- Have the material segregated by placing it into a holding area on surface in the area designated for temporary storage of potentially PAG material. The geologist will then arrange to have the muck pile labelled as to date, time and location or origin. The geologist will also arrange to have representative samples of this broken muck collected and analyzed for Total Sulphur using a Leco Total Sulphur analyzer (either at the on-site assay lab or at an accredited off-site lab). If the Total Sulphur content is greater than 0.30 wt% then the material will be documented as PAG material and held in temporary storage pending its return underground as backfill. If the Total Sulphur content is less than 0.30 wt% then the material will be declared non-PAG and can be used on site for construction or fill purposes.

This process will be assessed during the first 6 months of mine development by periodically submitting representative samples of both PAG and non-PAG classified material for conventional ABA analysis. The ABA results will be compared against the classifications drawn by the mine geologist to determine whether the process is effective in segregating all PAG rock. The process will be modified based on the findings of this assessment. It should be noted that pre-development characterization of the rock types expected to be encountered during mine development suggest that very little material is likely to be classified as PAG rock. The majority of the rock encountered is expected to be acid consuming due to its carbonate content.

The project will not involve the stripping or removal of any vegetation and/or overburden; a practice that could have serious impacts on permafrost degradation, resulting in the generation of mud and sediment that could potentially enter surface waters. It is proposed that rock fill building pads be constructed directly on top of the existing terrain. Consequently, no overburden stockpiles are proposed as part of this project.

2.6 Mill, Crusher and Ore Stockpile

The mill and camp complex will be located in close proximity to each other and will be constructed partly on exposed bedrock and partly on permafrost tundra. Where facilities will be on permafrost the rock pad thickness on which the facilities will be constructed will be at least 2.0 m thick. The location of the mill, crusher and ore stockpile in relation to the mine portal is shown in Figure 2.3.

2.6.1 Ore Stockpile, Crusher, Mill, Workshop, and Camp

2.6.1.1 Ore Stockpile

In the area between the portal and the crusher an ore stockpile pad measuring roughly 5,000 m^2 (100 m x 50 m) will be constructed. This ore stockpile of approximately 10,000 tonnes, or 15 days of mill feed will be end dumped by the underground haul trucks where ore will be drawn from the surface stockpile using a front-end loader and fed into the primary jaw crusher.

2.6.1.2 Surface Crushing and Ore Processing Facility (Mill)

The mill and crusher plant (1,800 m^2 and 3,200 m^2 respectively) will be located immediately west of the adit, on exposed bedrock. The bedrock is already exposed in this area, and thus the foundation preparation will be limited to levelling of the site using precision blasting. The areas surrounding the mill and crusher complexes that are not on exposed bedrock will be levelled by infilling with run-of-mine quarry rock to form a final pad at least 2.0 m thick. This will serve to protect the underlying permafrost.

The ore processing equipment will be housed in two adjoining "Sprung" type buildings, each consisting of a metal frame covered by an insulated fabric. One building will house the surface crushing facilities while the other houses the ore processing and gold recovery circuits.

The floor of the crushing plant will be rockfill to accommodate the operation of the front-end loader. The floor in the ore processing plant will likely be a compacted rockfill overlain by an impermeable high density polyethylene (HDPE) liner covered with crushed fine rock.

The ore processing plant will consist of a number of modular prefabricated ore processing units mounted on skids that will be shipped to site completely pre-piped and electrically wired. The units will be assembled inside the Sprung-type building and interconnected. The floor of the ore processing plant will be a compacted rockfill complete with berm lined with an impermeable HDPE liner that is covered with crushed fine rock. The liner will prevent spillage draining into the underlying rock fill. A series of lined berms will segregate the plant and act as containment berms similar to those used around tank farms. MHBL will continue to investigate the option of constructing a conventional concrete pad inside the ore processing plant. However currently no readily available source of sand or natural aggregate material has been identified in close proximity to the Doris North Project site. This makes it difficult to economically produce concrete on-site. Without a local supply all concrete sand and aggregate will have to be shipped to site at significant expense. Alternate construction techniques have been applied for uses where possible to reduce the reliance on concrete. The final design and materials of construction for the mill floor will be addressed at the detailed engineering phase for the mill.

