and understood.
Monitoring Standard Operating Procedures (SOPs)	Update the Monitoring SOP to include South Dam Monitoring requirements.	TMAC will work with SRK on updating the TIA Monitoring SOP to incorporate additional monitoring requirements for the South Dam. The updated SOP was distributed to applicable TMAC staff along with clarification on monitoring roles, responsibilities and frequency.
Compliance with Monitoring Requirements	Conduct monitoring in accordance with the Monitoring SOP, paying attention to those areas where conformance is not consistently met.	TMAC will ensure the revision is communicated to all staff involved in the operation, maintenance and surveillance of the TIA, and that all roles and responsibilities for monitoring are communicated and understood.
North Dam Inspection and Monitoring		
Ground Temperature Cables (GTCs)	None.	N/A

Thermosyphons	TMAC should measure the temperature of each thermosyphon riser pipe directly below the radiator fins using a contact thermometer or thermal camera. This measurement should be completed in early winter when the differential between the ground temperature and air temperature is the greatest. This will identify discrepancies between thermosyphons. If TMAC's measurement confirms a temperature differential, AFC, or another qualified contractor, must to be contracted to physically inspect thermosyphon North 2, to investigate the cause of the malfunction and conduct any necessary repairs. The inspection must occur in the winter, as early as possible, to ensure adequate ground and air temperature differentials. If AFC, or another suitable contractor, is on-site have them inspect all other thermosyphons, and carry out any additional maintenance they recommend.	A site visit was conducted by AFC in April 2018 and concluded that all thermosysons were performing as designed and required no maintenance or repairs (AFC 2018). TMAC will continue to monitor all themosyphons and will collect additional data using a thermal camera in winter 2019. This information will be communicated to SRK and AFC for review. TMAC will implement repairs as recommended by AFC if it is determined that the North 2 thermosyphon is malfunctioning or inoperable.
CR1000 Datalogger Battery Voltage	The external CR1000 datalogger batteries should continue to be monitored and recharged annually or replaced as needed.	TMAC will continue to monitor as per the TIA SOP.

Inclinometers	The inclinometer and associated readout device should be recalibrated every 3 years, with the next recalibration due before the spring of 2019.	The inclinometer instrumentation cable was sent for recalibration in February 2019. At the time of receiving this recommendation, the equipment could not be shipped offsite and returned prior to spring of 2019 (approximate timeline for recalibration and return is three months based on 2014 recalibration). TMAC will have the inclinometer instrumentation recalibrated prior to spring of 2020.
Survey Monitoring Points	Backfill the erosion around ND−DSP−100. Maintain a careful watch on downstream dam shell settlement points ND-SSP-080-3 and ND-SSP-110-3 to determine if thaw settlement of the toe is causing undue deformation	Erosion observed at ND-DSP-100 has been backfilled. TMAC will continue to monitor as per the TIA SOP.
Creep Displacement	No action required.	No action required.
Walkover Surveys	The required weekly walkover surveys are not being completed in accordance with the SOP. This is an important surveillance activity as defined in the OMS Manual and needs to be complied with.	TMAC acknowledges the non-compliance with the recommended frequency. The monitoring requirement and responsible department has clearly been communicated with staff and since then, compliance with this monitoring requirement has significantly improved.
North Dam Seepage	Continue water quality monitoring of North Dam seepage according to the methods outlined in SRK (2018b), but include the additional recommendations proposed. Conduct at least two additional frost probe surveys along the same transects in early summer and early fall, following the same procedure as in 2018.	TMAC will continue to monitor North Dam seepage as per the TIA SOP and will incorporate the recommendations by SRK into the 2019 monitoring program. Additional frost probe surveys will be completed in early summer and early fall of 2019.

