Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
Care and Maintenance			
Processed Kimberlite Management Plan (PKMP)			
Part H, Item 1 – Schedule H	What are the potential environmental impacts of flocculants, as flocculants may be used to treat colloidal material in Cell B/C,		
	"CPK stock piles and berms will be placed around the perimeter of Cell A to increase the volume of the facility": • Will a new liner be placed on these dams? (Concern as the liner on the East and SE Dams only go to 523.5)		
	Apparent lack of operational water balance that takes into account: • How much PCKA water will be recycled; • How much fresh water will be taken in; • Volumes of FPK to be stored; • Is there adequate storage volume and retention time to allow water to clear for discharge?		
	A filter has been built into Divider Dyke A. • Will the filter zone become plugged? • Has this filter material been checked with FPK to determine if it will clog? • If yes, then what? • What is the flow rate through the filter if it does not plug? • Is the flow rate enough to account for inflow or will Cell A back up and overtop the filter due to low flow through the filter?		
	How quickly will the FPK settle out – • what is the operational water cap depth? • What if FPK remains in suspension rather than settle out?		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
Pit Dewatering Addendum (May 2011)			
	• What plan is there to mitigate the risk if discharge criteria are exceeded; what are the ramifications if the pit can not be drained?		
Site Water Management Plan			
Part F, Item 1 – Schedule F	It is not clear how the use of Ponds A, B, C will be invoked to capture runoff (if necessary), particularly Pond A which appears to be on a side slope with no retention structure.		
	Is the water balance for the PKCA reasonable? • What is the water balance for recycle versus fresh water for processing?		
	Are there any chemical constraints on recycle water?		
	How was the allowable freeboard calculated for the PKCA?		
	The amount of water planned for usage during C&M is not specified		
	What is the likelihood that Lake C1 will be adversely impacted by mining? • No monitoring points in the lakes (C1, C2) but rather in the diversion channel itself (SWF-08). • If yes, what to do with water - current plan is to discharge it via C1 diversion.		
	Was inspection during freshet done in 2010? • What was observed?		
	Note 2009 geotechnical inspection showed C1 Diversion Channel to be in good condition.		
	No preliminary design of C4 channel in the report, although it states that it would be included as Appendix A.		
	Given that the explosives storage etc. is upgradient of the C4 diversion, it may be prudent to establish a monitoring point along the channel or in Lake C4.		
	With respect to Collector Ditches and Site Grading, Shear states that during the spring and summer of 2011, Shear		