The mill will be equipped with sumps designed to hold spillage equivalent to a minimum of 110% of the volume of the largest tank or vessel within that circuit. The mill will be arranged so that spillage is segregated by circuit (i.e., spillage from the cyanide leach circuit will be kept apart from spillage from the flotation circuit so that cyanide solution does not contaminate the flotation process thereby interfering with gold recovery and potentially by-passing the cyanide detoxification circuit). The individual sumps will be equipped with pumps designed to recover spillage for return to the appropriate circuits. These sumps will be lined with an impermeable liner to prevent release of solution and slurry into the underlying rockfill pads and ground.

The mill will consist of modular ore processing circuits that are completely pre-fabricated off-site and shipped to the Doris North Project for re-assembly. Each processing unit will be skid mounted and be constructed with its own spill collection tray complete with provision to return spillage to the circuit. Each modular unit would arrive on site pre-fabricated with piping, electrical wiring already in place. Each module will be moved into the ore processing building and then interconnected to create a fully operational mill.

A concrete foundation will be required to support the SAG mill module due to its weight and to dampen vibrations during operations. The pre-fabricated modular milling circuits will be shipped to site on the 2007 sealift for quick re-assembly within the ore processing plant.

Figure 2.6 shows a block diagram of the proposed ore processing flow sheet. The mill is being designed for a rated capacity of 800 tonnes per day (36.2 tonnes/hour at an operating factor of 92%), however the nominal milling rate will be 668 tonnes per day (~ 27.8tonnes per hour). Ore will be fed from the ore pad to the primary crusher by front-end loader. The product from the primary crusher will be conveyed to a crushed mill feed stockpile to be located outdoors between the crushing plant and the mill. The crushed ore will be loaded onto a conveyor belt by front-end loader, which will feed the ore into a SAG mill. The slurry output from the SAG mill will pass over a gravity concentrator and through cyclones to recover the "free milling" gold. It is projected that up to 40% of the gold contained in the ore will be recovered from the jigs, prior to the addition of any chemicals or reagents. The slurry output from the cyclones will be sent to a two-stage froth flotation process to recover the gold bearing sulphide minerals in the form of a flotation concentrate. The flotation circuit will reduce the mass of material going on for further processing to about 10% of the total weight of the ore processed. The remaining 90% will be discharged to the tailings containment area with no further treatment.

The gold contained in the flotation concentrate will be extracted in a conventional agitated tank leach circuit using a dilute sodium cyanide solution to leach out the gold. The slurry from the leach circuit will be contacted with activated carbon in a carbon-in-leach (CIL) circuit to allow the dissolved gold to be adsorbed onto the surface of the activated carbon. The gold bearing activated carbon will be recovered from the leach slurry using screens.

The gold bearing activated carbon will then be stripped putting the gold back into a concentrated solution, known as pregnant solution. The pregnant solution will then pass through an electrowinning cell where the gold will be recovered from solution onto wire wool cathodes. The cathodes will be periodically cleaned with the resulting sludge smelted. The sludge from the cleaning of the electrowinning cell cathodes will be dried in an oven, mixed with fluxes (such as silica sand, borax and sodium nitrate) and smelted in a smelting furnace to produce gold bullion and a slag. Similarly, the gravity table concentrates will be mixed with fluxes and smelted on site to produce gold bullion and a slag. The slag will be recycled back to the milling process through the SAG mill and the bullion cast into dore bars which will be shipped off site to a custom refiner. Overall gold recovery in the milling process is projected to be 94.9%.

After recovery of the activated carbon, the cyanide leach circuit slurry will be treated in an effluent treatment circuit to detoxify the remaining cyanide. Cyanide detoxification will be achieved using the Caro's Acid process. Caro's acid is an oxidant prepared by reacting hydrogen peroxide with sulphuric acid. It is a more powerful oxidant than hydrogen peroxide and does not require a catalyst to remove copper cyanide complexes. WAD cyanide is removed at near stoichiometric addition rates for Caro's Acid, amounts that are approximately half the addition required by hydrogen peroxide. Further the molar ratio of acid to cyanide remains constant over a range of cyanide concentrations down to 0.1 ppm. Additional information on the Caro's Acid cyanide detoxification process along with detoxification test results from the metallurgical investigations conducted by Bateman Minerals Limited on behalf of MHBL on a bulk sample of the Doris North Hinge Zone ore are presented in "Interim Report: Doris North Gold Project: Investigation into the Use of Caro's Acid for Cyanide Destruction" (Bateman Minerals Limited. September 2003, Supporting Document A2 in the November 2003 FEIS).

