CYANIDE FACILITY DECOMMISSIONING PLAN (ICM CODE PRINCIPLE 5)

FOR

KALGOORLIE CONSOLIDATED GOLD MINES

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EXECUTIVE SUMMARY

Kalgoorlie Consolidated Gold Mines operate two processing operations in the Eastern Goldfields of WA which utilise sodium cyanide as a key reagent in the gold recovery process. Both joint venture owners (Newmont Mining Corporation and Barrick Gold Corporation) have become signatories to the International Cyanide Management Code which addresses protection of communities and the environment from cyanide during decommissioning in Principle 5. This plan details the decommissioning requirements for Fimiston and Gidji cyanide facilties in accordance with Code Principle 5. Inherent in the plan are assumptions that 50 ppm weak acid dissociable cyanide in ponded waters will be non toxic to avian wildlife in the Kalgoorlie region, that groundwater cyanide must be below 0.5 ppm and that only tanks containing greater than 1% sodium cyanide in solution must be detoxified with sodium hypochlorite in addition to being water washed.

The cyanide facility at Fimiston comprises one large 30% solution storage tank, 3 trains of leach/adsorption tanks, elution columns, solution tanks and electrowinning cells, an Acacia Reactor, various cyanide containing water ponds and two large tailings storage facilities. At Gidji Roaster, the cyanide facility includes 4 storage bullets, 8 leach and 8 carbon adsorption tanks, various cyanide containing ponds and a 2 cell tailings storage facilty. Decommissioning plans focus separately on plant decommissioning and tailings storage decommissioning.

As the greatest hazard posed by decommissioning of the cyanide facilities is that to human health, a number of general safety considerations must be addressed in the first instance. These will include the revision of the current emergency response plan for the site in the final 6 months of operation (taking into consideration the non routine aspects of cyanide plant decommissioning), cyanide specific safety inductions for all decommissioning personnel, revision of general health and safety procedures and safety contract exhibits on tender documentation, supervisory training, audits and inspections and risk assessment and hazard identification with respect to decommissioning of cyanide facilities.

General environmental considerations include the requirement to leave no cyanide on the site after closure either in the form of unused product or exposed spent leach solutions, residues and tailings dam water ponds. TSF seepage and stability could also present hazards but most would not be cyanide related. The semi-arid goldfields environment is conducive to full containment and evaporation of cyanide contaminated water stocks and therefore environmental impact of tailings storage areas can be managed by restricting access to ponded cyanide water for as long as necessary to accommodate natural attenuation of CN_{WAD}.

Specific pre-closure strategies to ensure safe decommissioning of cyanide plant include development of detailed task lists and schedules for the plant cleanup, calculated reduction of cyanide stocks and sequential cleanout of cyanide storage tanks if necessary to remove accumulated toxic sludge. After shutdown, all cyanide plant is washed down from top to bottom and tanks containing cyanide are cleaned internally by washing with plant hose down water and in the case of “high cyanide” tanks this is followed by high pressure clean and sodium hypochlorite rinse. The internal cleaning of “high cyanide” tanks is best carried out by specialist tank cleaning contractors such as Collex but the procedure will be supervised by a cyanide supplier representative who is familiar with state of the art cyanide detoxification procedures. Cyanide reticulation pipelines are also of particular importance with regard to proper detoxification and recirculation of wash water and sodium hypochlorite solution will be necessary. The Acacia Reactor is regarded as a “high cyanide” vessel and will be detoxified accordingly.

The possibility of soil contamination by cyanide in unbunded plant areas will be checked by soil sampling and off site testing under contract (eg WA Chemistry Centre) in order to determine what remediation works, if any, are required. The possibility of pinhole leakage through the base of earth mounted cyanide tanks will also be tested by drill sampling through the base.

The key elements of residue disposal area decommissioning from a cyanide viewpoint will include risk assessment in conjunction with a geotechnical consultant, drawdown of ponded water stocks prior to closure, recovery bore pumping of groundwater seepage until cyanide level dissipates and, if necessary, water spreading strategies and batch cyanide destruction (possibly at Gidji). Cyanide destruction is only necessary if wildlife have access to a residual cyanide water source but surface and groundwater monitoring will be a necessary requirement during and after TSF closure in accordance with statutory requirements. Dam stability monitoring will also be an ongoing requirement but is not an essential cyanide decommissioning procedure.

The total cost associated with closing and decommissioning the cyanide facilities at Fimiston and Gidji is estimated to exceed $1 million and an assurance mechanism must be established by the site in order to demonstrate that such funds will be available at the time of mine closure. The major cost component is labour for plant cleanup and this will require ongoing review against KCGM payroll costs for the range of management and operating personnel who are scheduled for involvement in the plant decommissioning phase. Decommissioning costs for the tailings storage facilities at Fimiston and Gidji are estimated to constitute approximately one quarter of total decommissioning cost. Such tasks as tailings water balance and risk

assessment preparation and water quality monitoring (including water assays) might equally be costed to an environmental or operating budget however.

A schedule of the activities involved in decommissioning and closure of the Fimiston and Gidji cyanide facilities has been prepared and as a general rule the planning and execution of most safety and plant decommissioning activities will occur in a 12 month period either side of plant closure. Environmental monitoring activities will continue for up to 5 years post closure.

Closure and decommissioning of the cyanide facilities at KCGM Fimiston and Gidji sites is a major undertaking that must be carefully planned if full compliance with Principle 5 of the International Cyanide Management Code is to be achieved. Ongoing review of the plans encompassed in this document will be necessary on a regular basis to ensure continuing relevance.

CONTENTS

1. INTRODUCTION

Kalgoorlie Consolidated Gold Mines Pty Ltd (a 50:50 joint venture between Newmont Mining Corporation and Barrick Gold Corporation) operate the largest gold complex in Australia at Kalgoorlie in the WA Eastern Goldfields. Two processing operations (the Fimiston Mill and the Gidji Roaster) utilise sodium cyanide as a key reagent in the gold recovery process. Both Newmont and Barrick have become signatories to the International Cyanide Management Code and the process of ensuring full compliance with the Code commenced in 2005. Principle 5 of the Code addresses decommissioning and aims to protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities. This plan specifically addresses the critical elements that must be considered to ensure safe decommissioning of the Fimiston and Gidji cyanide facilities pursuant to Principle 5 of the Code. It is, however, envisaged to also form part of the KCGM Public Closure Plan, a broadly scoped public closure document to be developed by site personnel from early 2006.

2. DEFINITIONS

Incorporated into this plan are a number of presumptions which are necessary to ensure compliance with both the intent and letter of the Cyanide Code even if not specifically defined therein. Major definitions and presumptions are as follows:

"High" cyanide – a solution or slurry containing greater than 1% sodium cyanide. Tanks, vessels and piping which have contained or provided conduit for transfer of such solution or pulp at any time in service life will require being high pressure water washed and detoxified using sodium hypochlorite solution prior to any closure or dismantling activities.

"Medium" cyanide - a solution or slurry containing up to 1% sodium cyanide. Tanks and piping carrying such solutions or pulps require only water washing to render safe for subsequent activity.

"Low" cyanide - a solution or slurry containing no sodium cyanide. This definition is necessary as there are tanks and vessels at Fimiston labelled with the word cyanide which do not and never have contained cyanide.

