



Memo

To Ms. Lori Stevenson
Manitoba Infrastructure & Transportation, Crown Lands and Property

From Wilson, Jennifer

Date September 24, 2013

Document No. I301660200-MEM-V0005-00

Project Name TANCO Mine: Crown Pillar Mitigation Project

Subject Supplemental Information

BACKGROUND

Tantalum Mining Corporation of Canada Ltd. (TANCO), a wholly owned subsidiary of Cabot Corporation, currently operates the TANCO Mine under Manitoba Environment Act Licence No. 973. The TANCO Mine is located approximately 160 km northeast of Winnipeg, Manitoba and 70 km northeast of Lac du Bonnet, Manitoba (Figure 1).

The TANCO underground mine is unique in that three distinct mineral products - tantalum, pollucite, and spodumene - are mined concurrently from the same deposit and that in addition to producing mineral concentrates, the facility includes a chemical plant for the production of cesium chemical products. The operation's mining and milling production capacities are 1000 t/day with typical daily targets of 545 t/day tantalum, 300 t/day spodumene, and 100 t/day pollucite. At present, Cabot is mining and milling only pollucite.

Over its 40 year history, the mine has stimulated the regional and local economy through employment and expenditures relating to materials and equipment. At peak operation, the mine employs 150 persons as well as several contracting companies, most of whom reside in the Lac du Bonnet/Pinawa area. TANCO spends approximately \$9 million on payroll each year and \$28 million in total annual spending.

The deposit at Bernic Lake is believed to contain two-thirds of the world's known reserve of pollucite which contains cesium. TANCO is the sole global supplier of cesium formate to the oil and gas industry – a drilling fluid product of choice due to its superior safety and environmental characteristics. TANCO estimates that the remaining mine life, based on known reserves and production rates, is five to ten years. TANCO is currently evaluating options to extend mine life through alternate mining scenarios/methods.

NEED FOR THE PROJECT

The crown pillar at the TANCO Mine is unstable and requires immediate action. For the second time in three years, a significant quantity of rock (over 1000 tonnes) has fallen from the ceiling of the TANCO mine in an area of the mine that is directly under Bernic Lake. Following the second fall of ground (FOG), Cabot took additional measures to fully understand the risks to the mine by hiring an external consultant to investigate the stability of the mine's crown pillar.

The consultant's review concluded that the crown pillar of the TANCO Mine is unstable and at risk of deterioration. As a result of these findings, Cabot immediately stopped mining to ensure the safety of mine personnel and took necessary action to more fully understand the options to mitigate risks to the local environment. Cabot installed robust and proven monitoring equipment, enhanced existing systems, and engaged external consultants to fully understand these findings. The TANCO Mine is critical to Cabot's Cesium Formate business and the communities surrounding the mine.

A failure of the crown pillar under the lake could have significant consequences on the aquatic environment of Bernic Lake, the safety of Cabot's employees, the communities that depend on the mine to provide direct and indirect benefits, and the long-term outlook for Cabot's business globally, and especially in Manitoba. It is of the utmost importance that the Company moves forward promptly to mitigate the potential risks associated with the anticipated crown pillar failure.

Cabot must take action to isolate the mine from Bernic Lake to slow the deterioration of the crown pillar and mitigate the risk of flooding of the lake into the mine. Construction of a dike and dewatering of the west basin of Bernic Lake immediately mitigates this risk.

PROJECT OVERVIEW

Several alternative measures were considered in developing a plan to mitigate the effects of a breach of the crown pillar and the structure of the mine. A third-party technical review was conducted by engineers and biologists to assess possible options for the protection of mine personnel, the aquatic environment of Bernic Lake, and mine workings. Isolation of the mine from the lake was identified as the safest and most practical approach to ensure the long term viability of the operation.

The project has two main phases:

- Phase One: Construct a temporary dike in Bernic Lake at the narrows and dewater the west basin of Bernic Lake. This will immediately mitigate the risk of water flooding into the mine in the case of a subsequent fall of ground and/or breach to the surface.

- Phase Two: Construction of a permanent dike closer to the mine workings. Phase two will take 2-4 years to complete and is presented in this document at the conceptual stage.