The Caro's Acid reagent is prepared as follows:

$$H_2O_2 + H_2SO_4 = H_2SO_5 + H_2O$$

The reactions involving oxidation of cyanide using Caro's Acid are as follows:

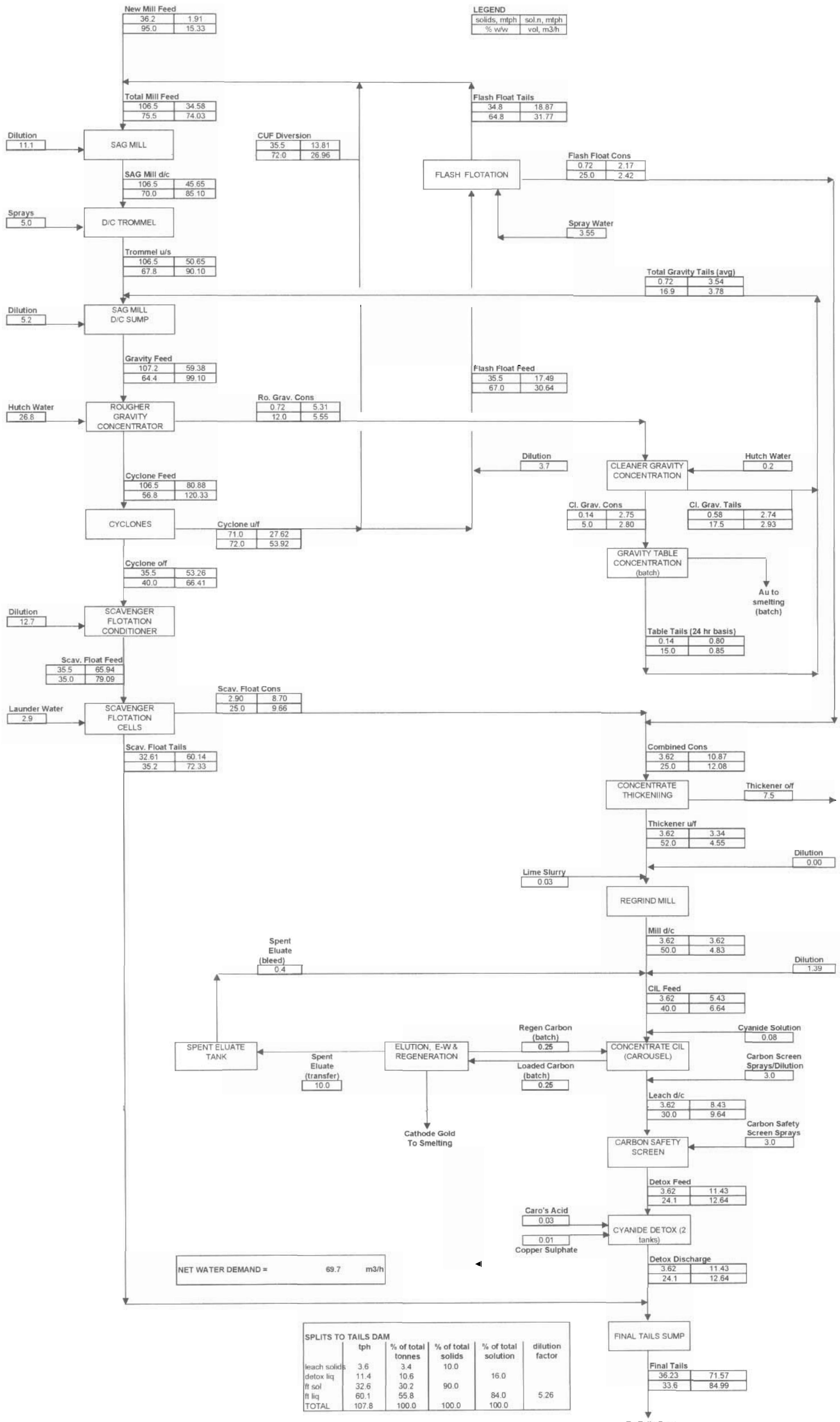
$$SO_5^{2-} + CN^- = SO_4^{2-} + CNO^-$$

$$4SO_5^{2-} + SCN^- + H_2O = 5\ SO_4^{2-} + CNO^- + 2H^+$$

DORIS NORTH PROJECT DESCRIPTION

FIGURE 2.6: BLOCK DIAGRAM OF MILL PROCESS FLOWSHEET

CLIENT:	Miramar Mining Corporation
PROJECT:	Doris North Process Optimisation (post-feasibility study)
JOB NUMBER:	M3952
DATE:	September 19, 2003
REVISION:	A