Surface Waters are presumed safe to bird life at levels of weak acid dissociable cyanide (CN_{WAD}) below 50 ppm although it is recognised that there is variable sensitivity on a species specific basis. It is understood that sites operating with CN_{WAD} levels above 50 ppm in ponded waters will have heavy onus placed upon

them by Code auditors to show that there is no threat posed to local bird and animal life by such operation.

A total cyanide (CN_{tot}) level in groundwater exceeding 0.5 ppm constitutes a “plume” that may impact upon the designated beneficial use. Successful decommissioning activities will therefore aim to restore the designated beneficial use at each facility.

3. DESCRIPTION OF KCGM CYANIDE FACILITIES

3.1 Processing Plant

The cyanide facilities at KCGM consist of two separate unloading and storage facilities (at Gidji Roaster and Fimiston), 4 separate cyanide leaching and carbon adsorption circuits (1 at Gidji roaster and 3 at Fimiston), a carbon elution and gold recovery circuit at Fimiston, 3 paddock style tailings storage facilities (1 at Gidji and 2 at Fimiston) and a number of cyanide containing water dams and tanks at both Gidji and Fimiston. Cyanide plant hardware includes tankage, piping, valves, pumps and supporting structure. Full lists of cyanide containing vessels at Fimiston and Gidji are attached as tables in Appendices 1 and 2.

Cyanide is received at both Fimiston and Gidji by road iso-tank in the form of 30% (max) sodium cyanide (NaCN) solution (concentration reduces to 27% in winter). It is unloaded at Fimiston into a 480m^3 storage tank (F71TK01) via pressure transfer.

Figure 1.1 Cyanide Storage Tank at Fimiston (F71TK01)

Cyanide is pumped to the head of 3 separate cyanide leach circuits via a 70 mm ID ring main, the full length of which is some 700 m (contained volume ~ 2.7m^3). CIL 1 processes flotation concentrate slimes and ultra fine grinding product and comprises 2 leach and 6 leach/adsorption tanks, CIL 2 treats flotation tailings plus the tailings stream from CIL 1 (1 leach and 5 leach/adsorption tanks) and CIL 3 is a replica of CIL 2 and processes flotation tailings only.

Cyanide is drawn from the ring main at the head of each leach circuit and dosed to any of several points in the tank system via a manifold incorporating automatic flow control.

Figure 1.2 Cyanide Dosing Manifold at Fimiston (CIL1)

Leached pulp containing less than 1% sodium cyanide discharges as tailings from Tanks F30TK02F, F30TK32F and F30TK62F and is pumped to the Fimiston 1 and 2 tailings storage facilities. Cyanide containing solution is drawn from the tailings decant ponds and returned to the Fimiston plant via decant solution dams. Three lined ponds and three tanks in Facility 75 at the western side of the Fimiston plant (TK61, TK 62 and TK64) contain various mixtures of tailings return cyanide solution and raw water and thus are relatively low in cyanide content.

Elution of loaded carbon from the 3 Fimiston CIL circuits as well as from Gidji CIP is carried out at Fimiston using two identical split AARL (Anglo) elution facilities.

Cyanide is added to the elution process by addition of a fixed volume of 30% NaCN solution per strip to the lean eluate storage tank (F65TK 62). Pregnant solution from carbon stripping is stored in two eluate storage tanks (F66TK68 and F66TK69) prior to electrowinning when it is transferred to and circulates from two eluate circulation tanks (F66TK61 and F66TK62). After passing through either of two sets of two electrowinning cells in parallel in the goldroom, the eluate contains significantly less cyanide. The barren solution is stored in the barren eluate tank (F66TK63) prior to discharge back to the head of CIL2 and CIL3.

Figure 1.3 Elution Solution Storage tanks at Fimiston (F66 Goldroom)

The final component of the cyanide circuit at Fimiston is the Acacia Reactor which processes gravity concentrate from the Knelson centrifugal concentrators in the milling circuit. Sodium cyanide solution is drawn from the main cyanide ring main into a cyanide solution tank (F66TK01) to make up a 2.5% caustic cyanide solution which is used in a batch treatment process in the Acacia Reactor. Pregnant eluate from the Acacia leach process still contains high cyanide levels and reports to a storage tank (F66TK04) prior to being pumped to the goldroom for electrowinning.

Figure 1.4 Acacia Reactor Circuit at Fimiston

At the Gidji Roaster, calcined flotation concentrate is processed in a conventional cyanide leach and CIP circuit and product from an ultra fine grinding mill is leached in 2 separate leach tanks before joining calcine leach tail in the 8 stage carbon adsorption circuit. Tailings from the Gidji CIP circuit are impounded in a dedicated tailings storage facility at the site. Loaded carbon is recovered from the CIP circuit and trucked back to Fimiston for elution and gold recovery.

Sodium cyanide solution (max 30%) is unloaded from road iso-tanks at Gidji into a farm of 4 level equilibrated 50m^3 cyanide storage bullets. The solution is pumped into the plant via a ring main and can be drawn into each of the 5 leach tanks and 2 of the eight adsorption tanks via a flow controlled piping manifold. Tailings return solution is relatively high in cyanide content (although less than 1%) and is stored in a lined decant pond and a 45m^3 tank (65TK02) prior to reuse in the leaching circuit.

Figure 1.5 Cyanide Storage Bullets at Gidji

Figure 1.6 Gidji CIL Circuit from Roaster

3.2 Tailings Storage Facilities

Two substantial tailings storage facilities accommodate tailings from the 3 Fimiston cyanide leach circuits. Fimiston 1 occupies an area of approximately 110 hectares and has capacity for 2 million tonnes of tailings per annum whilst the larger Fimiston

2 occupies 350 hectares and can accommodate 10 million tonnes per annum. Fimiston 1 is currently approved to a height of 40 meters and the various paddocks at Fimiston 2 are approved to heights of between 42.2-45 meters. Forecast mine life of 10 years requires that additional TSF capacity be found for storage beyond 2012 either by additional raising of the Fimiston dams , by utilising the existing Kaltails TSF or a construction of new TSF (Fimiston 3).

Embankments of both dams are constructed upstream using dry tailings and annual independent geotechnical reviews of stability are undertaken and provided to the Department of Industry and Resources (DoIR). The two dams are divided into separate paddocks, each of which has a central gravity decant pond for supernatant removal. The layout of the Fimiston tailings storage facilities is depicted in Figure 1.7.