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	will initiate an assessment of all collection ditch infrastructure and site grading. Will there be a report to NWB on the results of this assessment?		
	What if water in PKCA does not meet guidelines to allow discharge? • Is there any contingency?		
	Concerns over the integrity of the tankfarm liner because of the potential sharp stones in the bedding and cover material: • Is there an adequate plan to ensure liner integrity, and a monitoring plan to determine if there is leakage?		
	The WMP states that water that has come in contact with hydrocarbon contaminated soil in the landfarm will be treated in a portable hydrocarbon water treatment unit, and that a description of the proposed treatment unit is described in the Jericho Landfarm Management Plan (LFMP, EBA 2011f). • There are no details in the LFMP of the details of such a unit.		
General Monitoring Plan			
Part L, Item 1 – Schedule L, item 1	The plan states that an Operations, Maintenance, and Surveillance Manual is being prepared for the PKCA dams and dykes • What is the status of the OMS manual?		
	Has a copy of the 2010 geotechnical monitoring inspection been submitted to NWB? • We were only able to obtain a copy of the 2009 report for review.		
	The previous GMP also described an automated water level recorder near the outlet of Lake C3. • Will this be replaced if unserviceable?		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	The report states that the level of Carat Lake will be recorded and compared to the predicted drawdown of the lake. Since there is no background data regarding the seasonal variations of the Carat Lake water level, the lake level records will be compared to the lake bathymetry to determine the percentage of total lake water volume drawn off for mine use. • We would propose that there should be a baseline plan for drawdown of Carat Lake as part of the site wide water balance. This plan would then be compared to actual performance, and then projected performance recalibrated.		
	Impounded water in the PKCA will only be discharged to the receiving environment upon verification that its quality meets the criteria specified in the Jericho water licence and upon providing the required notification to the NWB and the Inspector • Has water testing in the PKCA been reported in 2011 prior to discharge?		
Preliminary Landfill Management and Designs Plans (Feb 2011)			
Part D, Item 6 – Schedule D, Item 6	Is there any thermal monitoring or water testing planned in the old landfill before decommissioning?		
	The plan seems to be lacking detail with respect to cover material: • Are adequate volumes of cover available? • Source(s)? • How will cover be managed in the winter conditions: i.e high winds and frozen in situ and stock piles?		
	Burnt waste ash can concentrate contaminants of concern. How will potential wind spreading and lachate generation be prevented and mitigated?		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	With respect to the Wastewater Sludge Pit: • If solids placement is staggered around the entire pit perimeter as planned, fluid will concentrate in the centre. How will this fluid be handled and managed? • The report indicates that seepage from the sludge pit is anticipated. • Are there planned surface water controls in this area (minimize snow melt by snow removal prior to melt, minimize open pit size to alleviate ponding, sloping base so fluids can run to sump and be removed for treatment, etc.)? • What are anticipated volumes? • What is the design size?		
	The thermal performance (freeze-back of the landfill) is predicted with no measurements planned. • Shear should implement a temperature monitoring program for the landfill to compare actual performance to predicted performance. • This should be implemented for both the new landfill and the old landfill • If the landfill does not freeze back, is there a plan to monitor for leachate? • Can they provide modeled behaviour versus observed behaviour for other sites to provide confidence that the system will perform as designed?		
	Although there is a plan that precludes putting in certain types of waste, it is possible (likely?) that this plan will be violated from time to time. • If leachate is found, how will it be handled? • What is the experience from other mines in the region?		
	A framework for record keeping is proposed. • How will compliance with this be audited? (Particularly in light of previous owner's lack of data collection, keeping, and reporting.)		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
Preliminary Landfarm Management and Design Plans, dated February 2011			
Part D, Item 7 – Schedule D, Item 7	A concept level design for the landfarm completed by AMEC Earth & Environmental (AMEC 2004) included as part of the environmental impact assessment (EIS) submission a plan for the construction of a lined landfarm on the waste rock dump, and the creation of a separate facility to accommodate contaminated snow. These separate facilities were incorporated into the conditions of the water licence. Shear proposes that limited contaminated snow volumes be admitted to the landfarm, as opposed to being dumped into a separate area. • This change will require a modification to the existing license		
	The plan states that co-contaminated soils or heavy-end hydrocarbon contaminated soils will be treated in a separate facility or disposed of offsite. • In the review, nothing was found detailing a separate facility to treat heavyend PHCs. The WMP says there will be no treatment of these and that they must be moved off site. This dichotomy should be resolved.		
	The estimated existing PHC contamination volume is 6,500 m3. Shear estimates an additional 2,500 m3 of PHC-contaminated soil will be generated throughout the remaining mine life, for a total PHC-contaminated soil volume of 9,000m3. • Given the historical spills in ~2 yrs of operation, the future estimates of spill volumes appear extremely low. • Is there adequate capacity to treat this this and future spills? • What is the anticipated treatment time for the anticipated volumes?		
	Shear is planning to pump and treat contact water regularly		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	to reduce water levels in the sump. • No details on how water will be treated were located in the review.		
	It appears from the design review, that the capacity of the sump is to hold one year's worth of precipitation for the 1:10 year event. • Water treatment capability will have to be in place prior to commencement of the use of the landfarm		
	Impound water meeting the applicable discharge criteria will be discharged to the Processed Kimberlite Containment Area (PKCA). • What discharge criteria will be used?		
	The landfarm management strategy appears to be adequately documented, however, to the uninitiated, control of the environment, sampling etc. is likely to be poorly understood. If a landfarm is to be operated, some form of control of personnel or the use of consultants to support the operation should likely be specified. Since there are currently approximately 6500 cu. m that need to be treated, Shear should be queried on just exactly how they envisage this being conducted and supervised.		
Waste Rock Management Plan, dated February 2011			
Part H, Item 3. Schedule H (Item 2)	From section 3.3.2: In summary, the testing results indicate there are relatively few concerns with respect to ARD and metal leaching from the waste rock. However, based on the observations of isolated sulphides on boulders in the development waste pile and elevated uranium in the development pile seepage, the waste rock solids will be monitored during mining to appropriately identify and manage any isolated materials that could require special handling.		
	From section 3.3.4: In addition to the minor issues related		