SPLITS TO TAILS DAM

	tph	% of total tonnes	% of total solids	% of total solution	dilution factor
leach solids	3.6	3.4	10.0		
detox liq	11.4	10.6		16.0	
ft sol	32.6	30.2	90.0		
ft liq	60.1	55.8		84.0	5.26
TOTAL	107.8	100.0	100.0	100.0	

VM00259A

The reaction times are fast (seconds) and residual total cyanide levels in the range of 1 to 2 ppm can readily be achieved. An advantage of the process is the reduction in the pH level of the cyanide leach solution being detoxified as a result of the reaction. Test work on Doris North ore produced a terminal pH range of 8.2 to 8.5 following cyanide detoxification with Caro's Acid, which is close to the ore's natural alkalinity in fresh water.

In this detoxification process, free and weak acid dissociable cyanide complexes are oxidized to the much less toxic cyanide complex, cyanate (CNO). Metals are precipitated. The treated solution will then be combined with the flotation tailings slurry and pumped to the Tail Lake tailings containment area. The quality of the combined effluent discharged into the tailings containment area following cyanide detoxification is estimated to be: 0.29 mg/L Total CN (0.04 mg/L WAD CN), 32 mg/L CNO, <0.1 mg/L SCN, 1.0 mg/L Total Ammonia, 0.039 mg/L Total Cu, <0.05 mg/L Total Pb, 0.03 mg/L Total Nickel and 0.09 mg/L Total Zn.

The mill work force is projected to be 30 persons, all owner personnel. The expected breakdown of this workforce is presented in Table 2.3.

Table 2-3: Projected Mill Workforce

Mill Operation	Contractor	Owner	From Nunavut*
Mill Superintendent		1	
General Foreman		2	2
Metallurgist		1	
Chemist		2	
Crusher Operators		4	4
Mill Operators		4	1
Leach/Stripping Circuit Operators		4	1
Gold Room Operator		2	
Metallurgical Technician		1	
Mill Maintenance/Trades		8	3
Planner		1	
Total	0	30	11

Note:
** Staffing levels from Nunavut are estimates only. Actual numbers will depend upon availability of qualified personnel*

2.6.1.3 Service Complex (Workshop)

A 1,500 m^2 (30 m x 50 m) machine and maintenance shop and storeroom will be erected on site, immediately between the camp and the mill complex. The shop will be supplied with all tools and equipment required for service and maintenance of the underground mining equipment fleet. The shop will be linked to the mill and camp via Arctic Corridors, minimizing exposure of the workforce to the elements.

2.6.1.4 Mill Site Fuel Tank Farm

A 0.52 million litre fuel storage supply will be maintained at the mill. This fuel will be stored in six 70 m^3 and two 50 m^3 EnviroTanks. These tanks are double walled self-berming and do not require additional emergency spill containment structures. They will require a pad surface area of 600 m^2 (20 m x 30 m). These tanks will be filled from the tank farm at Roberts Bay using the site's fuel truck on an as needed basis.

2.6.1.5 Mill Reagent Storage Area

Mill reagents will be shipped and stored in 6.1 m x 2.4 m sea-van containers. A storage area measuring 1,890 m^2 (45 m x 42 m) will be provided immediately adjacent the mill for storing 20 containers. The mill reagent storage area has been sized based on the number of containers required to supply the mill for one year.

2.6.1.6 Lay-down Area

An additional lay-down area for equipment and supplies, measuring 6,000 m^2 (100 x 60 m) will be constructed adjacent to the camp.

2.6.1.7 Camp/Dry

A conventional 175-person capacity camp will be constructed at the Doris North Project site, consisting of modular skid mounted units linked together by use of Arctic Corridors Rooms will be self-contained. The complete camp layout is presented in Figure 2.3.

The kitchen and recreation facilities will be located in additional modular skid mounted units joined to the rest of the camp via Arctic Corridors. The first aid station will be located in a separate modular unit connected to the rest of the facilities by an Arctic Corridor.