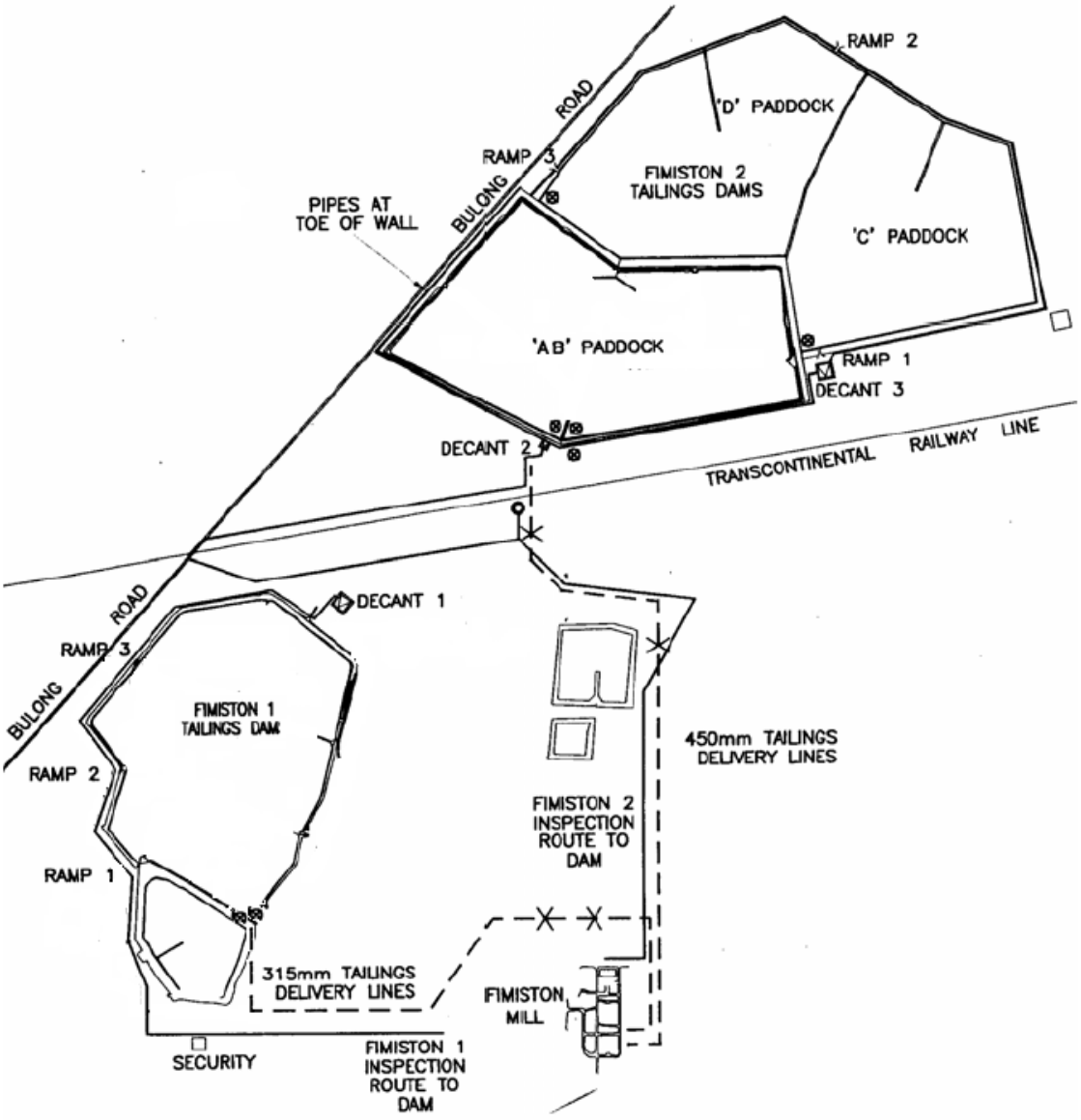

Figure 1.7. KCGM Fimiston Operations - Tailings Storage Facility Layout.

Plant tailings are typically deposited concurrently in active paddocks in both Fimiston 1 (20% of flow) and Fimiston 2 (80% of flow) via bunded pipeline corridors as depicted in Figure 1.7 above. The supernatant pond surface area is shown by aerial survey to vary substantially over a year (for example about 35,000m^2 to 140,000m^2 in FIM 2 "D" paddock in 2003). The decant dams at the base of the FIM 1 and FIM 2 facilities do not all routinely contain cyanide solution - Decant 1 at FIM 1 and Decant 3 at FIM 2 are routinely used for decant storage but Decant 2 seldom contains other than seepage water only. Decant water containing low cyanide concentration (typically ~2 ppm) is relayed back to the plant via Decant 3 pond and the Decant Transfer Tank pump station.

The tailings storage dam at Gidji Roaster has a footprint area of 18 hectares with two cell areas, each of 6.5Ha (300 meters x 300 meters) currently being operational. These each have a central gravity decant pond for supernatant removal. A third cell is planned for construction in 2009 to provide sufficient storage capacity for the life of mine (2017). The embankments are constructed upstream using compacted tailings The supernatant solution ponds on the Gidji Dam contain WAD cyanide levels in the order of 500 – 1000 ppm and as a consequence the dam has been netted to preclude access by bird life. Netting has also been installed on the Decant and Toe Drain dams.

Figure 1.8. Gidji Tailings Storage Facility

4. CYANIDE FACILITY CLOSURE - GENERAL SAFETY CONSIDERATIONS

Sodium cyanide is a rapidly acting poison with a human lethal oral dose being only 2.9 mg/kg whilst for inhalation of hydrogen cyanide gas, the lethal concentration is 120mg/kg/hour. The hazard posed by sodium cyanide to human health therefore represents the greatest challenge of successful cyanide facility decommissioning and human safety management and implementation throughout decommissioning, dismantling and disposal of the Fimiston and Gidji cyanide facilities is of primary concern.

The relevant KCGM Operations Superintendent will play a key role in the development of specific procedures required during the decommissioning phase and also in the extension and reinforcement of existing cyanide specific procedures. Emphasis will be placed on the responsibilities of KCGM supervisors, contractors, purchasers and coordinators for managing the safety and health of their own employees.

An overall safety management plan developed for the closure of the Fimiston and Gidji sites will incorporate cyanide handling and exposure issues but specific comments relating to decommissioning of the cyanide facilities follow.

4.1 Emergency Response Plan

For the decommissioning processes at KCGM the current emergency response plan will be revised and reissued in the final 6 months of operation to accommodate the non routine aspects of closure of the cyanide facilities. The revision of current emergency procedures should be straightforward and hence document revision can commence as late as three months prior to shutdown of processing facilities.

4.2 Safety Induction

Cyanide specific site safety inductions are required for all employees and contractors involved in the decommissioning of the cyanide facilities prior to commencing tank cleanout, equipment modification or dismantling activities. The cyanide supplier, Australian Gold Reagents, will be invited to conduct site based cyanide safety training two months prior to shutdown and will also induct the selected tank detoxification contractor (eg Collex Industrial Services) prior to their commencement on site. The use of the cyanide supplier in this way reduces the drain on the safety office resources at a hectic time on the mine site.

4.3 Health and Safety Procedures

Existing health and safety procedures will be revised to meet cyanide plant decommissioning and removal requirements no less than 2 months prior to plant shutdown.

4.4 Supervisory Training

The effective training of all supervisory personnel associated with decommissioning and removal of cyanide plant is of particular importance during review and redevelopment of emergency response, safety induction and work permit systems. Supervisory training will be carried out on a progressive basis from the shutdown date forward for incoming personnel and earlier for designated KCGM decommissioning team members. An additional consultant resource will be utilised if necessary to conduct training relating to removal of plant, contract coordination and safety tagging.

4.5 Safety Contract Exhibit

Tender documents received for contract removal of cyanide plant require the safety and health budget to be specified in the documentation. The tender documents should detail plans for inspection of the workplace, safety meetings and their topics, toolbox meetings and audits against the safety and health procedures. Each contractor group must present a safety management plan for the period of the contract to ensure it meets the requirements of the KCGM safety management plan. The same requirement applies to the purchaser of any cyanide facility asset. In this way KCGM can be sure that their duty of care over the safety of the cyanide facilities can be effectively discharged after closure.

