181 University Avenue
Suite 300 - PO Box 33
Toronto, Ontario
M5H 3M7
416-628-021

June 5, 2020

Derek Donald
Technical Advisor
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0

Sent via Email: licensing@nwb-oen.ca; derek.donald@nwb-oen.ca

Re: 2019 Annual Geotechnical Inspection for the Boston Exploration Site

Dear Mr. Donald,

In accordance with Part D, Item 13 of Type B Water Licence 2BB-BOS1727, please see Attachment #1 to this correspondence for the results of the Hope Bay Project 2019 Annual Geotechnical Inspection (AGI) of Boston surface infrastructure and earthworks, conducted by SRK Consulting (Canada) Inc.

TMAC Resources Inc. (TMAC) is pleased to present responses to recommendations made during the AGI for Boston in Attachment #2.

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:

Licensing (NWB)
John Roesch (KIA)

Kyle Conway (TMAC)
Sarah Warnock (TMAC)
Jerome Girard (TMAC)
Andy Fortin

Attachments:

Attachment 1 - 2019 Annual Geotechnical Inspection Letter for Boston (SRK, 2020)

Attachment 2 - Recommendations and TMAC Responses – Boston (TMAC, 2020)

Attachment 1

2019 Annual Geotechnical Inspection Letter for Boston (SRK, 2020)

SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2

T: +1.604.681.4196
F: +1.604.687.5532
vancouver@srk.com
www.srk.com

May 27, 2020
Project No: 1CT022.038

Vice President Environmental Affairs
TMAC Resources Inc.
181 University Avenue, Suite 300
PO Box 33
Toronto, Ontario, M5H 3M7

Attention: Oliver Curran, MSc, Vice President Environmental Affairs

Dear Oliver:

RE: Boston Advanced Exploration Project – 2019 Annual Geotechnical Inspection

TMAC Resources Inc. contracted SRK Consulting (Canada) Inc. to conduct a geotechnical site inspection on their Boston Advanced Exploration Project in Nunavut. This site has been intermittently used since its construction in 1993. The camp was temporarily closed and placed under Care and Maintenance (C&M) in November 2011. In 2017 and again in 2019, the camp was re-opened for single summer seasons of exploration activities. This geotechnical inspection is an annual requirement in response to Part D, Item 13 of TMAC's Water Licence 2BB-BOS1217 issued by the Nunavut Water Board (NWB) on July 26, 2017.

Following the 2015 annual geotechnical inspection (AGI), SRK recommended that TMAC adopt a Surface Infrastructure Geotechnical Monitoring Program (SIGMP), followed by an annual audit style geotechnical inspection as documented in the 2016 AGI report. In 2018, TMAC however decided to revert to the pre-2016 approach of a comprehensive AGI. This comprehensive AGI approach was again carried out in 2019, which is the subject of this letter.

The 2019 walkover geotechnical site inspection and aerial reconnaissance of the site (via helicopter) was carried out by SRK Senior Consultant John Kurylo, MSc, PEng on August 16, 2019. John was accompanied by the onsite TMAC environmental technician during this inspection.

Formal geotechnical inspections of the Boston Camp have been carried out annually since 2007, and those reports are filed on the Nunavut Water Board (NWB) public registry. All previous inspections have been conducted by SRK, specifically by the late Maritz Rykaart. This letter presents the findings of the 2019 geotechnical inspection.

Except for ongoing thermal erosion issues manifested on the airstrip, the 2019 AGI generally showed no appreciable differences to the conditions noted in the 2017 and 2018 AGIs.

Pronounced shoulder tension cracking at the airstrip is a historic and ongoing observation that has been noted in previous years' inspections (example 2018 inspection). Due to the lack of availability of equipment and material at Boston, ongoing observation and monitoring of the airstrip has been recommended previously and is suggested to continue.

