



Review of Fuel Tank design at Goose Lake mine site, Back River Project

John Roesch <srproject@kitia.ca>

Tue, Aug 31, 2021 at 11:07 AM

To: Richard Dwyer <richard.dwyer@nwb-oen.ca>

Hello Richard, enclosed is a memorandum concerning the fuel tank design at the Goose Lake mine site for the Back River Project. Our geotechnical engineering consultant had reviewed the design and e-mailed his comments to me, which I in turn forwarded to Sabina. Sabina had added their comments to the original e-mail in red which I reviewed and forwarded to our consultant.

We have no further comments or issues with the design and Sabina can proceed with its construction.

Thank you.

John

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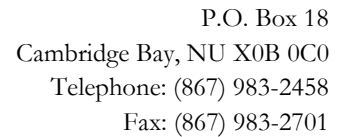
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KIA review of fuel tank.pdf

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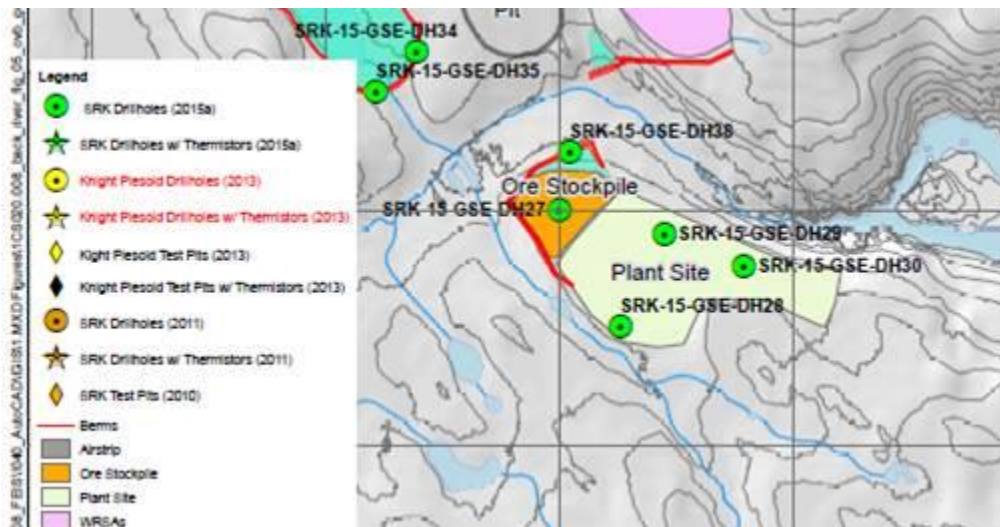




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boreholes per site. This standard is not binding for tank foundations, so it is really up to the developer what to do.

Sabina has numerous geotechnical holes in the Plant Site Area and specifically in the Fuel Storage Area at Goose collected during the original EA and Water Licensing Phase and in the years since. I will ensure this information is included in future applications. I have attached a map which illustrates the geotechnical holes drilled in 2017 – you will note there is one hole (17GGT012) directly on top of the 10ML fuel tank, 1 more directly in the in-Fuel Storage Area, and 2-3 more in the nearby vicinity. Below is also a snip from the Back River Property Geotechnical Design Parameters Report submitted during the original Type A Water Licence Application (171002 2AM-BRP---MAD App F-2_GeotechDesignRpt-IMLE) which illustrates additional geotechnical drill holes completed in 2015.



Map is provided by Sabina.

Based on the test pit information provided (SRK, July 27, 2021), the bedrock within the proposed tank footprint is encountered at depths between 0.0 and 1.8 m below ground surface at the time of the test pitting. SRK notes that some areas consist of loose blasted rock with soil and that this fill is not appropriate as a foundation for the tank, specifically when the bedrock / surface fill is uneven. I support those observations, as well as SRK's recommendation that:

- All blasted rock and/or soils to be removed to in situ unblasted bedrock. This should be followed by engineered fill to achieve designed tank elevation below liner bedding. Bedrock should be further blasted to achieve a level bedrock foundation.



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- Where the tank overlaps into a blasted area, bedrock steps down, the bedrock foundation should be levelled to avoid possible differential settlement.
- *The tank footprint was moved after investigation by SRK to avoid the uneven fill condition noted above. Please see the attached survey data 'tank 1 sub ex backfill' which shows the localized depressed bedrock surface and subsequent infill is not located under the tank footprint. The bearing surface under the tank is excavated to bedrock and is not subsequently backfilled, the backfill only happens to bring the area outside of the tank's footprint to matching grade. This should demonstrate that the bedrock under the tank is flat and level, and that the 1.8m bgs to bedrock referred to is not directly under the tank. As per the aforementioned design drawings in Appendix C of the Application document, there are no steps in the blasted surface below the tank; it is flat and level, and the tank in question is shown inside the bedrock surface boundary.*

I don't think that it is an issue, but I suggest that the granular material used for the berms as well as all the fill material are specified to be non-frost susceptible. The proposed graduation does not explicitly state that criterion, which I think is critical as the potential for ice segregation must be avoided.

Please refer to the tank application civil drawings in Appendix C, drawing 0013 and attached Earthworks Specification (Section 5). Materials under the tanks are classified as 'coarse gravel' and 'fine gravel' and neither gradation of material is anticipated to be susceptible to frost. The bulk fill in the berm is classified as 'minus 200' material which is a porous material essentially free of silt and clay, and therefore not anticipated to be frost susceptible.

In summary, I would support the construction of the tank, as long as the foundation is on competent, level bedrock and adequate (non-frost susceptible) fill is used. I would also suggest that at least one geotechnical hole be drilled within the footprints of the remaining tanks to confirm the absence of any ground ice and avoid surprises. Ideally, one (or all) would be instrumented with thermistors to monitor long-term temperature changes under the fuel tanks. *Please see the above response.*

Having received Sabina's responses, which are in red, KIA's geotechnical engineer has no further questions or concerns about the fuel tank design. The KIA believes that Sabina can proceed with the construction of the fuel tank at the Goose Lake mine site as planned.



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Thank you.

A handwritten signature in black ink that reads "John Roesch".

John Roesch, P.Eng.

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Kitikmeot Inuit Association, Department of Lands and Environment