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Jericho Mine Site Inspection Report

December 11, 2008

Background

On October 21, 2008 the Manager of Water Resources, INAC sent correspondence to Mr Mike Johnson, Director of Operations, Tahera Diamond Corporation requesting a written plan of action (by Nov 30/08) that would address deficiencies/concerns noted during an INAC site inspection on August 5 – 7, 2008 and as a result of a review by INAC Water Resources staff of Tahera's 2007 Annual Report to the Nunavut Water Board (NWB). These deficiencies/concerns were, among other things, elevated levels of nitrates in Lynne Lake due to possible run-off from the ANFO storage pad, the pumping of accumulated wastewater contaminated with petroleum hydrocarbons from on site fuel and waste storage related secondary containment structures to the East PKCA (tailings impoundment), fuel leakage/spillage at fuel transfer stations, improper storage and labelling of waste material and contaminated soils/substrate within secondary containment at bulk fuel facilities (due to spillage).

On December 8, 2008 Mr Johnson submitted his response. The report addressed many items requested in INAC's October 21, 2008 request and appeared to provide an up to date "snapshot" of environmental conditions, including current inventories of fuel and liquid waste, at the site. Some remediation activity had been completed, however Mr Johnson's response stated that any long term workplan or proposed activity by Tahera employees would be impossible to implement due to the fact that financial resources for the site would be depleted to the point that Tahera would no longer be able to support care and maintenance at the site. Mr Johnson also advised that it was "entirely likely" that after December 15, 2008 Tahera would no longer be able to perform its corporate duties or employ anyone at the site.

It was decided that INAC should perform a site inspection with other interested parties, namely, the Kitikmeot Inuit Association and the Government of Nunavut to verify Mr

Johnson's report as well as to assess the environmental risks at the site. This inspection was undertaken on December 11, 2008.

General

- attendees at the site included Kevin Buck, Manager Water Resources, INAC, Melissa Joy, Water Resources Officer, INAC, Stanley Anablak, KIA, Kevin Tweedle, KIA, Froedis Reinhart, GN
- arrival at Jericho mine site via charter – 1010 hrs
- staff present at site – James Turcotte, Supervisor (licensed plumber, gas fitter, etc.), Kevin Osmond (STP Operator), and Chuck Dorion (millwright).
- Mr Turcotte (JT) provided daily operational log sheets for review that indicate daily checks were undertaken at all fuel and waste storage areas, fuel dispensing facilities and the on site sewage treatment plant (STP).
- Office and other facilities were clean and well kept
- JT further advised that there was no current discharge from the West Cell to the receiving environment (Stream C3), no waste has been deposited at the industrial solid, non-hazardous waste landfill since the summer, no industrial waste had been deposited in the Waste Rock dump sites, general waste is incinerated every 2nd day, daily samples are taken at the STP and analyzed, on-site, for dissolved oxygen (DO) and ph, all fuel line seals and joints had been repaired, and that sewage sludge had been removed from the STP and disposed of at Waste Rock dump site # 1 app 1 month ago (as per license).
- at this point the inspection of on site facilities commenced. JT was familiar with the Dec 8, 2008 report to INAC prepared by Mr Johnson and had, in fact, contributed to the report.

Vehicle Pumping Fuel Transfer Facility

- this site was noted to have leakage/spills and contaminated soil during the August INAC inspection
- JT advised and it was observed that a plywood drip tray had been installed and a spill kit added to the area. Some contaminated soil had been removed and all hoses, seals had been repaired – no leakage was observed.
- This refuelling station is connected to a 62,000 litre "day tank" which is inside the secondary containment of the Main Fuel Tank Farm and is used primarily for vehicle re-fuelling. This facility is outside the secondary containment berm.
- Causes of the leakage/spills have been determined to be poor maintenance and fuel handling procedures – site is inspected daily now.