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	to the geochemical properties of the rock, ammonia and nitrate from blasting and fine sediments in the waste rock and overburden may cause water quality issues in seepage and runoff from these areas. Measures to control blasting residues and reduce suspended sediments are provided in the Jericho Explosives Management Plan (TDC 2005). • It will be necessary to monitor for ammonia and nitrate concentrations in contact water.		
	From section 5.4.1: Waste rock will be hauled to the dump using off-road mine trucks on all-weather mine access roads. At the dump, the waste rock will be end-dumped and spread with a dozer to make a flat surface for the mine trucks to drive on. <u>It has been previously noted that end dumping of trucks loads down the slope of the dump may segregate the rock and form a (desirable) drain at the bottom of the slope.</u> In addition, end dumping may prevent nesting of coarse particles at the crest, ensuring the slope remains at the angle of repose and is not "oversteepened." Shear will investigate options that involve end-dumping down the slope; however, the safety of the truck driver must remain the primary consideration and, in general, pushing with the dozer is the safer option. • The underlined sentence would imply that no rock drains are designed into the waste dumps. • Could this result in fluid pressure build up? • It is generally good practice to design and install rock drains in zones where flows may be concentrated. Is this a consideration?		
Waste Management Plan (Feb 2011)			
Schedule H	No concerns with the WMP at this time.		
Aquatic Effects Monitoring Plan			

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
Schedule L	Shear identified the following deficiencies, which they have undertaken to address already: • No detailed information is available regarding condition of Control Lake, Lake C4, Lake C1, streams C1, C3 and C4. Shear proposes to obtain this information as part of the current Care and Maintenance activities. • Shear questions legitimacy of the Control Lake, as it lies within a potential indirect impact zone. Before continuing baseline studies, a review of this lake will be conducted by Shear. A new control lake (Reference Lake 2) selection process will be undertaken to identify a candidate lake that can better serve future monitoring requirements. • Shear indicated that previous rationale for site selection and sampling for AEMP was incomplete and sparse. Will a new site be added to improve coverage of indirect project effects and enhance controls? • Ammonia, copper and TSS are main contaminants of concern from PKCA. Consideration for monitoring		
Interim Closure and Abandonment Plan, dated February 2011			
	Section 6.1 of the report states that the till stockpile is located on the north central side of the present Waste Rock Dump 2 confined by a toe berm. • Given that the till will likely freeze, why not put on a southern exposure to mitigate freezing if the till is to be used in reclamation?		
	Section 7.1.2 of the report states: Freeze back of the dumps is expected to occur in the first few years following deposition. From the WRMP: At Waste Dump 1, Shear expects to install a multi-thermistor ground temperature cable (GTC) at least two locations within the final stage of the dump. Similarly, at Waste Dump 2, two GTCs		

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	will also be installed. • When will these be installed? (The report says "within the final stage of the dump") • Where? • Elevation? • Vertical or horizontal? • The earlier the thermistor strings are installed, the sooner the data is available, the sooner the models can be calibrated, and if the thermal behaviour is as anticipated, the sooner there is confidence in the plan. Alternately, if thermal performance is not as anticipated, contingencies can (and should) be planned and implemented prior to closure.		
	Section 7.3.4 of the report states: Alternatives to overburden cover include rock armouring should overburden cover not prove practical. Based on experience at the EKATI Diamond Mine, direct placement of vegetation on CPK is unlikely to be successful. However, creation of microhabitats to prevent sand drifting will be investigated as part of revegetation trials. • There seems to be a lack of understanding about behaviour of CPK. What happens at other mines?		
	Section 7.4.3.1 of the report states: If trends in water quality indicate discharge on closure may be problematic, at least one year prior to closure, testing of PKCA supernatant water will be undertaken with the goal of selecting a system that will treat the water to Water Licence objectives. • What types of problems are anticipated? • What type of treatment is planned?		
	Section 7.4.3.2 of the report states: At closure, ponded supernatant water will be pumped to Stream C3 if water meets discharge criteria or treated as indicated from operational experience prior to closure to meet these		