Access to the camp, mill complex and shop for workers will be provided via Arctic Corridors. Where bedrock is not present, the modular camp units will be placed on 2.0 m thick rock-fill pads to protect the underlying permafrost.

2.6.1.8 Office/Dry Complex

The office and dry facilities will be modular skid mounted units joined together, and ultimately joined to the dorms via the Arctic Corridor. Three of these units will comprise the dry area, and three will be the office area. This office will be fully equipped with electrical and communication outlets.

2.6.1.9 Boat & Float Plane Dock

A boat and floatplane dock measuring 400 m^2 (40 m x 10 m) will be installed at the northwest end of Doris Lake. The preferred option is a floating dock, with an in-lake section of approximately 2 m in length and 10 m in width. The dock will be removed from the water following each summer's operation. Alternatively there is the potential that the dock may be constructed of rock fill to allow access for loading and unloading float planes. Should the decision be made to construct a rock filled dock, then the impact of the dock footprint would be discussed with Department of Fisheries and Oceans (DFO) staff and a determination made as to whether or not a HADD authorization is required.

2.7 Mill Tailings Containment Area and Tailings Management

Details on the design and proposed operation of the tailings containment area, including the geotechnical investigations conducted in 2002 and 2003 are provided in SRK (c), Supporting Document A5 to the November 2003 FEIS. The following is a summary of this information.

2.7.1 Deposition in Tail Lake

Tail Lake is 76.6 ha in size within a catchment area of 4.4 km2. The normal water level in Tail Lake is 28.3 m above sea level. Detailed bathymetry is available for Tail Lake, and confirms that it is a shallow lake, with a maximum depth of 5 m in the widest section of the lake. The southern section of the lake is however between 1 and 3 m deep only. Tail Lake has a discontinuous outflow into Doris Lake immediately upstream of the Doris outflow creek. Ogama Lake (158 ha in size) is situated immediately south of Tail Lake and its normal water level is at 24.3 m above sea level. The height of land between the lakes is at 32 m above sea level. The normal volume of Tail Lake is approximately 2,196,040 m3, which equals a 6-year mine life volume of tailings.

The tailings will be pumped as a slurry with a solids content of 36.1% and discharged sub-aqueously into Tail Lake. The discharge location will not be fixed, but will be moved around such that the tailings impoundment can be sequentially filled from its deepest location. This deposition methodology will enable the final closure water level to be as low as possible. Tailings will be pumped from the mill to Tail Lake via a 150 mm insulated HDPE pipeline. The pipeline route will be southwest from the mill site towards the northwest shore of Doris Lake. From there the pipeline will continue along the Doris Lake shore towards a crossing at the Doris outflow before continuing south-west towards the Tail Lake shoreline. The maximum piping distance from the mill to the southern tip of Tail Lake will be 5.5 km.

Operationally the piping freezing risks will be managed by constructing emergency dump ponds strategically along the pipeline to allow drainage of the pipeline in the event of a pump stopping for whatever reason. This would ensure controlled containment of the tailings, and minimize the risk of freezing pipelines.

Return water will be pumped from Tail Lake to the plant through a heat traced and insulated 100 mm diameter HDPE line. Both tailings and return water pipelines will follow the alignment of the tailings service road. The pipelines will follow the all-weather road, which has been designed to have a longitudinal grade of at least 1% at any location. There are four internal low points in the pipeline, where emergency tailings dump catch basins have been designed. These dump catch basins will store the contents of the tailings pipeline in an event of a pump stoppage. A valve located immediately above the catch basin will be automatically opened to allow gravity drainage of the tailings line to prevent freezing in the line. The dump catch basin located outside the Tail Lake watershed will be sized to hold the contents of both the tailings and reclaim water pipelines. Within the Tail Lake watershed the reclaim water line will drain by gravity onto the tundra and into Tail Lake consequently the catch basins within the Tail Lake watershed have been sized to hold only the contents of the tailings pipeline.

The dump catch basins have been sized to allow two sequential fillings plus an additional 0.5 m of freeboard. Each basin will be lined with HDPE placed on a geotextile fabric. The underlying basins will be constructed of a minimum of 2 m thickness of quarry rock, or an equivalent combination of insulation and rock fill to preserve the underlying permafrost.

2.7.2 Tail Lake Containment Area

In order to adequately isolate Tail Lake two containment dams will have to be constructed. The first would be an 8.5 m high, 160 m long North Dam located between Tail Lake and Doris Lake. The second would be a 3 m high, 170 m long South Dam on the high point between Tail Lake and Ogama Lake.

