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GNDOE-1	**General**	n/a	p2	supporting documents relevant for this technical review are inconsistent with the documents outlined by the applicant in a list (namely Doc. 502 dated Dec. 5, 2007). For example, the Bathymetric Surveys (Doc. 309) and the Incineration Waste Management Plan (Doc. 581) submitted for review, are not currently on the list. Additionally, at the beginning of this review, regulators such as GN-DOE received many documents through electronic mail and regular mail delivery	documents relevant for this review should be clarified	
GNDOE-2		n/a	p2		terms and conditions from previoulsy issued Type B water licenses (namely 8BC-TEH, 8BC-MEA, and 3BC-THE respectively), be incorporated into a single enforceable Type A water license that deals with management, mitigation and monitoring of waste and water related issues holistically	
GNDOE-3	**A. Water Quality**	Issue #1: Acid Rock Drainage and Metal Leaching	p8-10	It is noted...that analysis for neutralization potential (NP) has been reported as Sobek methodology and that the CaNP, based on CO2 analysis, are comparable (pg 10, Fig 3-4, Doc 425). Although these values are similar, in reviewing the geochemistry data presented to date some samples currently classified as NPAG because of NPR>2, may now be classified as PAG because the NPR<2 if using the CO2 determination for NP.	The applicant should clarify how changing NP determination using on-site analysis (i.e., CaNP test) affects material classification and waste volume calculations. In re-evaluating the ARD/ML potential over the next two years, the applicant should also revisit the existing database and confirm that waste volume calculations are still valid. These revisions should also be reflected in revised water quality predictions.	
GNDOE-4			p8-10	applicant suggests that segregation of PAG and NPAG IV may be difficult operationally (pg, 54, Doc 485) and that if it cannot be done then all the material will be managed to minimize ARD potential.	applicant should clarify how IV material will be managed if it cannot be segregated, and when the decision point will be made to segregate NPAG and PAG IV material. If the material cannot affectively be separated, it should all be managed as PAG.	
GNDOE-5			p8-10	applicant proposes that over the project life that total metal analysis will be assessed as a tool to indicate metal leaching. It has not been possible to make this correlation to date (pg 10, footnote, Doc 425), however, with on-going work on understanding geochemistry the applicant may be able to establish some useful correlations	In re-evaluating the ARD/ML potential over the next two years, the applicant should include an analysis establishing correlations between metal concentration and leach rates for NPAG material. They should also consider including some PAG material in these programs. Although the intent is to encapsulate the PAG material in order to mitigate leaching potential, the inclusion of these samples in the program may improve correlations by providing additional information with respect to maximum rates possible from material on-site	

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GNDOE-6			p8-10	applicant has also committed to using NPAG material in road construction (Table 2.1, Doc. 500)	Clarification of what ARD/ML screening criteria will be used for material used to construct site roads, and for exposed outcrop along the road that may be subject to cutting, should be included in the waste and water management plan. Given that work will continue on-site to improve geochemistry this work should be expanded to include access routes as well	
GNDOE-7		Issue #2: Water Management & Water Quality	p10-13	The applicant is proposing to construct the dikes primarily from materials mined on-site with the designs including a downstream rockfill, a filter zone and an upstream impermeable element (pg. 62, Doc. 485). The proposed design includes either a geomembrane liner or compacted till as the impermeable element will depend on the availability of till at the time of construction and the construction costs at that time. Water management also includes a network of ditches and sumps to facilitate site management of contact and non-contact water. The applicant has not provided detailed design or maintenance procedures for these structures, however, they do state commitments to ensure that the challenges presented by ice-rich ground will be considered (pg 65, Doc. 485).	The applicant should provide information with respect to: a) using the liner or till for the dike; and b) design details for the ditch and sump construction before work proceeds	

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GNDOE-8			p10-13	Discharge to the environment is planned to be from the attenuation pond through a diffuser into Wally Lake in the Vault area throughout operations. In the Portage area discharge to the environment is from the attenuation pond into Third Portage Lake during years 1 to 5, and from the reclaim pond to the open pit from year 5 to closure. Modelling indicates that the discharge complies with MMER at the diffuser discharge point, except during year 6 to closure in the Portage area; there are possible exceedances of cyanide and copper. In reviewing the provided information, GN-DOE notes that at the diffuser, the effluent quality has several parameters that exceed HC DW and CCME FWAL, and the applicant notes that these criteria will potentially be approached within a 30 m radius from the diffuser (pg 70, Doc. 485)	GN-DOE acknowledges that effluent plume modelling from the diffuser must account for effluent discharge, water quality and flow, however, the applicant should clarify at what distance the CCME FWAL criteria are met if it is outside the 30m boundary. As a minimum, the applicant should ensure the effluent discharge to the receiving environment meets the CCME FWAL criteria within a 30 m radius from the Third Portage Lake diffuser.	
GNDOE-9			p10-13	the applicant has developed a Water Quality and Flow Monitoring Plan (Doc. 450) to track changes in drainage chemistry. This plan incorporates compliance points (CM), where drainage is discharged to the environment and must meet MMER, and internal monitoring locations (IM) to monitor contact water across the site for operational purposes.	The proposed monitoring plan, and its associated triggers and response mechanisms are sufficient to address water quality issues over the mine life. However, GN-DOE suggests that the applicant confirms the data presented in Appendix C: Table C-1 in the Doc. 450 and clarify if these are the triggers for action for IM locations (i.e., are these 10x predicted "possible poor end"? pg 18, Doc. 450). Further, there is a commitment from the applicant that some locations will meet the HC DW criteria such as the pit lakes and adaptive management may need to reflect a change in applying MMER criteria to HC DW criteria over mine life. This consideration should be reviewed annually with the monitoring program.	