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	criteria. To minimize long term stability risks, the dam will be breached; the final discharge elevation will be determined as part of final closure planning. The West Dam will, therefore, no longer perform or be classified as a dam. The discharge elevation will be set so that FPK in the upstream pond does not wash out through the discharge. Natural discharge from the basin is expected to be restored with these measures. • We are uncertain that adequate details are provided with respect to the dam breach, and associated retention of FPK. • This harkens back to a lack of detail on how much FPK will be stored, how it will sediment out in Cell C etc.		
	Section 7.6.3 of the report on Long-term Stability states: Preservation of the permafrost between the open pit and the channel is of utmost importance. Permafrost degradation could result in seepage losses toward the pit wall resulting in possible pit wall instability. To avoid seepage losses, the up-gradient and pit side embankment of the Stream C1 diversion is designed with a minimum 5 m wide running surface to permit heavy equipment traffic and to positively preserve and aggrade permafrost. Furthermore, an approximate 2 m insulating sand and gravel/rock cover will be used in the zone between Reach C and the pit crest in areas suspected to contain high levels of ground ice. Fills used for the embankment adjacent to the channel will be chosen selectively to provide low permeability when frozen to act as a natural liner/cutoff. Geothermal and hydrogeological considerations will determine the berm dimensions and therefore the berm dimension will exceed those that would be required to control runoff if the channel was simply lined with a geosynthetic liner. • Given the importance implied above, is there any plan		

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	to monitor the geothermal conditions?		
	Section 7.6.3 of the report describes the management of borrow areas. Borrow area reclamation can be problematic, particularly if they are near water bodies and melt of ice-rich materials leads to sediment transport. • We suggest a detailed inventory of borrow areas be developed and a reclamation plan for each be developed so they can be reclaimed in an ongoing and timely manner rather than leaving it all to the end of the mining operation.		
INAC Intervention – Jericho Diamond Mine – Tahera Diamond Corporation Water Licence Application, Dated November 2004			
Water Quality			
	Did Tahera submit the plan on effluent discharge indicating in detail how effluent discharge rates will be managed to ensure a minimum 10:1 dilution at the edge of the mixing zone in Lake C3?		
	Are the Shear aquatic thresholds for Aluminum reduced from the Tahera value that INAC took exception to? • INAC had recommended monitoring of fish flesh or zooplankton populations to detect potential impacts for cadmium, copper, and uranium. Does the Shear AEMP include this testing?		
	INAC found the discharge limits for 6 parameters to be unnecessarily high (ammonia, nitrate, nitrite, chromium, zinc, and aluminum). • Do the Shear discharge limits address these concerns?		
	Does the West Dam include a spillway as recommended by INAC? • If yes is there a spillway rating curve?		
	Have the erosion protection requirements for stream C3 been assessed?		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
	INAC recommended monitoring seepage towards the Key Lake catchment. There does not appear to be any monitoring in the Shear plan for this monitoring.		
Closure and Reclamation			
	Has the uncertainty associated with potential effects of Uranium leaching and other metals been resolved?		
	Post closure water quality is a concern, particularly for Cd and Cu, and U. Has any water quality testing been done on the current water in the pit? This may provide some insight as to how it will perform post closure. • If yes - what were the results? • If yes, what does the A&R plan say about long term management of this water? • Also, if no, this does not ensure avoiding problems in the future, so the A&R plan should still discuss how it may deal with this issue.		
	How are land versus water reclamation costs and security being managed? (INAC recommended NWB deal with water only, and land costs be managed through INAC and KIA).		
	INAC recommended that "any revisions to the A&R plan should trigger a security review under both the water licence and the land leases".		
C1 Diversion Construction Summary			
	Reach A and Reach C may experience some settlement due to either poor compaction of frozen material or thaw of ice rich fill. What is the current status of these areas?		
	The design was intended to have permafrost aggrade into the fill. • Did this indeed happen? • Was there any monitoring to determine this? (No evidence was found in the reports reviewed.)		

Indian and Northern Affairs Canada
Technical Information Requests
Jericho Type 'A' Water Licence Renewal
June, 2011

Licence Condition	Concern/Comment/Question	Response	If no response, date response proposed by
Items Apparently not Addressed			
Part H, Item 5	Operation and Maintenance Plan for Wastewater Treatment Plant, Landfill and Landfarm		
Part L, Item 5	QA/QC Plan requires approval of an analyst; no commitment has been made to provide and updated plan and submit for approval		
	A schedule to identify outstanding compliance items of the Licence and the time frame for submission of information or carrying out the activity, to bring the Licensee into compliance. The 'plan for compliance' should address the concerns and issues brought forward by the inspection of December 11, 2010.		
Part M, Item 7	Updated estimate of the total mine closure and restoration liability using the most current version of RECLAIM, its equivalent or other suitable method approved by the Board.		