PROPOSED SCHEDULE

It is of the utmost importance that, in consultation with provincial and federal regulatory agencies and the communities that surround the mine, we move forward promptly to mitigate the potential risks associated with crown pillar failure.

- Construct Access Road to Narrows Dike: September 12, 2013 to October 9, 2013
- Construct Narrows Dike: October 10, 2013 to December 4, 2013
- Construct Access Road to Bernic Creek: October 21, 2013 to November 15, 2013
- Construct Inlet Structure at Bernic Creek: November 18, 2013 to November 29, 2013
- Install Dewatering Pipeline and Pumps: November 5, 2013 to December 16, 2013
- Dewatering: December 17, 2013 to August 31, 2014

MINERAL AND SURFACE RIGHTS

TANCO currently holds 13 surface leases (Figure 2):

- M-126 to M-130, inclusive (dated April 2, 1968);
- M-145 to M-149, inclusive (dated April 7, 1971);
- SL-1 (dated September 8, 1992);
- SL-3 (dated October 16, 1995); and,
- SL-11 (dated July 23, 2008, and held by Coltan Mines Ltd., a subsidiary of TANCO).

TANCO currently holds 3 mineral leases (Figure 3):

- ML-04 to ML-06, inclusive (dated April 1, 1992).

The proposed location of the temporary access road (portion of), temporary dike and dewatering/effluent pipelines west of the mine to Bernic Creek are located on Crown land.

CROWN LAND REQUIREMENTS

Portions of the temporary access roads and the temporary dike are located on provincial Crown land adjacent to TANCO's existing surface leases. TANCO is seeking a Work Permit and Crown Land General Permit for the following quarter sections located adjacent to the mine (Figure 4):

- SW 11-017-015-E1
- NW 11-017-015-E1
- SW 15-017-015-e1
- NW 15-017-015-e1
- SE 16-017-015-e1

PROPOSED ACTIVITIES

1. Quarrying

Rock to construct the temporary dike will be quarried from an approved, existing quarry managed by Don Sikora Enterprises. Approximately 13,000 m³ of rock is expected to be obtained from this quarry for the dike. Rock to be used for the temporary access road will be obtained from the existing quarry or a new quarry closer to the work site. Rock to be used for the temporary dike from the existing quarry has been submitted to Maxxam Analytics for acid-base accounting (ABA) testing with the results available in 4-8 weeks. It is anticipated that, like the waste rock generated from the mine, the rock obtained from the quarry will be non-acid generating.

2. Temporary Access Road and Staging Area

A 1,330 m temporary access road and a 0.5 ha staging area will be required to access the location and facilitate construction of the temporary dike at the Bernic Lake narrows (Figure 5). The temporary road alignment was selected to make use of existing mine roads and Manitoba Hydro maintenance trails along transmission line so as to minimize the amount of new road construction. Where possible, the temporary access road has been aligned within the Manitoba Hydro right-of-way so as to minimize brushing while maintaining a safe distance from the transmission line. Transmission line crossings have been minimized and sited adjacent to the towers to provide maximum clearance with the conductors. The majority of the temporary road, will be constructed on the existing mine surface lease while the remaining portion and the temporary staging area will be constructed on Crown land.

A 585 m section of the existing Manitoba Hydro maintenance trail will be upgraded to a single-lane road with quarried material (Figure 5). Trail curve radiuses at two locations may need to be adjusted to accommodate the turning radiuses for dam construction equipment. Activities will include brushing secondary growth along the trail, potential minimal timber clearing at adjusted curves, and the placement of quarried rock (approximately 10,000 m³) in low areas, and surfacing with till. The 745 m of new road and laydown area will require timber clearing and brushing in pioneered sections and brushing within the transmission line right-of-way. Timbers and brush will be left in place and quarried rock will be end-dumped to form a road base. Quarried till will be used for surfacing.

There are no stream crossings along the alignment. Cross drains will be placed within lowland area as necessary to maintain surface drainage patterns. Grubbing will be minimized in order to preserve the root mat and minimize disturbance in the lowland areas.

A second temporary access road or trail will be constructed from the polishing pond to the Bernic Creek discharge location to allow pipes associated with water management of the east basin and mine effluent discharge to be constructed and maintained. Alignment alternatives for the road/trail are currently being evaluated and every effort will be made to minimize their impact.