Bulk Fuel Transfer Facility

- This site is just east of the vehicle transfer pumping station referred to above and was also identified during the August INAC inspection as having some leakage and evidence of spills. This station is also outside of the secondary containment structure for the Main Fuel Tank Farm.
- All leaking pump and distribution line joint seals have been repaired or replaced and absorbent pads have been placed on the floor inside the station. A spill tray was outside and a spill kit was evident. Daily checks are now made at this site.
- This transfer station is the distribution system for off-loading fuel to the Main Fuel Tank Farm tanks, including the "day tank". (photos taken - #1 a-b)

Generator Day Tank

- This is a 62,000 litre fuel tank located just to the east of the main accommodation building and is used to supply the on-site generators. The tank is in a bermed and lined secondary containment structure.
- Evidence of leakage/spills in the form of stained base material within the secondary containment and leaking joints during August INAC inspection.
- The fuel to this tank is supplied via underground pipe from fuel storage tanks in the Main Fuel Tank farm. The underground pipe is unprotected and leakage could occur undetected, especially small leaks. JT advised that the fuel distribution line joint at the pipe entering the generator fuel tank area had been leaking and was recently repaired. This caused some contamination in the berm construction material.
- Site is checked daily

Main Fuel Tank Farm

- Fuel tank farm consists of two phases – Phase 1 is a lined, bermed containment area surrounding 8 – 522,070 litre tanks – these tanks are considered empty of usable fuel but still contain an aggregate of a app 104,000 litres. This remaining fuel is likely a waste and is usually considered as "tank bottoms" (possible sediment contamination) at these types of facilities. Phase 2 is also lined and bermed (there is a berm separating the two phases) and contains 4 – 1.5 million litre tanks. At this time two of these tanks, #9 and #11 contain fuel used at the site. The total amount of usable fuel is app 1.8 million litres. The two tanks that are not in use contain app 84,000 litres of non-usable fuel. Leakage from seal, pipes, valves, etc have occurred within this tank farm in both phases thus the substrate is contaminated. There has, in the past, been a 2,000 litre spill within the tank farm (due to overfilling).
- JT advised that all leaks have been repaired and the site is inspected daily.
- Ice in the Phase 2 area was observed to be clear and no obvious free product was noted within the berm. There was a significant accumulation of snow within the containment areas.
- All fuel at this site is diesel. (photos taken - # 2 a-c)

East PKCA

- This is the tailings disposal facility for the mine.
- There is concern because the company has been pumping accumulated water contaminated with petroleum hydrocarbons from all on site secondary containment areas including the waste transfer area (WTA) containment. The company is of he opinion that the current water license allows this and there is some question in this regard.
- The STP discharges to the East PKCA on a batch basis.
- The area was frozen and solid.
- No leakage or flow was observed at the divider dike which separates the East PKCA from the West Cell (polishing area prior too discharge to the receiving environment) – normally liquid filters through the divider dike and accumulates in the West Cell. This water is then sampled to ensure compliance and is ultimately pumped to the receiving stream – C3. Data from the 2007 Annual Report indicates that the site was in compliance during the discharge. Discharging usually occurs during the summer months of July, August, September. While Oil and Grease is a parameter that is sampled for, no specific test for petroleum hydrocarbons is required by the license. Tahera has been pumping accumulated wastewater from the secondary containment structures since operations commenced. Based on sample results provided by Mr Johnson of the wastewater (low loading compared to volume) and the procedures utilized during the pumping process any petroleum like contaminants from this source are likely minimized and bioremediated within the tailings facility or filtered out by the divider dike. However it would be appropriate to sample the contents of the West Cell for petroleum compounds associated with diesel fuel prior to the 2009 discharge to confirm this.
- The West Cell level was app 5 – 10 Metres below the East PKCA and ice was present (frozen). (photos taken - #'s 3 & 4)

<u>Sewage Treatment Plant (STP)</u>

- The STP was operating in a satisfactory manner – wastewater in the effluent chamber was relatively clear and there were no sewage type odours.
- The operator samples daily for DO and ph using on-site instruments – samples are sent out every 2 weeks and analyzed for BOD, TSS, and FC in accordance with the water license.
- The treatment system utilizes a rotating biological contactor (RBC) and a film was present on the unit.
- The STP was being operated in automatic mode and discharging occurs by batch (not continuous) – discharge to East PKCA
- The operator was "feeding" the system dog food as the nutrient loading is minimal due to the small staff compliment on site. Bacteria in the RBC require "food" to survive. It can be difficult to get these types of systems restarted if there is a bacteriological die-off or plant shut down. Another possible solution would be to recirculate generated sludge back to the influent stage of the system to assist in the treatment process.