AGI Physical Inspection	No action required.	No action required.
South Dam Inspection and Monitoring		
Ground Temperature Cables (GTCs) and D405 Dataloggers	Complete troubleshooting and repair damaged, but repairable GTCs in the spring of 2019.	TMAC will work with SRK to complete troubleshooting and repair of GTC's in the spring of 2019.
Survey Monitoring Points	Complete installation of survey monitoring points and prepare monitoring database for evaluation.	TMAC will work with SRK on the installation of the survey monitoring points on the South Dam.
Physical Inspection of the South Dam	No action required.	No action required.
TIA-Wide Monitoring		
Tailings Deposition System	TMAC needs to install the dedicated mine water discharge pipeline to the TIA as soon as possible to allow tailings deposition to recommence from the South Dam. It is critical that South Dam beaching maintain beach of at least 100 m at all time, for all TIA water levels. Saline mine water may only be discharged together with tailings from, or within, 300 m of the South Dam provided the freezing point depression is less than 0.5 ◦ C. If the freezing point depression exceeds 0.5 ◦ C, saline mine water may be discharged with tailings at other designated tailings discharge points or directly into the Reclaim Pond. The freezing point depression calculation is provided in this AGI and needs to be incorporated into an updated OMS Manual. Used propylene glycol may be discharged into the Reclaim	TMAC is evaluating options to install the mine water discharge pipeline to the TIA to separate mine water from the tailings stream. This may include use of a previous tailings pipeline for discharging mine water. Onsite monitoring of the mine water freezing point will be conducted using the depression calculation provided to determine when beaching at the South Dam can recommence prior to installation of a dedicated mine water discharge pipeline. TMAC will work with SRK on updating the TIA OMS to incorporate the discharge of used propylene glycol into the TIA. TMAC will discharge tailings to the TIA as per the designated tailings discharge plan.

	Pond in accordance with the stipulations provided in this AGI which needs to be incorporated into an updated OMS Manual. Tailings discharge must be done in accordance with the designated tailings discharge plan, which provides designated tailings discharge coordinates, including elevation. Areas along the western shoreline of the TIA where tailings discharge has occurred at elevations above 36.5 m needs to be carefully monitored to determine if permafrost damage is occurring due to vegetation dieback. Should any damage be noted, appropriate proactive mitigation may be required.	TMAC will work with SRK to develop a monitoring program for monitoring permafrost damage on the western shoreline of the TIA and will implement proactive mitigation measures as required.
Emergency Dump Catch Basins	Completely reconstruct the Western Emergency Dump Catch Basin as the earliest opportunity. TMAC has agreed to complete this work in the summer of 2019.	TMAC has committed to completing this project in 2019.

Pipelines (Reclaim, Tailings Deposition and TIA Discharge)	TMAC must carefully inspect all pipelines placed directly on the tundra for signs of vegetation dieback and associated flow path channeling. Where this is occurring, the pipeline must be relocated to follow existing all weather road shoulders, and appropriate remediation needs to be put in place where damage has occurred. Going forward TMAC should consider abandoning the practice of placing pipeline directly on tundra. The thermal erosion feature that has developed along the northern shore of the TIA needs to be backfilled. The ideal backfill method should be hydraulic placement of a slurry as that would minimize tundra damage during the activity. The use of tailings slurry for this would be a good practice, however it should ideally be cooled to avoid further thermal erosion. TMAC should ensure that under no circumstances water be discharged directly onto the tundra adjacent to the TIA, Water should be discharged directly into the TIA Reclaim Pond.	TMAC will conduct a survey of all distribution pipelines for signs of vegetation dieback. To date, TMAC has not observed any issues with insulated lines on the tundra. If damage is observed, TMAC will take the appropriate action to prevent further damage to tundra and remediate where required. TMAC will reconsider this practice based on the results of the survey. TMAC will continue to monitor and investigate options for backfilling the thermal erosion feature observed on the northern shore of the TIA. TMAC has advanced the discharge line from the Sedimentation Control Pond directly to the TIA Reclaim Pond to prevent further thermal erosion in this area. TMAC will ensure any further discharges of water be directly to the TIA Reclaim Pond.
Shoreline Erosion	No action required.	No action required.
TIA Water Balance	It is of paramount importance that the Roberts Bay Discharge System Pipeline be completed during the summer of 2019. Further delay may result in reduced operations.	TMAC plans to complete the installation of the Roberts Bay Discharge System Pipeline during the 2019 open water season.
Climate Data	None.	None.

TIA Water Quality	TMAC must action the water treatment plant for TIA discharge water to ensure that once the Roberts Bay Discharge System Pipeline is operational in the summer of 2019, water can be treated and discharged.	TMAC is evaluating options for water treatment (if required) for the TIA discharge water to be installed prior to operation of the Roberts Bay Discharge System Pipeline. TMAC is responsible for meeting compliance under MDMER once discharge commences.