The proposed dams will be constructed as rock fill structures with a geosynthetic clay liner (GCL), filter and transition zones and a frozen key trench founded on non-organic permafrost soils and/or bedrock. The North tailings dam will have an operational spillway on the right abutment excavated in bedrock. The spillway has been sized to pass a 24-hour storm event with a 1:500 year recurrence interval. The spillway will be 20 m wide and will have a constant grade of 2%.

Both dams will be sized according to the maximum water elevation of 33.5 m. Both dams would be constructed with a freeboard of at least 3.5 m above the maximum water level. The crest elevation of the fine-grained core is 1 m above the maximum water level to compensate for the potential settlements within and below the frozen core. Larger settlement will likely occur in the zone upstream of the core. The effective freeboard is consequently 2.5 m above the maximum operating lake level. The crest of the dam would also be 2.5 m above the crest of the central fine-grained core. This minimum 2.5 m cover is essentially an insulating blanket that would prevent the frozen central fine-grained core from thawing. The 2.5 m freeboard well exceeds the required 1.7 m freeboard deducted from the water balance of the tailings containment area (source: Section 10.4 of SRK 2003 (c) 2003, Supporting Document A5 of the November 2003 FEIS).

The facility can operate as a full containment (zero discharge facility) for the design life of 10 years, although it is intended to operate with an annual discharge of supernatant. At any one time during the life of the impoundment there will be a minimum of 3 m water cover over the tailings, and after 10 years the water cover will be 7.6 m. At that time the water quality is expected to be sufficiently good to allow the dam to naturally spill over its spillway. Once water quality has reached a point where normal flow through Tail Lake can be allowed, the South Dam will be demolished and the North Dam will be reduced to a 3 m high structure by excavating a permanent post-closure rock armoured engineered discharge spillway. This spillway will ensure the maintenance of a permanent water cover over the tailings (minimum of 3 m in depth to prevent wave re-suspension of tailings) while allowing excess water to flow back into the Tail Lake outflow (SRK 2003 (c), Supporting Document A5 to the November 2003 FEIS).

MHBL has utilized a six year operating and 4 year post-closure design life for the tailings containment area to accommodate future capacity on the expectation that future exploration at this site will provide for an extended mine life and as a contingency measure should the proposed effluent quality not consistently achieve the expected discharge standard. It is MHBL's intention to discharge supernatant on an annual basis in a controlled means. Decant from Tail Lake will be achieved through a system of pumps, which will be synchronized to match the annual Doris Lake outflow hydrograph. Flow measurements at the Doris Lake outflow location will be used to trigger the pump(s) that will transfer the appropriate decant volume from Tail Lake to a discharge point approximately 50 m downstream of Doris Lake but upstream of the 4.5 m high waterfall in Doris Creek. All releases from the Tail Lake containment area will meet water license discharge criteria.

The timing of the annual release would be during the open water season and be controlled to ensure that water quality in the Doris Outflow stream below the 4.5 m high waterfall at the discharge point remained protective of freshwater aquatic life (i.e., water quality does not cause harm to fish, benthic invertebrates or other wildlife).

2.7.3 Chemical Characterization of Tailings Solids and Solution

In 2003 MHBL commissioned work to characterize the properties of the final mill tailings slurry that are of interest from an environmental perspective. Bateman Minerals conducted a metallurgical testing program on a representative sample of the Doris North ore. As part of this work Bateman created a bulk sample of both the flotation tailings slurry and the cyanide leach slurry. The cyanide leach tailings were then subjected to the Caro's Acid cyanide detoxification process using the optimized operating parameters previously developed by Bateman. Both the solid and liquid fractions of each of these tailings slurry materials were analyzed for a wide spectrum of parameters. The flotation tailing slurry was then combined with the detoxified cyanide leach slurry from the Caro's Acid treatment process in the same proportions that they will be produced in the mill to create a bulk sample of combined tailings. A sample of both the solid and liquid phases of this combined tailings slurry was sent for analysis for a wide spectrum of parameters. A sample of the solution was subjected to an LC50 toxicity test (Reference Method for Determining Acute Lethality of Effluent to Rainbow Trout, EPS 1/RM/13, Second Edition, December 2000) conducted at BC Research in Vancouver (see Section 4.0 of AMEC 2003 (a), Supporting Document B2 to the November 2003 FEIS). The combined tailings solids were also subjected to ABA analysis, leachate extraction, mineralogy and to a humidity cell test (still under way, started in August 2003). A sample of the combined tailings slurry was subjected to a standard settling test and the supernatant analyzed for total suspended solids to assess the expected clarity of the tailings containment area supernatant. The bulk sample of combined tailings was then left to sit for one month to age and then the solutions were re-analyzed to look at changes, especially in relation to cyanide and nitrogen compounds.