4.6 Audits and Inspections

Safety and health inspections of the workplace and auditing against procedures should be carried out throughout the decommissioning and dismantling phase. Inspection sheets will be used by nominated personnel to capture the information, and enter into a site database to facilitate follow up action. Auditing should be completed on a monthly basis by the relevant KCGM Operations Superintendent and by the dismantling contract supervisor against safety and work rules documentation.

4.7 Risk Assessments and Hazard Identification

Before KCGM is decommissioned and before the removal of cyanide facility assets HAZOP and workplace risk assessments will be completed to identify the hazards

associated with decommissioning and dismantling and the control measures required.

The risk assessments should be carried out by a team comprising supervisory, contractor, purchasing, engineering, safety and environmental representatives. They will incorporate environmental and community relation impacts and be documented and accessible on the KCGM intranet.

Hazard identification will be reported through the existing hazard identification and risk assessment procedure.

5. GENERAL ENVIRONMENTAL CONSIDERATIONS

A key objective for the decommissioning of Fimiston and Gidji processing plant and tailings disposal facilities is to ensure that there is no environmental impact either prior to plant closure or for an indefinite period afterwards. Any cyanide remaining on the site after closure in the form of unused product, exposed spent leach solutions and residues and tailings dam water ponds could undermine this objective whilst TSF seepage and stability could also be of concern. Statutory and responsible management obligations ensure that extensive monitoring is carried out on cyanide levels in TSF ponds and in seepage and groundwater during operational life and also on the geotechnical stability of the facilities. Most of the specific strategies to ensure safe and secure closure of the facilities will therefore be in place long before cessation of operations. Site operating license conditions require that a detailed formal Public Closure Plan incorporating TSF strategies be prepared a minimum of 6 months prior to closure of both Fimiston and Gidji operations. KCGM are committed to much earlier preparation of such document however, as noted in the 2005 Operations Extension Project Definition Document. This Cyanide Facility Decommissioning Plan will specifically define the critical elements that require to be considered for closure of the cyanide facilities. These elements will form a part of the wider scoped Public Closure Plan. Key elements of the plan are discussed in Section 7 and should be revised as closure becomes more imminent.

5.1 Water Management

The semi-arid goldfields environment in which evaporation substantially exceeds rainfall is readily conducive to full containment and evaporation of cyanide contaminated water stocks. Environmental impact of the tailings storage areas can therefore be managed by preventing access to ponded cyanide water for as long as the solution contains harmful CN_{WAD} levels. Promotion of evaporation and restriction of access following facility closure are therefore key strategies.

Planning for closure of the KCGM tailings storage facilities will ensure that:

- Minimum water stocks are contained in both residue and water dams at the end of the processing plant clean up period. This action ensures minimal probability of discharge of contaminated water from the site.
- Final residue profiles ensure adequate management of rainwater.
- Pumping and piping infrastructure are retained following closure to facilitate movement of residual water over dry beaches to promote evaporation if necessary.
- Post closure groundwater quality monitoring programs are well defined in conjunction with statutory requirements and approvals
- Necessary groundwater quality and quantity control infrastructure remains in place for as long as necessary.

These strategies are covered in greater detail in Section 7.

6. PLANT AREA CLOSURE STRATEGIES

6.1 Detailed Task Development and Scheduling

Planning for the shutdown of the Fimiston and Gidji processing plants and associated cyanide facilities will be the subject of detailed task lists and associated schedules of activities. The compilation of task lists will be the responsibility of a dedicated person(s) who is highly familiar with the plant hardware such as a process technician or supervisor and commence no less than 3 months prior to plant shutdown. The task lists should be tabulated under the headings of equipment number, description, required action, special requirements, resource, hours and people. An example would be;

Description	Action	Special Requirements	Resource	Time (hours)	People
F66TK01 Acacia Reactor Solution Tank	Clean down external structure with cyanide free water	Barricade surrounds to 5 meter exclusion area	Labour	One	One

These lists are a valuable tool to determine special safety precautions (eg barricading, confined space entry or safety harness requirement) and maintenance project requirements (eg installation of temporary pipeline or additional local hose point). They also enable an accurate estimate to be made of the time required to

complete the facility decommissioning. A Gant chart will be compiled which serves as a master reference document for all personnel involved in the decommissioning of the facility and which enables daily tracking of progress against the plan.

6.2 Cyanide Stock Reduction

The quantity of 30% sodium cyanide solution in stock at both KCGM and Gidji will be drawn down to meet only minimum operating requirements as plant closure approaches. Preclosure draw down is necessary to avoid the hazardous practice of emptying liquid stocks from storage tanks into trucks and the issue of transport restrictions imposed on partially loaded cyanide vessels. A maximum stock holding of one week should be achieved two weeks from closure.
Management of stock drawdown is complicated by the fact that a number of elution cycles are required post closure to recover the gold inventory from tank carbon. A reasonable estimate of the elution requirement can be made based on the known carbon inventory and cyanide requirement per strip. In the event of overestimation of requirement then cyanide concentration can be raised for the final gold recovery activities to facilitate disposal without adverse process impact.

For effective cyanide stock reduction, close liason is required between processing staff, the supply department and the cyanide suppliers. A formal weekly meeting between the Mill Superintendent and the Supply Coordinator to discuss reagent stocks and supply issues should be instituted two months prior to plant closure.

6.3 Preclosure Tank Cleanout

The presence of a single large cyanide solution storage tank at Fimiston (F71TK01) makes it impossible to empty and clean out any solid residue for codisposal with tailings during plant operation. This procedure is usually necessary with solid cyanide mixing facilities due to the accumulation of toxic solid precipitate at the base of the storage tanks during operation. Precipitates take the form of either white calcium hydroxy carbonate sludge entrapped with various metal cyanide salts or dark brown sludge comprising organic and complex derivatives of cyanide. Precipitate formation is of less concern with liquid cyanide receival facilities however an inspection of F71TK01 incorporating a sample scooped from close to the base not less than 12 months prior to closure will determine the requirement for a preclosure temporary storage facility to enable TK01 hose out.

At Gidji the 4 cyanide storage bullets will be targeted for progressive isolation and cleanout in the final 2 months of plant operation as a safety precaution. Any sludge present in the cyanide storage tanks becomes a potential dust hazard once dry, if

disposed onto the surface of the TSF in the form of water slurry. The preclosure bullet cleanout at Gidji can concentrate specifically on sludge removal as each tank will undergo a final cleanout and detoxification after plant closure.

6.4 Cyanide Disposal

In the event that residual cyanide stocks are retained in storage on site due to inaccurate prediction of requirements then various cyanide disposal options must be considered.

If the retained volume of 30% cyanide solution is small (less than 20 m^3) then disposal of cyanide into the relevant TSF via sump pump and normal tailings discharge pipelines may be feasible in conjunction with high volumes of plant wash water. In this case the approximate volume and cyanide concentration of the TSF decant pond should be known and a calculation made to determine the impact of discharge of the known volume and concentration of stored cyanide solution. Discharge of a small volume in this way will minimise the impact on WAD cyanide levels in open water and assist to keep the WAD cyanide levels below what is hazardous to wildlife.