- Sludge currently removed 1x/mo and disposed of at the Waste Rock dump as per the water license.
- JT advised that all staff at the site would be trained in the operation of these types of systems so that they would not be dependant on one staff member.

Waste Dumpsite # 2

- Most of this area is on Inuit Owned Land
- Runoff is collected and directed to the East PKCA
- Area contains overburden/waste rock from the open pit mining process
- The site incinerator is located here as well as an open burning area – according to JT only clean wood and like is burned. The area was snow covered.
- Incinerator not operating at time of inspection
- Evidence of solid waste disposal – difficult to determine due to snow (Photos taken - #'s 5 a-c)

Waste Dumpsite # 1

- Just North of Site #2
- Waste rock from open pit process
- Appears that app ½ of this area is on Inuit Owned Land
- Industrial Landfill area appears to be on Crown Land and contained some building material ant structural steel
- STP sludge also disposed of here – observed to be frozen and quantities were not large
- Run-off is collected and directed to the East PKCA as per site Water Management Plan – analysis results indicate that waste rock is non-acid or minimally acid generating (photo taken - #6)

Explosive Area Emulsion Plan

- Site is on Inuit Owned Land
- Fuel spillage, stained soil around refuelling area and leakage observed during INAC August, 2008 inspection
- Fuel tank is double walled and is on a shallow concrete base – 22,000 litre tank
- JT informed that all fuel had been removed from the tank and the site is no longer in use.
- Remediation of contaminated soil in this area will be required

ANFO Storage Pad Area

- Area was clear of all Nitrate Prill - there was app 50 – 75 bags of concrete
- This site is just east of the Emulsion Plant and is also located on Inuit Owned Land.

- There is concern as Lynne Lake (East and downgrade) had elevated levels of Nitrate detected during routine monitoring by INAC (2007) and reported in Tahera's 2007 Annual Report. Results from INAC and Tahera sampling in 2008 indicate minimal, if any, sustained impact to Lynne Lake. Also, as the likely source material has been removed from the site, the environmental threat has diminished significantly. This should be confirmed during the 2009 sampling season. (photo taken - #7)

Open Pit

- The mining area was not fenced however there was no evidence of recent human or animal activity – no tracks in snow (photo taken - #8)

Waste Transfer Area

- This is a lined and bermed containment area – within the structure is a divider berm creating 2 distinct cells.
- During the August, 2008 INAC inspection it was noted that drums of waste material were open to the elements collecting precipitation, waste was improperly stored with no labels (non-identifiable), etc
- At present all waste in the site was neatly stored and properly labelled – contaminated soil is predominantly in the West Cell and is tarped.
- Mr Johnson provided a complete inventory of wastes and product stored at this site in his December 8, 2008 report to INAC. Observations on the date of inspection verified the information in his report. Drums of fuel for aircraft servicing the site are also stored here and not at the airstrip.
- Some remediation may be required due to previous spillage at the site. There are 4 – 62,000 litre tanks in the West Cell, of which two contain app 60,000 litres of contaminated fuel from a previous spill (at the airstrip). The other two are empty
- There is another 62,000 litre tank located in the East Cell which contains app 22, 000 litres of waste fuel and glycol mixed.
- There is a significant amount of liquid waste material on the site
- There is also an accumulation of snow inside the containment
- Photo #'s 9 (a-e)