The results from this characterization test work are presented in AMEC 2003 (b), Supporting Document B2 of the November 2003 FEIS. The results indicate that the combined tailings solids are expected to be non-acid generating (NPR = 8.8). The tailings solution will meet MMER discharge criteria, is not acutely toxic and will have a supernatant total suspended solids concentration of < 5 mg/L after 24 hours of settling time.

2.7.4 Predictive Water Quality Modeling

MHBL commissioned SRK to update the predictive water and contaminant load balance for the tailings containment area, the Doris Lake outflow below the siphon/pump release point during the proposed annual release of supernatant from Tail Lake and similarly for the Little Roberts Lake outflow. The model looked at the sources and fate of ammonia, including blast rock at site, and effects and potential mitigation measures. The results of this work are presented in SRK 2003 (d), Supporting Document F8 to the November 2003 FEIS. To be conservative this water quality modeling was conducted for a hypothetical 6-year mine life (i.e., 6 years of tailings deposition into the tailings containment area). The total period modeled covered 24 years (i.e. 18 years after the cessation of tailings deposition into Tail Lake).

SRK put forward the following conclusions based on this work:

- "Cyanide compound degradation to ammonia in Tail Lake was also included in the water and load balance. The results indicated that:
  - If no ammonia degradation occurred, ammonia-N concentrations may peak at about 5 mg/L in year 6 of operations.
  - Natural degradation of ammonia-N will likely reduce ammonia concentrations to below levels of concern."
- "An assessment of the background water quality suggests that:
  - Results for aluminium pre-dating July 1997 exceeded CCME guidelines, but more recent data (August 1997 and July 2003) averaged about 0.07 mg/L. The reason for the elevated concentrations pre-dating July 1997 is not known.
  - Cadmium concentrations were consistently below detection limit, with the lowest detection limit at 0.000005 mg/L.
  - Copper in Little Roberts Lake outflow is shown as 0.002 mg/L, even though the average for all available data is 0.00186 mg/L. The background concentration may therefore be overestimated. Additional sampling and low level copper analysis was conducted in 2004 and the results indicate that background water quality within Doris Creek outflow is lower than previously indicated. These findings will be presented in the additional reporting to be submitted to NIRB in early 2005.
  - Similar to cadmium, thallium concentrations were consistently below detection with the detectable concentrations of 0.000002 mg/L in Tail Lake and Little Roberts Lake outflow measured in 2003."
- "Predicted concentrations in Tail Lake further indicated that copper will be the primary parameter of concern in discharge from the impoundment."
- The results from the water quality and load balance predictions for the Doris Lake and Little Roberts Lake outflows showed that:
  - Operating a "zero" discharge impoundment will not adversely impact receiving water quality.
  - Discharge from Tail Lake can be achieved without adversely impacting receiving water quality, and the maximum operational discharge rate is expected to be about 220,000 m3/year, excluding the estimated seepage of approximately 18,500 m3/year.

- "Post operational, it is anticipated that the discharge rate could be incrementally increased while still meeting water quality in the receiving waters that will be protective of aquatic life (fish, benthic invertebrates and other wildlife). After 20 years, the allowable discharge will exceed the net inflow to Tail Lake. The estimated maximum volume of storage in addition to that already present in the pond at the cessation of operations is 1.73 million m3 and will be reached in year 19."