Alternative methods of on site disposal of a small volume of residual cyanide would be to increase cyanide addition to post closure carbon inventory strips or to use it to leach lower grade tank sediments in the Acacia reactor. Cyanide which ultimately presents to F66TK61 and F66TK62 circulates through the electrowinning cells and is substantially oxidised to cyanate and ammonia. This reduces the burden of cyanide solution presenting to the surface of tailings storage facilities.

6.5 Plant Cleanup

Immediately following plant closure at both Fimiston and Gidji, the entire plant will be hosed down and cleaned of mud/dust/salt encrustation as far as practicable. This activity in the cyanide storage and reticulation facilities will pay particular attention to removal of salt encrustation as this material will almost certainly have high cyanide content. The destiny of the Fimiston and Gidji plant after cleanup will determine any requirement for surface preservation and corrosion protection works but it is assumed for the purposes of this report that non mechanical components are sold for scrap value only. Cleanup must therefore be of sufficient standard that no safety hazard is presented to plant dismantling personnel.

6.5.1 Tanks and Vessels

6.5.1.1. "High Strength" Cyanide Tanks

All cyanide storage tanks which have contained greater than 1% sodium cyanide solution in operating life will be considered "high" cyanide vessels for decommissioning purposes as discussed in Section 2. Sodium hypochlorite washing will be undertaken as hosing with raw water only may leave a low surface pH and cyanide film after drying which is hazardous to personnel entering the space or cutting into the vessel wall or structure.

The following tanks contain "High Strength" cyanide and will be subjected to hypochlorite washing:

- F71TK01, Cyanide Storage Tank
- F66VL-01, Acacia Reactor
- F66TK04, Acacia Reactor Area Pregnant Eluate Storage Tank.
- F66TK01, Acacia Reactor Area Solution Tank
- Gidji Cyanide Storage Bullet Tanks (4 off)

The procedure to be followed for emptying and washing "High Strength" cyanide tanks will be largely in accordance with CSBP Limited Document Number OP-09-040-09 "Sodium Cyanide Solution Storage Facility Decontamination"

After emptying of residual cyanide solution to the level of pump suction, the manhole cover is removed and the suction line of a portable vacuum pump is inserted. This pump is used to drain remaining cyanide into the cyanide area sump pump as well as wash solution deriving from hoses trained through the manhole and possibly the top tank vent pipe flange. Once the tank floor has been vigorously washed and the tank drained via the drain valve at base, a large blower fan is used to blow atmosphere out of the tank vent flange prior to any vessel entry consideration. The KCGM confined space permit to work procedure will be strictly adhered to including atmospheric testing and observer provisions for all subsequent internal cyanide tank cleaning activities. These activities involve further surface washing and sludge removal from floor via the tank drain valve using brooms and running water. Once the tank is cleaned of sludge and wash solution it is subjected to high pressure water spray washing via a spray manifold inserted either through the manhole at base or the vent flange at top of tank. Washings from this procedure are removed using either the installed transfer pump or a vacuum pump and are tested for cyanide concentration. When less than 30 ppm CN^- is detected in the water washings the tank is detoxified using the same spray equipment but incorporating 1.5%wt/vol

sodium hypochlorite solution. This solution can be prepared by mixing neat sodium hypochlorite (12.5% wt/vol) with clean water in the ratio of 20 litres hypochlorite to 180 litres of water. As a general rule 15 liters of 12.5% sodium hypochlorite liquor (diluted at 1 to 9) will destroy 1 kilogram of sodium cyanide (100% NaCN) and provide a 20% excess which will ensure complete detoxification.

After the sodium hypochlorite rinse solution has been removed from the tank by pumping or draining from the base it may be appropriate to do a final high pressure water only rinse and to test that wash solution contains less than 1 ppm of cyanide.

For both the Fimiston and Gidji “high strength” cyanide tanks It is proposed to utilise a specialist chemical storage cleaning contractors such as Collex Industrial Services. Such contractors use twin plane swivel head spray nozzle equipment to scour internal tank surfaces with up to 10 bar pressure spray water in a sequential wash and sodium hypochlorite rinse process described above. Such contractors can generally detoxify a single tank in a period of several hours. An estimate of 64 hours total (8, 8 hour shifts) has been received for cleaning the 8 “high cyanide” tanks at Fimiston and Gidji listed above. Once cleaned the cyanide tank is opened to air when completely dry, is fully safe for any dismantling activity.

Cyanide header tanks at each CIL train will be flushed internally as part of the ring main. With the coverplate removed, these tanks can be rinsed with sodium hypochlorite using a broom dipped into 1.5% sodium hypochlorite solution. External hose down and washing is also undertaken to remove all trace of cyanide containing encrustation.

6.5.1.2. “Medium Strength” Cyanide Tanks

Tanks containing process slurries such as leach/adsorption tanks will be deemed “medium strength” cyanide vessels. The cyanide hazard posed by such tanks is relatively low and hosing down with raw water once emptied of slurry is considered a safe clean up provision. Hose down of the external and internal surfaces of process tanks will broadly follow the procedure for “high strength” tanks (Section 6.5.1.1) except that most of these tanks are open to atmosphere at the top. As a general principal the structure should be cleaned from the top down to remove built up and caked slurry and thus minimise the requirement to duplicate cleaning of lower structure. Scale buildup on tank walls should be able to be dislodged by plant hose water otherwise a high pressure spray unit at up to 6000 PSI may be necessary. Probable sediment accumulation at the base of all leach tanks may require additional labour to be removed though drainage manholes. Such sediment will require to be assayed to determine gold content and batch leaching in the Acacia Reactor may be

justified prior to disposal in TSF. Low grade clean down slurry will be sent to carbon safety discharge hoppers via sump pumps for discharge to the relevant TSF.

Leach and adsorption tanks will be emptied individually in a sequence calculated to recover carbon to elution in the most efficient and cost effective manner. The tank emptying sequence will involve displacing higher grade slurry from the leach tanks into the first adsorption stage by pumping initially from the back of the adsorption circuits to F30TK02A, F30TK32B and F30TK62B at Fimiston and 50TK01C at Gidji. A hire pump installed at the tank base is necessary for this purpose. Slurry underflow from the loaded carbon screen will be allowed to drain by gravity into the carbon safety screen underflow launder on the relevant tank train via a temporary HDPE line. The final tank to be emptied must be the first adsorption stage to take advantage of the installed carbon recovery pump.

6.5.2 Piping

All steel and polyethylene piping used to reticulate cyanide around the processing plant will be flushed after closure in accordance with the KCGM Isolation and Tagging (Permit to Work) procedure for the cyanide ring main. At Fimiston this could involve adding a minimum of $30m^3$ of potable water to the cyanide storage tank (F71TK01) and circulating through the ring main for at least 30 minutes. TK01 may then be drained after the flush by opening the cyanide addition valves on each tank feed point to ensure that no cyanide remains in the dead legs. (The leach and adsorption tanks will still contain process slurry at this time – less than 3 days after closure). Following the water flush, a hypochlorite solution rinse will be instituted. Principles of hypochlorite use for cyanide detoxification are discussed in Section 6.5.1.1 and the cyanide supplier (CSBP) will be consulted regarding cyanide line detoxification procedures and volumes. The procedure most likely to be adopted is the addition of an appropriate volume of 1.5% NaOCl to TK01 and circulation of the solution through the ring main for 30 minutes. After flushing, cyanide lines are drained by breaking flanges at low points (both feed and return lines at TK01) and the hypochlorite rinse solution is either allowed to drain onto the ground in the vicinity of TK01. The cyanide supplier does not recommend disposal of hypochlorite wash liquors into tailings dams where they can come into contact with cyanide due to the potential for evolution of highly toxic cyanogen chloride gas. They are generally safe to dump on the ground in the plant area provided there will be no run off into ecologically sensitive areas. Any reagent pumps that are not scheduled for use in any subsequent care and maintenance period should be isolated electrically and pipe discharge flanges broken.