Airstrip Fuel Tanks

- There are 2 – 62,000 litre fuel tanks at the airstrip located within a lined, bermed containment structure. This is the site of a previous spill in the amount of app 47,000 litres. Most of the liquid from this spill was collected and is now stored in the WTA. The material in this secondary containment area is the most heavily contaminated on the site at the present time.
- This system is longer in use for the re-fuelling of aircraft however the tanks do contain an aggregate of 60,000 litres of Jet A fuel. JT advised that this fuel had expired for aircraft use but could still be utilized in the onsite boiler or to fuel

portable heaters. Eventually it may have to be removed from the site as liquid waste.
- There is snow accumulating within the bermed area
- Remediation will be required at this site (photo taken - #10)

Drum Storage Area – Airstrip

- During August INAC inspection it was noted that fuel drums stored at the site had inadequate secondary containment. The instaberm equipment had been trampled and/or dismantled.
- All fuel drums were removed and placed within the WTA area which provides secondary containment – the only drums now stored at the airstrip are empty – app 600 (photo taken - #11)

Truck Shop - Boiler Feed Fuel Tank

- 18,000 litre double walled tank mounted in a shallow concrete pad
- Concrete pad has settled unevenly – 12" in total
- Concern for stress on distribution fuel lines potentially leading to a spill
- JT advised that he removed a fuel line hangar support bracket from the piping stands which has relieved related pipe stress
- Concrete pad should be repaired during summer months and installation of flexible lines should be considered to minimize spill potential
- System is monitored on a daily basis

Conclusions/Recommendations

1) Based on observations made during the inspection it would appear the Mr Johnson's December 8, 2008 response report to INAC provides a relatively accurate "snapshot" of the current environmental conditions at the site. Tahera staff addressed many of the concerns stated in the October 21, 2008 correspondence to INAC. For example, all wastes are stored properly within the WTA and a complete inventory has been provided. In addition, leaking pump seals and other fuel distribution equipment has been repaired. Mr Johnson further identified areas of contamination within fuel containment structures on site. Also provided are an inventory of on site fuel supplies which are significant in volume (app 2.5 million litres). The report certainly provides a good reference for the development of an environmental remediation program.

2) Due to the volume of fuel and liquid waste currently on the site it would be prudent to ensure that there is a staff presence and the systems are kept operating. There are several fuel related risks that having staff on site would minimize. These include site security – if no staff are on site persons could travel to the site and remove fuel leading to the likelihood of spills that could impact the area water and land, the underground fuel line to the generator day tank which is unprotected

- any leakage (due to frost heave?) could go undetected causing soil contamination, and finally the accumulation of precipitation (currently present) within the contaminated secondary containment structures, which in the past has had to be pumped out to prevent overflow and likely impacts, must be monitored to prevent discharges. Currently staff are monitoring all fuel related tanks, containment, piping, joints, valves, etc on a daily basis – if a spill or breach occurred it can be rectified in an expedient manner thus minimizing potential impacts. If no persons were on the site and a breach or failure of a large fuel tank occurred it would go undetected and the potential for a significant environmental impact is high. It is further recommended that staff on site commence removing clean snow in the containment structures so as to minimize the accumulation of contaminated wastewater generated during the spring freshet.

3) The STP should be kept operating to ensure that effluent meets design criteria. When these systems are shut down it can be difficult to develop the correct amount of biological film on the RBC.

4) Consideration should be given to creating a working group as soon as possible consisting of KIA, INAC and the NWB to develop a final reclamation/remediation plan as well as amending the current water license to reflect the present conditions and possible future activities at the site, ie sample monitoring, waste disposal, water use, etc. This same working group could possibly develop a partnership that ensures that the site is reclaimed in a manner that minimizes environmental impact and such that the land and water can used for future use – whatever that may be.

5) The existing Main Fuel Tank Farm contains two cells. The aggregate base material is contaminated and will require remediation. The Phase 1 area, because it is already lined and bermed, and not in use for fuel storage, could be considered as an area to conduct landfarming of contaminated soil. Another area that should be considered is the current WTA, which is also a lined containment structure (most of the contaminated soil is already stored at this location). The utilization of these existing structures, provided NWB approval is obtained, would provide cost savings during any reclamation process.

6) To summarize, there appear to be no imminent environmental threats at the site provided daily monitoring of the above stated risks are being undertaken (which they are)

Melissa Joy, INAC Water Resources Officer

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