The shoulder tension cracking in areas extends 3+ m inwards / onto the runway. At the surface some of these cracks are on the order of 110+ mm wide at surface. Based on inspection of the surrounding area many of these cracks can be seen to be associated with permafrost disturbance from historic drilling activities or associated with seasonal surface water flow ponding against the airstrip edges. Based on the layout of the airstrip and prior exploration history, these cracks and depressions are expected. These cracks form because of permafrost thaw associated with the airstrip rockfill placed directly onto the tundra, thereby deepening the active layer along the shoulder where the fill is thin. An additional cause of these tension cracking, and as noted above, include surface water annually ponding in the summer months against the airstrip. Some of this ponding can be associated with areas where historic exploration drilling has disturbed the permafrost. Based on visual observation around the Boston site, massive ice is expected around this area (see comments about the erosional gulley below). In some cases, over 20 years of thermal degradation has led to slight topographic lows which allows for additional surface water to pond and have resulted in some settlement at the airstrip shoulders. The finer crush material placed on the top airstrip running surface (finer as in higher percentage of finer gradation material than the bulk rockfill base) helps to further accentuate this cracking.

There is some undulation on the top airstrip surface, but generally beyond the affected airstrip shoulders, the central part of the runway appears relatively smooth. No new or significant depressions in the central surface were noted (beyond what was noted in 2018). The condition of the runway was noted in the 2018 inspection to be sufficiently compromised that aircraft operators should conduct an inspection of the runway prior to using it to satisfy themselves that they can operate aircraft safely. This recommendation is still relevant for 2019. SRK was informed that prior to use in 2019, the Boston airstrip was assessed by Summit Air pilots and cleared for use. Additional inspections will be required each season / year before use. Based on recommendations by the aircraft operators, TMAC may have to carry out some airstrip maintenance, likely in the form of regrading of the runway surface.

The other notable feature at the Boston site was an erosion gulley noted along the western slope of the camp leading towards Aimaokatalok Lake. Historically water has been discharged in this area causing the original gulley. In 2018 this gulley was noted to be increasing in size because of thermal erosion, as evidenced from the fresh scarp cuts. Some of this erosion and rapid thermal erosion (as further noted by cracking along the edges of the fresh scarp cuts) appears to have been exacerbated by concentration of surface water flows in and around the topographic lows created by the ongoing permafrost degradation. This is most apparent in areas where massive ice is expected in the slope permafrost.

Since 2018 TMAC has made efforts to do some intermediate remediation of this area. This was done, considering the fact that there are no suitable construction material or equipment at the site to readily do this, by installing silt fencing downstream of the area to avoid sediment loads from entering Aimaokatalok Lake, and also by placing coconut matting over the erosional feature to assist with slowing the rate of thermal erosion. Additional thermal erosion at this location is expected but the preliminary remediation measures noted above are notable improvements from the conditions noted in the 2018 inspection.

When construction of the Phase 2 Boston mine commences, this erosional gully area will still have to be permanently remediated. Meanwhile the area must be continued to be monitored carefully (visually), and if the erosion progresses further / extensively alternate remediation plans may be required. Visual monitoring in the summer months will require careful inspection around this area to check if any larger voids have developed below this coconut matting. Fortunately, this area is not readily accessible; however, additional erosion below the coconut matting may be less visible now that this area is covered. Thus additional care must be taken to ensure safety is upheld during any future inspections or during any remediation work around this area.

Table 1 below summarizes the overall recommendations stemming from the 2019 AGI completed for the Boston Advanced Exploration Camp.

Aside for the items noted above, cracking in the overline crush material surface was noted at the Boston Tank Farm. This is expected to not be deep seated stability induced, but instead liner induced (material sliding on liner interface). Suggestions for remediation of this cracking and operation recommendations for this Tank Farm are also provided in Table 1 below.

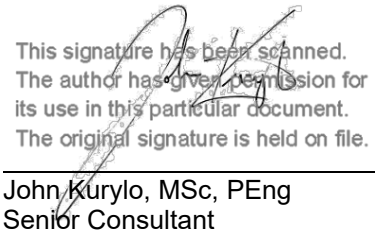
Table 1. Summary of Recommendations – Boston Advanced Exploration Project 2019 AGI