6.5.3 Steel Structures

All steel structure in the cyanide facility is hosed down as far as practicable using plant raw water as described in Section 4.5. No further specialised cleaning or protective coating is necessary.

6.5.4 Bins, Chutes and Hoppers

Apart from hosing out to render clean and free of carbon build ups, the carbon bins and hoppers in the elution area require no specialist treatment. Measures will be taken however, to ensure water does not accumulate eg all drain valves to be left open and drainage holes cut if necessary.

6.5.5 Pumps

Pumps and other mechanical rotating equipment in the cyanide, elution and carbon regeneration areas will be washed down externally with raw water to remove traces of cyanide and have grease applied to moving parts. As far as possible, old grease will be purged due to the likelihood of some delay before the equipment is reused. Vapour phase inhibitor may be added to oil sumps on relevant equipment while it is still warm and capable of being run. The requirement for these applications will be picked up during detailed task listing and they would be carried out by maintenance in conjunction with the KCGM operations clean up phase.

6.5.6 Instrumentation

Following cleaning, selected instruments (ie pH meters, oxygen meters, cyanide monitors and analysers) will be wrapped in an appropriate Denso system and removed to storage.

6.5.7 Concrete

Concrete surfaces in the cyanide bunds will be thoroughly hosed down with raw water and those in the elution and leaching areas possibly subjected to sample coring to determine gold content. Raw water washdown is adequate treatment to render concrete safe for break up and removal prior to site rehabilitation.

6.6 Goldroom

The goldroom at Fimiston may be seen as a specialist cyanide facility in so far as the carbon elution and electrowinning process solutions stored and processed therein operate with “medium strength” cyanide solutions.

The elution and electrowinning circuit will be in use for several weeks after plant closure for recovery of gold from the plant carbon inventory. Once drained the elution

tanks require to be thoroughly flushed with potable water and this should include circulation of 20 m^3 of potable water from the eluate circulation tanks (F66TK61 and 62) through the electrowinning cells for one hour. Following the recirculation flush, the cells, tanks and pumps should then be washed down with potable water and drained. The goldroom sump will later require to be emptied and dug out as part of a gravity trap recovery program.

6.7 Acacia Reactor

The gravity area Acacia Reactor will be an important unit process after plant closure to maximise recovery of high grade plant clean up residues. It is therefore likely that decommissioning and clean out of the reactor vessel and associated reagent mixing, feed and holding tanks will not occur until at least 2 months after plant closure. For this section of plant, thorough wash down with potable water will be undertaken and 2 tanks will also require hypochlorite detoxification due to high cyanide solution content during operation (see Section 6.5.1.1). The reactor vessel will require washdown only as it is open to atmosphere. Surface cleaning of pumps using brooms dipped in hypochlorite may be required however.

6.8 Plant Removal, Dismantling and Demolition

Removal and dismantling of the plant facilities at both Fimiston and Gidji are planned to occur in accordance with typical current gold industry practice ie valuation of plant and equipment followed by auction of significant items at site and dismantling and demolition of remaining plant to concrete level under contract to realize scrap metal value. Market conditions at the time of closure will determine the likely value of the cyanide circuit facilities ie the prevailing value of scrap metal and the possible presence of a new mine in the goldfields area.

6.9 Tailings Storage Facility Infrastructure

The continued use of tailings discharge facilities during the clean up phase will mean that these will be amongst the last items to be decommissioned. Decommissioning of the main tailings delivery lines will involve flushing with cyanide-free raw water prior to dismantling. The tailings pumps can then be decommissioned as per 6.5.5 above. Decant return lines at both Fimiston and Gidji will be flushed using raw water and the Fimiston Decant Transfer tank will be inspected and cleaned as per 6.5.1.2.

The decant ponds and pumps and the tailings paddock distribution piping systems at both Fimiston and Gidji will remain in service to facilitate water spreading as detailed in 7.2.1.

Potential soil contamination by cyanide beneath lined dams and tanks and in pipe corridors will be checked by soil sampling in order to determine what remediation works, if any, are required.

6.10 Contaminated Site Management

During 2007, a Register of Suspected Contaminated Sites in KCGM operational areas was developed as part of an obligation to report all suspected contaminated sites to the Department of Environment and Conservation (DEC) under the *Contaminated Sites Act (2003) and Regulations (2006)*. This included sites operational both during and prior to KCGM's existence, since 1989. Sites that were suspected to be contaminated with cyanide included:

- Pre KCGM and present plant sites
- Pre KCGM and present tailings storage facilities
- Groundwater plumes associated with tailings storage facilities
- Historic concentrate storage areas
- Pre KCGM heap leach facilities

All suspected contaminated sites in KCGM operational areas are currently (June 2007) under review by the DEC. A more detailed Preliminary Site Investigation (PSI) of contaminated sites is underway and expected to be complete by mid 2008, using external resources as required. This PSI involves a comprehensive investigation of all parts of KCGM operations to confirm the absence or presence of contamination, including soil and water testing where required. All testing will be carried out by a National Association of Testing Authorities (NATA) approved laboratory. At the completion of the PSI, the KCGM Register of Contaminated Sites will be updated to reflect any changes. This will then be used to track the management and remediation of contaminated sites where required on an ongoing basis during operation and closure.

6.10.1 Earth Mounted Cyanide Tanks

Many of the medium and high grade cyanide tanks at Fimiston and Gidji are mounted on an outer concrete annular ring filled with compacted soil/clay in accordance with standard tank construction practice. The possibility that a leak of cyanide solution may have occurred through the baseplate during service but not detected from

obvious seepage from the edge of the base rim is very small. In the case of the “high cyanide” tanks however, even a pinhole leak through the baseplate could be sufficient to pose a significant hazard to tank dismantling personnel if high temperature cutting equipment was to be used above an area of cyanide accumulation. Dismantling safety procedures must therefore include provision for either core testing through the base plate during dismantling or removal of the lower section of tank in one piece by crane slung between cut off side walls. Awareness of the possibility of cyanide contamination of the compacted soil base beneath cyanide tanks should be sufficient to ensure adequate safety procedures surrounding tank removal and site rehabilitation.

7. CLOSURE TASKS - RESIDUE DISPOSAL AREAS

Many of the necessary steps and precautions that must be undertaken in order to minimize human and environmental impact of the KCGM tailings storage facilities during decommissioning and after cessation of activities will already be in place during operational life. There should thus be no substantial increase in resource requirements or costs in the preclosure period but an ongoing cost liability will apply to environmental monitoring after closure. The key elements and approximate timing are discussed in the following sections. More detail regarding the tailings storage facility closure activities will be included in the KCGM Public Closure Plan.