3. Temporary Dike

A temporary dike will be constructed at the narrows between the east and west basins of Bernic Lake (Figure 6). The dike location is immediately upstream (east) of the existing Manitoba Hydro transmission line crossing and placed such that the dike will not encroach on the transmission line right-of-way. This location was selected because the dike can be constructed and the west basin dewatered within the shortest possible time frame in order to minimize environmental risks to the lake and ensure the safety of mine personnel. The dike will also allow the east basin to be maintained at the normal water elevation which will preserve the existing fish community and allow at decommissioning the rapid colonization of the west basin by indigenous fish species without the need for stocking. The dike will be constructed of locally sourced rock and grout and/or LLPDE liner.

Dike construction will begin with a rock fill embankment formed by pushing coarse rock into Bernic Lake from the north shore. The embankment will require approximately 13,000 m³ of rock fill. A finer transition zone material will then be placed on the embankment and, if required, an LLDPE liner will be placed on the upstream (east) face. A key trench along the dike crest will be constructed to secure the liner and then sand and gravel ballast will be placed on the liner. Rip rap will be placed on the upstream face in the wave run up zone to provide protection for the ballast and liner. A passive spillway, running from the crest and down the downstream (west) side of the dike will be constructed to allow water from severe precipitation events to pass over the dike without damaging the structure. The spillway will also facilitate the refill of the west basin prior to the decommissioning of the dike. If dike seepage is observed after the west basin has been dewatered, a toe drainage collection system

may be incorporated into a toe berm, depending upon seepage volume. The LLPDE liner has a life of five years. In the unlikely event that the dike is required for more than five years, an additional liner would be placed on the upstream face of the structure in order to provide adequate seepage control for the extended service life of the dike. Geotechnical investigation is underway to determine the depth of the sediment along the alignment of the narrows dike. If the investigation reveals that the sediment is too weak and compressible, steel sheet piling may be incorporated into the final design of the dike.

Decommissioning activities will be initiated after two to four years of service and will begin with the refilling of the west basin. The west basin will be allowed to fill naturally by discontinuing temporary water management activities and allowing upstream drainage to discharge through the dike spillway from the east basin. It is anticipated that natural water elevations will be achieved within 17 months. Once the water levels on either side of the dam have equalized, the dam crest, rip rap, and liner will be removed beginning at the south shore. In order to avoid disturbance of the natural lakebed, some rock, sand, and gravel will be left in the lake. This material will be contoured with the lake bed and while maintaining a minimum depth of 3 m. The LLPDE liner will be disposed of at a licensed waste facility while the quarried dam material will either be stockpiled onshore or recycled for mine use.

4. Temporary Dewatering

Water from the west basin of Bernic Lake will be directed to the natural outflow of Bernic Lake. Natural wetlands in Bernic Creek have been incorporated in the dewatering program and will be used throughout the dewatering phase with the purpose of reducing total suspended solids and nutrients. Dewatering of the Bernic Lake west basin will begin as soon as hydraulic isolation from the east basin has been achieved at the temporary dike and continue over a period of 9-12 months. During this period, the volume of the west basin (9.77M m³) will be removed to Bernic Creek. Surface runoff into the east and west basin will also be managed during this time.

A containment weir will be constructed across Bernic Creek to prevent the wetlands from draining back into the west basin as the water level in the west basin declines. The containment weir will be constructed following the methods outlined for the temporary dike. The pipeline will be constructed directly from a barge-mounted submersible pump anchored over the deepest area of the basin to a diffuser array at the discharge point in Bernic Creek. The pump suction inlet will be suspended just below the water surface so as to draw surface water and to avoid causing currents at depth across the sediments and/or inadvertent lake turn-over and re-suspension of sediments. The pump will be located above the surface of the water. If a constant pumping rate is maintained over the nine month dewatering period, the rate would be approximately, 0.75 m³/s.

The assimilation capacity and expected performance criteria for the Bernic Creek wetland are still under assessment. If the discharge rate exceeds the assimilative capacity of the wetland then pre-treatment methods will be considered.