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GNDOE-10				the NIRB Project Certificate conditions (#9) include providing water treatment details for process and attenuation pond water. Proposed treatment methods are presented (Doc. 467) to address concentration of TSS, metals and cyanide species. GN-DOE acknowledges that water treatment would be implemented on an "as needed" basis during operation to ensure MMER compliance and implemented at closure to ensure flooded pit water meets HC DW prior to dike breach. A metal that seems to be of concern is arsenic and proposed treatment includes the addition of iron to the drainage prior to pH adjustment with lime (pg 11, Doc. 467). Current water quality predictions indicate that iron concentrations may be above the HC DW and CCME FWAL criteria under the "expected probable" case. Additional treatment for arsenic may introduce additional iron into the drainage, and for iron exceedances, treatment will be implemented by adding lime to precipitate the iron.	GN-DOE acknowledges that even the best models cannot compare with the evaluation of operational monitoring data that allow for refined predictions and management plans. GN-DOE therefore recommends that the applicant refines water quality predictions and management plans (i.e., treatment needs) based on updated monitoring data during operation.	

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GNDOE-11		Issue #3: Waste Management & Water Quality	p13	The Mine Waste and Water Management Plan (Doc. 500) indicates that dust-control water (pg 10-5) will be drawn from Portage attenuation pond for use in the Portage Mine Area and drawn from Phaser Lake for use in areas outside the Vault and Portage catchment areas. GN-DOE recognizes that dust suppression will be necessary to minimize contamination of soil and vegetation and will ensure visibility on the road and safe passage for mine traffic. It is anticipated that the road corridors will be part of the site water management system with ditches and sumps directing impacted drainage toward the attenuation ponds. However, there may be areas that fall outside the proposed water management network (e.g., Vault haul road)	GN-DOE recommends that water from the noted areas be used, unless on-going monitoring indicates that it exceeds MMER and will require treatment prior to discharge to the environment. If other dust suppressants are to be used, the applicant is to refer to GN-DOE *Guideline for Dust Suppression* issued under the *Environmental Protection Act* .	
GNDOE-12	**B. Waste Management**	Issue #4: Sewage Treatment & Management	p13-14	In the submitted documents, the applicant indicates that during mine construction treated sewage will be discharged to a fishless lake, namely Tear Drop Lake; however, it is unclear what the impact will be on the water quality in the lake. Page 10 and 11 of Doc. 355 indicates that a Rotating Biological Contacting (RBC) sewage treatment system will be able to meet a range of effluent quality (i.e., 4 to 40 mg/L for Biochemical Oxygen Demand and Total Suspended Solids). However, there is no further discussion on specific effluent discharge criteria that the applicant intends to meet	To ensure water quality of the Lake is not compromised, GN-DOE recommends as a minimum that the applicant meets *Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories* , and that monitoring at the lake be conducted to ensure the lake water complies with the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* .	
GNDOE-13			p13-14		the applicant should discuss contingency measures in the case of RBC malfunction, and indicate how and where the raw sewage will be handled and placed.	
GNDOE-14		Issue #5: Landfill Design Drawings & Management Procedures	p14-15	The applicant has provided preliminary design drawings for two proposed landfills	given that the project is in licensing stage and construction can be started once a water license is granted, the applicant should have the final design drawings available for review	