7.1 Risk Assessment

In order to achieve the defined closure objective (Section 5) and put in place appropriate risk management strategies it is necessary to have an understanding of the risks posed to personnel and the environment by the cyanide disposal areas after closure. Risks include significant harm to people and death of flora or fauna on plant or tailings dam sites and could arise from such events as accidental release to the environment of cyanide containing soil (tailings) or water (liquor), substantial and uncontrolled seepage of cyanide containing water into groundwater and failure to meet rehabilitation commitments. A qualitative or semi quantitative risk assessment will be documented not less than 2 years prior to plant closure which will include a risk management plan that defines the steps required to minimise risks to people and the environment associated with failure of any aspect of the tailings disposal system prior to and after facility closure. Many of the risks are understood during operation and the plan will formally document these as an early step in closure preparation. The output from a site water balance model is usually helpful to quantify risk as it can predict probable outcomes of specified climatic events such as a 1 in 100 year rainfall event. The existing spreadsheet based (MS Excel) numerical simulator should provide adequate predictive capability but should be regularly updated to incorporate

changes in flows and water stocks. The risk assessment may be prepared either by site personnel with extensive experience of residue and water management on site or by the site preferred geotechnical consultant with input from key stakeholders on site. The current consultant, Golder Associates have extensive experience with the risk based approach to tailings dam closure management and could advise further on the scope of the risk assessment.

7.2 Cyanide Water Stock Reduction

KCGM have an operating policy of minimizing TSF water pond volume which is pursued by maximizing the capacity for tailings decant water reuse and minimizing borefield abstraction for make up requirements. At present (September 2005) approximately 50% of processing plant saline water derives from TSF recycle and scope thus exists for increased reuse capacity. Further drawdown of water stocks on both the Fimiston and Gidji tailings dams prior to closure is a critical element of environmental risk management and should commence at least 6 months prior to closure depending on water balance model predictions. The aim must be to leave supernatant ponds and cyanide containing water dams with volumes as small as practicable. Stock drawdown may be contingent upon pumping and infrastructure capacity and a meeting of all “water users” not less than 12 months prior to closure should define a detailed plan to facilitate minimisation of supernatant pond volume at closure. Output from the site water balance model for a range of climatic scenarios in the final months of operation will be required input to this water stock reduction planning meeting.

With evaporation exceeding rainfall in the semi-arid goldfields region the probability of contaminated water release from the Fimiston and Gidji TSF areas is very low in any climatic scenario. Nevertheless contingency cyanide water management options in the period immediately prior to and after closure should be available and include the following strategies:

7.2.1 Water Spreading

Water spreading over dry tailings beach area is a very effective means of promoting evaporation of excess water that may accumulate during a flood event or a high rainfall season. To allow this possibility at KCGM pumping facilities at Fimiston 1 and 2 decant ponds and at Gidji will be retained for a minimum of one winter after closure and minor piping reconfiguration undertaken to direct TSF decant water back into the dam discharge pipelines. Water can be distributed onto the surface of the dam by open spigot as currently, or by sprinkler system. This activity is an option for the first summer post closure and could also be helpful from a dust control perspective although the rehabilitation plan for the dam is likely to include rock cover for the

slopes and heavy rock armor of dam crests to address dust minimisation. Operating costs for a sprinkler system will be dependent upon demand for water loss or dust control.

7.2.2 Cyanide Destruction

Detoxification of cyanide containing saline water would only be necessary at Fimiston in an extreme post closure rainfall event in which case cyanide concentration would likely meet beneficial user standards anyway due to dilution. It may however be considered as an option to process the Gidji supernatant pond in order to rapidly reduce the cyanide risk to birdlife, notwithstanding the presence of netting over the dam. Cyanide destruction at Gidji would enable early removal of net covering and the commencement of dam rehabilitation. The principal cyanide effluent treatment options available for batch treatment of a finite volume are hydrogen peroxide and Caro's acid. Other systems in use for cyanide destruction such as INCO (SO_2/Air) and biological/nitrification are more appropriate in an operating application. Alkaline chlorination is appropriate for detoxification of empty vessels and contaminated surfaces but not for a significant water volume. The most appropriate technology is a function of solution characteristics, the desired water product quality and site specific factors such as natural degradation rate and the availability and cost of reagents.

The hydrogen peroxide process utilises hydrogen peroxide in the presence of a soluble copper catalyst to oxidise cyanide to cyanate.

$$H_2O_2 + CN^- \xrightarrow{Cu^{+2}\ Catalyst} OCN^- + H_2O$$

Metals are precipitated as metal-hydroxide compounds. The rate of the destruction reaction is directly proportional to the concentration of the copper catalyst. However, as hydrogen peroxide catalytically decomposes in the presence of copper, excess reagent consumption can occur if copper levels are not carefully controlled. The presence of copper in the Gidji TSF decant solution may influence peroxide process selection.

Caro's Acid (peroxymonosulphuric acid - H_2SO_5) hydrolyses cyanide and its weak complexes to cyanate and can effectively reduce CN_{WAD} from several hundred ppm to 0.1 ppm or less. The process may require the addition of a soluble copper catalyst to improve the reaction efficiency and rate but in many cases this is not required. The reaction between Caro's acid and cyanide is very rapid, being completed in less than one minute. Caro's acid is less sensitive to decomposition from heavy metals than peroxide and so can be used in slurry treatment applications**.**

If required a simple mixing and dosing system could be assembled on site utilising existing plant tankage and equipment. An engineering scoping study of the relevant factors including site water balance no less than 6 months prior to Gidji closure will effectively determine both the requirement for cyanide destruction and the preferred process.

7.3 Post Closure Wash Water Management

The Fimiston and Gidji plant areas will be cleaned down following closure and all residue, process water and reagents will be removed from the system as described in Section 6.5. The process water pond will be retained and used as both a wash down water source as well as a sump to monitor the quality of water washings from the plant area. Following plant cleanup all cyanide containing water will be transferred to the FIM1/2 and Gidji tailings dam areas for evaporation through the existing pipelines. All ponds containing cyanide have sufficient freeboard to handle both the volume and 48 hour probable maximum precipitation rate associated with a 1:100 year rainfall event.

7.4 Groundwater Management and Quality Monitoring

Groundwater quality in the vicinity of both the Fimiston and Gidji TSF's poses a risk mainly to beneficial users. At Fimiston the risk is more associated with rising groundwater level than deteriorating groundwater quality whereas at Gidji, cyanide concentration contours can be recognized in groundwater surrounding the TSF. KCGM has a comprehensive monitoring program incorporating a network of 70 groundwater monitoring and 109 production (recovery) bores at Fimiston to monitor and control groundwater quality and levels influenced by seepage from Fimiston 1 and Fimiston 2. Similarly at Gidji, a network of 35 monitoring and 27 recovery bores are used to monitor and control groundwater quality and quantity around the TSF. For Fimiston KCGM are working with the Department of Environmet (DoE) to review groundwater monitoring requirements and have undertaken to develop and implement a Seepage and Groundwater Management Plan in the FIM 1 TSF raise Notice of Intent (NOI). The groundwater monitoring programs currently in place at both Fimston and Gidji will continue for at least the first 12 months after cessation of ore processing. For Fimiston it will likely be groundwater level that will determine when bore monitoring can be reduced but the cyanide concentration contour at Gidji will be the key determinant. Bore pumps currently installed at both facilities to control groundwater quality will remain in operation as long as required with water being directed back into the relevant tailings dam rather than to plant process water ponds as currently. Operating experience at KCGM and at mines that have closed in the goldfields area such as Mt Percy indicate that the borefield will be able to be substantially closed within 12 months of plant closure by progressive trimming as the

groundwater contour shrinks. The groundwater monitoring programs for both sites post closure will be further delineated in the Public Closure Plan and in accordance with stipulations by the DoE and the Water and Rivers Commission (WRC)