The cyanide detoxification process will be largely automated as indicated in Section 5.4 Bateman 2003, Supporting Document A2 to the November 2003 FEIS. The operator will be required to monitor free and WAD cyanide concentrations by titration on a 2 and 4 hourly basis respectively. An ORP probe will be used to prevent excessive cyanide discharge to the tailings containment area resulting from a short term upset in the cyanide detoxification process. A site-specific relationship between redox potential and cyanide levels will be developed, but generally, negative redox values indicate a surplus of cyanide species present in the final tails. The ORP probe output will be input directly to the DCS (Digital Control System) in the mill for continuous logging, with excessive values triggering operator intervention and/or feed stoppage. The prevention of excessive cyanide in the mill discharge will be accomplished by the following action:

- An ORP alarm or operator intervention due to excessive WAD cyanide levels (typically in excess of 4 ppm, as measured by titration) will trigger the cessation of new feed to the SAG mill, followed by dumping of pump sumps. The tails line would be automatically flushed to avoid bogging and to dilute cyanide values to safe limits until the process upset is resolved.

2.8 Water Source, Distribution and Management

2.8.1 Freshwater Supply

Potable water, fire suppression water and up to 67% of the mill water (100% of the mill water for up to eight months of the year (October through May)) will be supplied from Doris Lake. Two separate 100 mm diameter insulated and heat traced HDPE lines will pump water from the lake to storage tanks at the mill and camp. The intent is to supply 100% of the mill water requirements from tailings return water, however there is a possibility that the water may not be able to clarify sufficiently during the winter period when lake ice reduces the volume in Tail Lake. Taking up to 67% of the mill water from Doris Lake is thus a contingency measure.

During summer months (June through September), process water will be taken from Tail Lake by a pump installed on a floating barge to be located near the north end of the lake. Make up freshwater for use in the mill will be drawn from the freshwater holding tank only in case of a shortage from Tail Lake. It is projected that water will be released from Tail Lake in a controlled annual discharge during open water periods.

Mill process water requirements are projected to be 1,183 m^3/ day. During summer months the source of most of this make-up water will be recycled water recovered from Tail Lake returned to the mill by way of an insulated and heat-traced return line from a floating pumphouse.

Water use underground is expected to be minimal. A brine solution will be mixed in the mill and piped underground for use in drilling and dust suppression. This brine solution will be recirculated through an underground sump. Development and production drilling will use this brine solution to stop drills from freezing in the permafrost. Total requirements are estimated at approximately 0.1 m^3/hr. As mining is expected to be within the permafrost zones, groundwater is anticipated to be minimal. Any water encountered will be pumped from underground and discharged into the tailings line to Tail Lake.

Potable water will be treated in a packaged plant consisting of sand filtration followed by ultra violet light and/or chlorination treatment.

2.8.2 Mill/Camp Storm Water Management

The mill/camp pads will be graded nominally to ensure that water will drain from the pads. Surface run-off from process and work areas will be directed towards and collected in a sump and pumped to the mill. From the mill, the storm water will be added to the Tailings Feed line and deposited with the tailings in the Tail Lake tailings containment area.

Similarly, stormwater from the temporary PAG waste rock stockpile will be directed towards and collected in a sump and pumped to the mill. From the mill, the stormwater will be added to the Tailings Feed line and deposited with the tailings in the Tail Lake tailings containment area.

2.9 Domestic & Industrial Solid Waste Disposal Site

All solid non-combustible, non-hazardous waste will be disposed of in a portion of one of the rock quarries (Figure 2.2). An area approximately 100 m x 100 m will be dedicated to solid waste disposal operations. The final quarry configuration will consist of a flat surface, graded at approximately 1% in the down slope direction, adjoining a steeper angled rock surface that forms the transition to natural ground on the ridge above. Storm and melt water will be diverted away from the solid waste disposal site by small berms on the upslope edges of the excavation.

Annual solid waste disposal site operation will involve clearing of snow prior to spring melt, placement of waste rock over the summer period, and placement of a graded cover prior to the winter period of snow accumulation. Wastes produced during the winter months would be stored temporarily in the solid waste disposal site area and relocated to its final location following snow removal. Upon closure the disposal site will receive a final cover of clean rock, the surface will be re-graded to blend in with the surrounding terrain, and surface drainage will be directed away from the site. All combustible material including kitchen waste will be incinerated in an industrial incinerator to be located near the camp.

2.10 Waste Oil & Hazardous Waste Management

Waste oil will be consumed on site in a dedicated waste oil burner. Other waste products such as used glycol, vehicle batteries, waste grease, etc. will be packaged in appropriate containers and stored in a secure fashion pending shipment off-site for disposal of in an appropriate manner. These materials will be placed into sea-can containers and held (pending shipment) on the plant site rockfill pad area where any spillage can be captured in the stormwater sumps and directed to the tailings containment area.