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GNDOE-15			p14-15	Page 11 of Doc. 458 provides a list of materials to be landfilled including asbestos, white goods (i.e., refrigerators), and light bulbs (items of concerns are fluorescent lamp tubes); however, the applicant has not provided detailed landfilling procedures for these items of concern.	The applicant is to refer to GN-DOE guidelines and policy documents regarding landfilling of asbestos, equipment containing ozone depleting substances, and fluorescent lamp tubes.	
GNDOE-16		Issue #6: Landfarm Design Drawings & Management Procedures	p15	The applicant has provided a preliminary design drawing for the proposed landfarm.	However, given the project is in the licensing stage and construction can be started once a water license is granted, the applicant should have the final design drawings available for review.	
GNDOE-17			p15	page 5 of the Doc. 564 states “if the soil and snow/ice cells do not have sufficient capacity to accommodate a large spill, a temporary stockpile area could be set up adjacent to the landfarm.” However, the applicant has not provided any further details on management and design of this temporary storage area. For example, how will this area be managed to ensure contaminants do not enter the surrounding environment? Will a liner be installed? What is the capacity of this temporary storage area?	The applicant should provide further design and management details regarding the temporary emergency stockpile area for hydrocarbon contaminated soil	
GNDOE-18		Issue #7: Remediation Guidelines for Hydrocarbon Contaminated Soils	p16	It is unclear which remediation guidelines the applicant intends to use, and what parameter will be measured, for remediation of hydrocarbon contaminated soil. Reuires clarification if intend to use one set of guidelines or the most stringent levels from combination of guidelines	The applicant should clarify the remediation guidelines that will be used for hydrocarbon contaminated soil, how the guidelines will be used, and what parameters will be measured	
GNDOE-19		Issue #8: Treatment and Monitoring of Hydrocarbon Contaminated Water	p16-17	when treating contaminated water by the oil-water separator, it is generally advised to include an additional filtration treatment step such as the use of an activated carbon filter. Further guidance on this can be found in the Government of the Northwest Territories Generic Plans and Operating Procedures of a Remediation Facility for Hydrocarbon Contaminated Materials in the NWT.	The applicant should consider additional treatment beyond the use of an oil-water separator for treatment of hydrocarbon contaminated water	

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GNDOE-20	**C. Spill Contingency Planning**	Issue #9: Spill Contingency Planning	p17-19; p23-25	GN-DOE believes the Spill Contingency Plan is generally satisfactory; however, we have provided specific comments below for further improvement. Additionally, GN-DOE recognizes the plan cannot be fully completed until the mine and associated infrastructure is in place and operational. Spill plans are evolving documents that must be updated from time to time to adapt to changing circumstances	*The applicant is expected to re-visit and revise their spill contingency plan when the mine becomes operational* ; subsequent to this, the plan should be re-visited and updated yearly.	
GNDOE-21	**D. Closure & Reclamation**	Issue #10: Closure & Reclamation	p19-21	The applicant has submitted a *Preliminary Closure & Reclamation Plan* (Doc. 511) describing how the project site will be restored after closure, and further indicated in page IV of Doc. 511 that a final version of the plan will be submitted. However, the timeline of this submission is unclear, and whether the applicant will seek consultation with relevant regulators such as GN-DOE on the final plan.	The applicant should clarify when the final closure and reclamation plan will be submitted, and should commit to submit this final plan to relevant regulators such as GN-DOE for review	
GNDOE-22			p19-21	GN-DOE is concerned about the proposed timeline for monitoring re-vegetation success at disturbed project sites post-closure.	The applicant should clarify when the final closure and reclamation plan will be submitted, and should commit to submit this final plan to relevant regulators such as GN-DOE for review	
GNDOE-23			p19-21	GN-DOE is concerned about the proposed methodology to restore disturbed wildlife habitat sites. The applicant indicates on page 11-2 of the Doc. 511 that they will cover the Tailings Storage Facility and Rock Storage Facilities with a layer of coarse grained waste rock, with potential to add another layer of fine till.	The applicant is recommended to cover waste rock piles with finer grain materials and/or to provide corridors through the rock piles to ease wildlife passage	

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GNDOE-24		Issue #11: Water Quality & Closure	p21-22	The closure plan incorporates the use of a cover of NPAG material to ensure geochemical stability on the Portage Rock Storage Facility (RSF) and the Tailings Storage Facility (TSF); however, it is proposed that the Vault RSF will not require a cover. It is presented that the decision to cap one but not the other is based on current geochemical understanding and the predicted water quality. The long term geochemical stability of the RSFs and TSF is dependent on assumptions that the establishment and maintenance of frozen conditions will occur, that the proposed classification of waste rock is correct, and that management plans will be appropriately implemented and mitigation measures are successful	The applicant should revise closure plans regarding the TSF and the RSFs as operational information and management plans are revised	
GNDOE-25				The Mine Waste and Water management plan (Doc. 500) suggests that freezing conditions will not be established until 10 to 15 years after operations cease and it is unclear the post-closure monitoring period (pg 14-2, Doc. 511) or if it incorporates thermal monitoring	The applicant should clarify the timing of post-closure monitoring of the TSF thermal conditions; the Mine Waste and Water Management Report (Doc. 500) suggests that freezing conditions will not be established until 10 to 15 years after operations cease and it is unclear the post-closure monitoring period	
					The applicant should commit to monitor thermal conditions within the Vault and the Portage RSF areas with mitigative measures implemented if predicted thermal response is not realized	
GNDOE-26				The applicant proposes that water quality in the flooded pits will be monitored and predictions indicate that the chemical constituents will comply with MMER criteria and CCME FWAL criteria except for arsenic, cadmium, chromium and manganese	The applicant should ensure the water quality of the flooded pits meets the CCME FWAL criteria (i.e., metals) prior to dike breaching	