5. Temporary Water Management

The west basin will continue to receive surface water and ground water drainage through and after dewatering. This water (approximately 4.2M m³/yr) will be allowed to collect in the dewatered basin. The water will be periodically discharged to the Bernic Creek wetlands using the equipment and temporary infrastructure constructed to dewater the basin (Figure 7). If phosphorus and/or TSS concentrations become excessive (i.e., exceed the capacity of the wetland to treat water) then pre-treatment alternatives will be considered.

The east basin will also continue to receive surface water drainage (approximately 3.2M m³/yr); however, the natural outflow path will be inaccessible. In order to manage water levels in the east basin a water transfer system will be installed. The system will consist of a pump in or adjacent to the east basin and pipeline to the Bernic Creek wetland. The pipeline will roughly follow the temporary access roads. The mine currently draws 1,000,000 m³/yr of process water from the west basin. A take-off at the mine site will allow the mine to draw process water from the east basin until the west basin has been refilled.

The east basin pipeline will be decommissioned and removed at the same time the temporary dike and access road are decommissioned. Process water will once again be drawn from the west basin.

6. Effluent Management

The existing final discharge point from the polishing pond is at the west basin therefore a new final discharge point will be required prior to the dewatering of the west basin. The polishing pond water will be directed to Bernic Creek through a stand-alone pipeline from the polishing pond (Figure 7). A flow meter will be installed to provide flow rates and volumes. Detailed design will be provided prior to the change-over during the 2013-2014 winter season. The final discharge point will be maintained for the duration of the temporary dike at which point the discharge point will be reviewed. TANCO will continue to work with Environment Canada to develop a long-term solution.

7. Permanent Dike

The temporary dike and dewatering of the west basin will facilitate the construction of a permanent solution with a much smaller environmental footprint. An extensive geotechnical investigation of the area is planned for fall 2013. Detailed design including confirmation of the alignment of the permanent dike will follow subsequent to the geotechnical investigation and will be provided to the appropriate regulatory agencies as well as presented to the public.

A permanent dike around the mine workings will reduce the affected area significantly to less than 50 ha from over 200 ha as per conceptual alignment. The permanent dike will be maintained in place until decommissioning at the end of mine life. Because the permanent dike will be located within a deeper area of the west basin, the dike design will need to be more

robust than the temporary dike and more detailed geotechnical investigations will be required before a detailed design can be completed.

DECOMMISSIONING AND RECLAMATION PLAN

At project closure, the minesite will be returned to a state compatible with the surrounding natural environment. TANCO will follow the plans laid out in the facility's Closure Plan which was prepared in accordance with Manitoba Mine Closure Regulation (67/99) and submitted to Mines Branch. TANCO is currently updating the Closure Plan.

POTENTIAL EFFECTS OF THE PROJECT AND PROPOSED MITIGATION

The project has been designed to be developed and operated with a minimum of adverse environmental and socio-economic impacts. This impact assessment details the interactions between the project and the natural and human environment, and in most cases describes how adverse effects have been avoided through design. Potential project-environment interactions were identified using a number of sources including:

- Scoping of effects by the environmental and engineering teams;
- Socio-economic issues identified through past and recent community and regulatory engagement activities;
- Scientific data for Bernic Lake and surrounding water bodies.

In consideration of the fairly localized geographic extent, short duration (2-4 years), frequency (continuous over short duration), and reversibility of effects, the overall significance of the potential project-environment interactions is minimal to nil.

Physical Environment

Physical disturbance of the site has been minimized through design by making use of existing clearings and avoiding areas that require extensive cut and fill operations to the extent possible, with the exception of a wetland area that will be partially filled during construction of the temporary access road (Figure 2.5). Cross-drains will be installed to ensure natural surface flows are maintained and grubbing will be kept to a minimum. The total area of terrestrial disturbance associated with construction of the roads and staging area is minimal at approximately 4 ha.

Emissions from the project will include exhaust and dust. Exhaust emissions will be minimized through regular maintenance of equipment and limited idling when possible. Dust generated by is expected to be minimal and will be managed as needed by water application.

It is possible a drawdown of the water table adjacent to the lake could occur due as a result of dewatering. Should it occur, the effects will be temporary while the narrows dike is in place.

