Table 1	Summary of Review of Geotechical and Geothermal Issues		
Issue	**Comment**	**Recommendation**	**Trow Response**
Technical Deficiencies	The results of the geothermal analyses appear inconsistent with the methodology described.	The results of the geothermal analyses should be reviewed, and the design needs to better incorporate the results of the geothermal analyses.	The geothermal report has been revised, including updated Figures 3-3, Figure 4-1 and Figure 4-2 addressing comments in BGC letter section 4.1.
	Derivation of the value of the effective cohesion for ice layer used in stability analyses has not been adequately described or justified.	Provide basis for strength of ice used in stability analyses, noting that near the top of the ice layer, temperatures may be as warm as 0°C. Test sensitivity of cohesion value on stability analyses.	The strength of ice was based on Weaver and Morganstorm 1981. The strength of ice @ 0 °C **y** 90 kPa. Trow initially used a c of 100 kPa for ice. Trow revised the stability analysis based on c = 50 kPa and non circular failure and stability was not an issue. Please see the letter dated October 27, 2008 which addresses the geotechnical concerns.
Key Uncertainties	Derivation of design stratigraphic sections used in stability analyses has not been discussed. Design section does not appear to consider the results of the geothermal modeling, particularly for the ice layer.	Provide basis for design sections used. Test sensitivity of depth and temperature of ice layer on stability analyses.	Please see response above.
	Impermeable liner installed along side valleys of lagoon impoundment to minimize lateral migration of effluent. Liner to be keyed into permafrost or sound rock.	Rock is reportedly of poor quality; depth of sound rock or permafrost may be deep (greater than 3 m depth). If keying into permafrost, geothermal analyses should be carried out to confirm that the proposed 2 m key trench depth is appropriate.	The presently proposed liner key depth of 2 m combined with temperature monitoring of the containment structure is considered sufficient and appropriate. If temperature monitoring indicates thawing within the containment structure then mitigation may be applied as discussed in the geothermal report.
	Effects of predicted long-term permafrost thaw and warming beneath the upstream toe and lagoon facility on berm stability and settlement have not been discussed.	The effects of long-term thaw settlement and creep strain, particularly on liner integrity, should be addressed.	It is considered that any thaw settlement that developed within the native subgrade will induce compressive stresses on the liner system and as such will not induce tensile strains and tearing. It is expected that the berm will be thaw stable and experience minimal settlement.
	The source and quality of borrow materials for berm construction have not been finalized.	Specification for fill materials used for berm construction should be forwarded to the NWB for review.	Specifications for the fill material will be provided for review prior to tendering.
Ongoing Attention / Monitoring	The layout of the thermistor strings and sampling wells has been presented in Drawing L-1, with details shown in Drawing DE-2. No settlement and displacement monitoring program has been proposed.	To better understand and monitor the influence of the lagoon facility on the geothermal regime of the berm and permafrost foundation, the 2 m penetration depth into the subgrade soils should be reviewed. Additional thermistors should be installed in the lined key trench. A survey monitoring program is also recommended. The frequency of measurements and trigger values for remedial action will need to be described.	The designers are not opposed to the installation of thermistors within the liner key trench, provided that they are installed in a manner that does not compromise the integrity of the liner. These thermistors should be read on the same frequency as the other thermistor installations proposed by the designers.