Observation	Recommendation
Extensive shoulder tension cracks and depressions along most of the runway shoulders caused by permafrost thaw of underlying foundation. *Note: This is a historic and ongoing observation that has also been noted in previous years' inspections. Due to the lack of availability of equipment and material at Boston, ongoing observation has been recommended to watch and track these areas.*	• Prior to landing any aircraft on the runway, the aircraft operators should conduct their own assessment of the runway conditions (in terms of functionality) and make recommendations for maintenance. – Permafrost degradation at the Boston airstrip is suggested to continue to be visually monitored each year during the annual geotechnical inspection. As part of future inspection, ground level photographs will be collected from similar locations and view directions for comparison with the observations made in 2019 (and past years). – The inspection will also include measurement of the width and depth of the tension cracks previously observed along the airstrip and extent of the thermal erosion feature adjacent to the lake, along with other descriptive characteristics that allow for evaluation of change over time. – Based on 2019 inspection permafrost thaw is ongoing but at a slow rate, with similar size cracking and depressions noted in 2018 as was noted in 2019. • Aerial imagery (taken by UAV /drone or from plane or helicopter) are suggested to be gathered in the summer months every year until additional maintenance activities are able to be carried out. This information would be used to assist better evaluation of changes related to permafrost degradation over time. • In the areas where extensive cracking has been noted by the shoulders of the runway, steel rebar pins (painted orange) are suggested to be installed / driven into the ground by hand. This would be done to set up reference points for measuring the lateral impact of permafrost degradation on the airstrip surface. The staked positions located off the airstrip will serve as reference points for measuring the lateral impact of permafrost degradation on the airstrip surface.

Observation	Recommendation
Ongoing progressive thermal erosion of existing erosion gulley west of the camp, upstream of Aimaokatalok Lake. *Note: This is a historic and ongoing observation that has also been noted in previous years' inspections. In 2019 work was done by TMAC to install silt fence downstream of the erosion gully to minimize the risk of sediment release to Aimaokalaok Lake. In additional, coconut matting was placed over the ensure area to help limit potential for further erosion and to help slow permafrost degradation.*	• Continue to monitor area carefully and implement permanent remediation if damage becomes excessive. Remediation may be deferred until Phase 2 Boston mining commences. – Thermal erosion observed adjacent to Aimaokatalok Lake should continue visually monitored each year during the annual geotechnical inspection conducted by SRK. – As part of the inspection, ground level photographs will be collected from similar locations and view directions for comparison with the observations made in 2019. Future inspections should also include measurement of the width and depth of the thermal erosion feature adjacent to the lake, along with other descriptive characteristics that allow for evaluation of change over time.
At the Boston Tank Farm, both the north and eastern berm was noted to have extensive cracking. This is expected to not be deep seated stability induced, but instead liner induced (material sliding on liner interface). In addition, within the bunded area during the August 2019 inspection pooling water was noted.	• No equipment should travel in the bunded area or rest on the top of the berms (would include generators of larger pump loads resting on the top of the berms). This likely means that fuel would need to be pumped into the tanks in the bunded area from outside. • This facility should be managed dry / water should be removed from within the bunded area. If any ponded water still exists within the bunded area then it should be removed. Specifically, this water must all be removed before the tanks are filled. This is required to ensure more containment area is available and sufficient capacity is available if there is a leak or spill. Also this will allow for any potential leaks to be identified earlier (as they will be more visually apparent if they exist). • Additional fill should be placed on the downstream east berm to lessen the oversteepened slope. This would be best if this could be done before the tanks are fully filled. At a minimum visual inspection should be done on this downstream slope as the tanks are filled, and after the tanks are filled. To best help with visual observations the areas of the primary cracking should be marked (such as with spray paint that can be reapplied each summer). This would be done to ensure that no increased signs of stability area resulting from the increased loading from the full tanks.

Sincerely,

SRK Consulting (Canada) Inc.