Terrestrial Environment

Overall effects to the terrestrial environment, given implementation of appropriate avoidance, minimization and mitigation measures, are estimated to be not significant. The clearing of a 20-m ROW for two temporary access roads will result in the alteration or removal of approximately 3.29 hectares (ha) of vegetation. An additional 0.5 ha of clearing is planned for the temporary staging area at the narrows. In the unlikely event that a listed species does occur in the area, the small amount of habitat disturbance is unlikely to have an adverse impact. In addition, the disturbance to these habitats will occur during the non-breeding season, thereby minimizing potential direct impacts to wildlife such as breeding birds.

One of the primary concerns regarding road construction is the potential for the road to act as a barrier to movement of animals, thereby resulting in habitat fragmentation; however, the road will be decommissioned and allowed to revegetate and the roads will not be heavily used once construction is complete. Additional concerns with road construction include the potential for vehicle collisions with wildlife, increasing predator access, and attracting wildlife to roads by creating browse in newly cleared areas. Although the road building may increase access for mammalian predators as is it using an existing ROW, the overall use of the area by predators is likely low due to the mining activity. The low traffic rates and low maximum speed limit will minimize the potential for such collisions to occur.

A primary concern with the proposed plan relates to the potential for sedimentation in the wetland(s) from the dewatered volume; however, as the lake volume decreases and the ice cover melts and breaks up, it is expected that wind-driven waves will suspend sediment from the lake bed. Assuming the entire volume of sediment pumped into the wetland is retained, the average depth of sedimentation would be approximately 0.5 m; if only half of the sediment is retained, the average sedimentation depth would be approximately 0.25 m. Since there appears to be less than one meter of relief between Bernic Lake and Bernic Wetland, such depths of sedimentation may be too excessive to allow for positive downstream flow. An alternative would be to discharge the pumped water into an adjacent larger wetland. Assuming the entire volume of sediment pumped into this wetland is retained in the wetland, the average depth of sedimentation would be approximately 0.1 m; if only half of the sediment is retained, the average sedimentation depth would be approximately 0.05 m. It is expected that relatively shallow depths of sedimentation will be naturally stabilized by vegetation. However, localized depths of sedimentation may require stabilization using mechanical or bioengineering measures.

Aquatic Environment

The proposed dewatering plan, making use of wetlands adjacent to Bernic Lake, is expected to provide the opportunity to mitigate the loading of phosphorus and sediment delivered to the Bird River. Natural wetlands reduce nutrients through a combination of physical, chemical and biological processes that include plant uptake, bacterial and algal fixation, sedimentation, and by adhering or sorbing nutrients to sediments. A numerical hydraulic model will be developed to simulate travel times for various flows through the wetlands. The travel times will be used to estimate the potential reductions in sediment and phosphorus in the flows delivered to the Bird River. Final pumping rates will be determined by adjusting the modeled flow to fully utilize the wetlands and meet Manitoba Water Quality Standards, Objectives and Guidelines following wetland treatment upon discharge to Bird River. Mitigation requirements for Bernic Creek and its wetlands will be developed after sufficient design details became available to predict post-project conditions, and by comparing post-project conditions to baseline conditions. It is anticipated that, at minimum, focused soil stabilization efforts at areas most prone to erosion would be needed, along with revegetation in areas where substantial sedimentation or erosion had occurred. Active restoration measures may be needed in the streambed to restore aquatic habitats and morphological features.

Effects on fish and fish habitat will include the temporary loss of natural habitat within the west basin of Bernic Lake and in Bernic Creek during and after dewatering and the loss of fish within the west basin due to the inability to conduct a fish out in December. This loss is mitigated by the preservation of habitat and fish populations within the east basin and the construction of a permanent dike closer to the mine which reduces the loss from over 200 ha to less than 50 ha, as per conceptual alignment. After the temporary dike (2-4 years) has been decommissioned and the lake allowed to refill; the fish population preserved in the east basin will recolonize the west basin.

Human Environment

There are five archaeological sites within/adjacent to the local study area. One site is located on a peninsula in the east basin of Bernic Lake. The site, a human effigy, was field inspected and was observed to be more than 1.5 m above the high water level of Bernic Lake. As the temporary dike will be constructed with only 1.5 m of freeboard, it will not be possible for flooding related to the dike to occur and affect the effigy site.

Access to Bernic Lake will continue to be limited to the security controlled mine gate. Trapping may be temporarily affected while the temporary access roads are in place. Any restrictions on trapping will be discussed with the affected trappers. Hunting in the area will continue to be restricted around the mine site.

Aboriginal peoples in Manitoba use land across the province for hunting, fishing and gathering. No traditional uses within the proposed project site have been identified Sagkeeng First Nation. TANCO will continue to communicate with the local Aboriginal communities to assess the potential for any project-related interference with traditional land uses.

As a major employer in the region, closure of the TANCO Mine due to a failure of the crown pillar would have a significant effect on the communities surrounding the mine including Lac du Bonnet, Pinawa, and Powerview/Pine-Falls. The available workforce of Lac du Bonnet (defined by Statistics Canada as being over the age of 15) is 455. Of this number, 59 residents and their families from the Town depend on the TANCO mine for employment and thus direct financial benefits. In addition, the mine contributes \$28 million dollars annually to the community and province which indirectly benefits a much larger population. Continuation of the mining operation, in addition to the workers required for this project, will continue to generate indirect employment and financial benefits for local hotels, restaurants, and supply stores.

MONITORING

A monitoring program is currently being developed and will be revised as the detailed design and project schedule are finalized in consultation with the appropriate regulatory authorities. An environmental monitor will be on-site on a regular basis through the construction period and operation/maintenance phase. The environmental monitor will be responsible for ensuring compliance with all applicable environmental regulations, licence/approval conditions, and best management practices associated with the activity(s) being carried out.

Water quality monitoring will be conducted at the discharge point to Bernic Creek as well as downstream and upstream of the Bernic Creek and the Bird River. Water quality results will be compared to Manitoba Water Quality Standards, Objectives and Guidelines to ensure compliance. Water level loggers will be run continuously at the stations during dewatering.

A monitoring program for the wetland(s) will be developed as sufficient design details become available. Permanent photo points and transects will be established to allow for consistent evaluation of effects over time. Monitoring efforts will focus on reestablishment of vegetation communities (e.g., survival rates, invasive species, restoration of native species), hydrology and hydraulics (e.g., base flows, velocities, frequency of connection to flood plain), physical features (e.g., channel morphology, erosion, sediment composition), and habitat value for fish and wildlife.

PUBLIC, ABORIGINAL AND REGULATORY ENGAGEMENT

TANCO implemented a public engagement program during the conceptual design phase. The program involved identifying potential stakeholders and conducting activities to ensure that the public was meaningfully consulted. This included an open house held in Lac du Bonnet on July 23, 2013 and in the RM of Alexander on July 27 2013. Comments from the Lac du Bonnet and Bird River public at the open houses were positive and in favour of plans to protect the mine.

Notification of the project was provided by TANCO to Sagkeeng First Nation, Brokenhead Ojibway Nation, Hollow Water First Nation and Black River First Nation by registered letter. TANCO is aware of Sagkeeng First Nation's claim of unextinguished aboriginal title with the Manitoba Court of Queen's Bench covering an extensive area from Fort Alexander east to the Ontario border. The TANCO Mine is located within that area which is considered to be traditional territory of Sagkeeng. Follow-up communications with Sagkeeng were undertaken to provide an opportunity for information sharing about TANCO's proposal and to learn about Sagkeeng's interests in the area. A site visit was arranged to discuss the operation and proposed undertaking. Concerns centred mostly around mitigation of environmental effects and future employment opportunities. Notification of the project was also provided to the Manitoba Métis Federation (MMF). No communications from MMF have been received to date.

During development of the mitigation concept and preparation of this project description, TANCO has been in contact with several regulatory agencies to ensure those who may be involved in reviewing and approving the project were kept informed. Regulatory agency contact has included Manitoba Conservation and Water Stewardship, Fisheries and Oceans Canada, Canadian Environmental Assessment Agency, Manitoba Innovation, Energy and Mines, Environment Canada, and Transport Canada. TANCO submitted a Notice of Alteration package to Manitoba Conservation and Water Stewardship on August 20, 2013 to facilitate review and approval of the proposed works.

TANCO intends to maintain communication with its contact list and other stakeholders through the regulatory review process to provide clear and concise information about the project as it develops. This transparency will continue through the operational phases of the undertaking. TANCO is committed to maintaining the long-term relationships it has developed with its neighbouring communities and organizations over the past 40 years.