John Kurylo, MSc, PEng
Senior Consultant

Attachment 2

Recommendations and TMAC Responses – Boston (TMAC, 2020)

Table 1 *Boston Advanced Exploration Project: 2019 Annual Geotechnical Inspection Recommendations and TMAC Response*

Observation	Recommendation	TMAC Response
Extensive shoulder tension cracks and depressions along most of the runway shoulders caused by permafrost thaw of underlying foundation. *Note: This is a historic and ongoing observation that has also been noted in previous years' inspections. Due to the lack of availability of equipment and material at Boston, ongoing observation has been recommended to watch and track these areas*	Prior to landing any aircraft on the runway, the aircraft operators should conduct their own assessment of the runway conditions (in terms of functionality) and make recommendations for maintenance. • Permafrost degradation at the Boston airstrip is suggested to continue to be visually monitored each year during the annual geotechnical inspection. As part of future inspection, ground level photographs will be collected from similar locations and view directions for comparison with the observations made in 2019 (and past years). • The inspection will also include measurement of the width and depth of the tension cracks previously observed along the airstrip and extent of the thermal erosion feature adjacent to the lake, along with other descriptive characteristics that allow for evaluation of change over time. • Based on 2019 inspection permafrost thaw is ongoing but at a slow rate, with similar size cracking and depressions noted in 2018 as was noted in 2019. Aerial imagery (taken by UAV /drone or from plane or helicopter) are suggested to be gathered in the summer months every year until additional maintenance activities are able to be carried out. This information would be used to assist to better evaluate changes related to permafrost degradation over time. In the areas where extensive cracking has been noted by the shoulders of the runway, steel rebar pins (painted orange) are suggested to be installed / driven into the ground by hand. This would be done to set up reference points for measuring the lateral impact of permafrost degradation on the airstrip surface. The staked positions located off of the airstrip will serve as reference points for measuring the lateral impact of permafrost degradation on the airstrip surface.	The airstrip was assessed by Summit pilots prior to use in 2019 and will continue to be assessed prior to use each season. TMAC will carryout the recommended monitoring.
Ongoing progressive thermal erosion of existing erosion gulley west of the camp, upstream of Aimaokatalok Lake.	Continue to monitor area carefully and implement permanent remediation if damage becomes excessive. Remediation may be deferred until Phase 2 Boston mining commences.	TMAC will continue with the recommended monitoring.

Observation	Recommendation	TMAC Response
Note: This is a historic and ongoing observation that has also been noted in previous years' inspections. In 2019 work was done by TMAC to install silt fence downstream of the erosion gully to minimize the risk of sediment release to Aimaokalaok Lake. In additional, coconut matting was placed over the ensure area to help limit potential for further erosion and to help slow permafrost degradation.	• Thermal erosion observed adjacent to Aimaokatalok Lake should continue visually monitored each year during the annual geotechnical inspection conducted by SRK. • As part of the inspection, ground level photographs will be collected from similar locations and view directions for comparison with the observations made in 2019. Future inspections should also include measurement of the width and depth of the thermal erosion feature adjacent to the lake, along with other descriptive characteristics that allow for evaluation of change over time.	
At the Boston Tank Farm, both the north and eastern berm was noted to have extensive cracking. This is expected to not be deep seated stability induced, but instead liner induced (material sliding on liner interface). In addition, within the bunded area during the August 2019 inspection pooling water was noted.	• No equipment should travel in the bunded area or rest on the top of the berms (would include generators of larger pump loads resting on the top of the berms). This likely means that fuel would need to be pumped into the tanks in the bunded area from outside. • This facility should be managed dry / water should be removed from within the bunded area. If any ponded water still exists within the bunded area then it should be removed. Specifically, this water must all be removed before the tanks are filled. This is required to ensure more containment area is available and sufficient capacity is available if there is a leak or spill. Also this will allow for any potential leaks to be identified earlier (as they will be more visually apparent if they exist). • Additional fill should be placed on the downstream east berm to lessen the oversteepened slope. This would be best if this could be done before the tanks are fully filled. At a minimum visual inspection should be done on this downstream slope as the tanks are filled, and after the tanks are filled. To best help with visual observations the areas of the primary cracking should be marked (such as with spray paint that can be reapplied each summer). This would be done to ensure that no increased signs of stability area resulting from the increased loading from the full tanks.	• As a matter of site policy, TMAC limits the use of equipment or placement of any materials on top of containment berms. TMAC will continue with this practice. • TMAC will continue with seasonal dewatering activities as required. • Fill was placed along half of the berm to reduce the slope angle. This project was left incomplete due to an abrupt camp shutdown. The berm will be finished prior to filling the fuel tanks and the recommended monitoring program will be implemented.