7.5 Dam Stability Monitoring

Post closure monitoring of the Fimiston and Gidji tailings dams must be able to demonstrate that the structures are geotechnically stable such that there is very low risk of a failure that would result in uncontrolled release of cyanide contaminated tailings. The monthly monitoring of dam wall peizometer data to determine phreatic surface and annual independent geotechnical reviews as currently undertaken will therefore be continued after closure contingent with DoIR requirements and for as long as the data indicates necessary. Note that no significant geotechnical issues have been identified with any of KCGM's existing tailings dam structures during the operating life of the facilities to September 2005.

8. KCGM CYANIDE PLANT CLOSURE COSTS

The total cost associated with closing and decommissioning the cyanide facilities at Fimiston and Gidji is estimated to exceed $1 million. The breakdown of this cost estimate for Fimiston and Gidji cyanide plant facilities is provided in Table 6.1 below.

Costs associated with the decommissioning and cleanup of the Fimiston and Gidji cyanide facilities are principally labour for which a standard cost including administration component has been assumed to be $60 per hour. A more accurate estimate could be obtained from the KCGM payroll costs for a range of the management and operating personnel who might be expected to be involved in the plant decommissioning phase.

Table 6.1 Cost Summary for the Decommissioning of KCGM Cyanide Facilities (Fimiston and Gidji Roaster)

Area/Action		Fimiston					Gidji				
1. Cyanide Facility Direct Costs		Labour			Contracts	Materials/reagents	Labour			Contracts	Materials/reagents
		Hours	Unit Cost	Cost			Hours	Unit Cost	Cost		
Detailed task development (cyanide plant only)		60	60	3600			40	60	2400		
Cyanide stock reduction		16	60	960			16	60	960		
Processing/Supply interface		12	60	720			N/A				
Preclosure cyanide tank cleanout or assessment		4	60	240		60	64	60	3840		960
Residual cyanide disposal		24	60	1440		1000	N/A	60			500
Plant cleanup	"Medium strength" Cyanide tanks	2800	60	168000		42000	1080	60	64800		16200
	"High Strength" CN tanks (detoxification)	40	70	2800	15,000	1000	24	70	1680	12,000	500
	Cyanide pipework	40	60	2400		3000	20	60	1200		300
	Cyanide plant structure	120	60	7200		1000	60	60	3600		1000
	Acacia Reactor (external area)	16	60	960		500	N/A				
	Goldroom (including elution area)	60	60	3600		1500	N/A				
Contaminated soil sampling and testwork		40	60	2400	5000		24	60		1000	
Cyanide plant dismantling and site contouring		Zero net cost					Zero net cost				
Totals		3116		194320	15000	50060	1304		78480	12000	19460
		Cyanide Facility Subtotal				**259380**	Cyanide Facility Subtotal				**109940**
2. Environmental/Tailings Storage Facility Costs		Labour			Contracts	Materials/reagents	Labour			Contracts	Materials/reagents
		Hours	Unit Cost	Cost			Hours	Unit Cost	Cost		
Tailings risk assessment		25	60	1500	30000		25	60	1500	15000	
Tailings storage water stock reduction		80	60	4800			80	50	4000		
Modify pumping infrastructure for evaporation		60	60	3600		5000	60	50	3000		5000
Modify deposition strategy for closure		80	60	4800			80	50	4000		
Water spreading/detoxification (unknown requirement)		Requirement unknown - assumed not required					Requirement unknown - assumed not required				
Water quality monitoring		1500	60	90000	10000		1500	60	90000	50000	
Dam stability monitoring		500	60	30000	20000		500	60	30000	20000	
Totals		1720		104700	40000	5000	1720		102500	65000	5000
		Environmental/Tailings Subtotal				**149700**	Environmental/Tailings Subtotal				**172500**
3. Safety Costs		Labour			Contracts	Materials/reagents	Labour			Contracts	Materials/reagents
		Hours	Unit Cost	Cost			Hours	Unit Cost	Cost		
Revise emergency response plan		40	60	2400			40	60	2400		
Cyanide safety training		1600	60	96000	2000		500	60	30000	1000	
Revise permit to work system		40	60	2400			40	60	2400		
Supervisory training-KCGM + contractors		800	60	48000			400	60	24000		
Revise health and safety procedures		80	60	4800			80	60	4800		
Develop safety contract exhibit-closure contracts		40	60	2400			N/A				
Workplace risk assessments		2000	60	120000			1000	60	60000		
Totals				276000	2000				123600	1000	
		Safety Costs Subtotal				**278000**	Safety Costs Subtotal				**124600**
Total Closure Costs - Cyanide Related Activities						**687080**					**407040**

Other assumptions and notes pertaining to the cost table are as follows:

1. A specialist detoxification contractor (Collex Industrial Services) has been assumed to undertake the detoxification of all "high cyanide" tanks as outlined previously (Section 4.5.1.1). Collex quoted a total of 64 hours requirement using three operators, Vacuum and HPW unit with breathing apparatus to complete the task of cleaning the 8 tanks providing all tanks were totally drained and all work is performed under the safe direction of a KCGM supervisor. The total cost quoted of $26,960 has been nominally split between Fimiston and Gidji on the basis of relative tank size.

2. The cleaning of "medium strength" cyanide tanks (35 at Fimiston and 18 at Gidji) constitutes the largest cyanide facility direct cost and is based on an average of 80 man hours per tank at Fimiston and 60 man hours per tank at Gidji. These estimates are based upon experience of similar internal and external tank cleaning excercises at Boddington Gold Mine. They are reflective of a heavy sediment content being present in the base of several tanks at that site and a similar phenomenon is expected at KCGM.

3. The largest cost component in tailings storage area decommissioning is incurred in water quality and dam stability monitoring which activities are assumed to be required to be continued for 5 years after cyanide plant closure. Three person days per month are assumed to be required for water quality monitoring and one day for dam stability monitoring (piezometer data collection). A geotechnical contractor will also be required to oversee these activities and evaluate data.

4. The largest safety cost is incurred in carrying out cyanide specific inductions for all site personnel prior to closure and all specific cyanide area contractors entering site during and after plant closure.

5. Sodium hypochlorite liquor (12.5%) is assumed to be procured in $1m^3$ bulka boxes at a cost of approximately $400/m3.

6. There is assumed to be no net cost associated with dismantling and demolition of the cyanide facilities at both Fimiston and Gidji. The ultimate fate of the equipment and structure will strongly influence the method and cost of removal. Even in the worst case of minimal salvage of mechanical equipment for resale, however, the current value of the plant as scrap metal is likely to exceed the cost of contract demolition and removal to bare concrete level. Further costs

thereafter for concrete breakage and landscaping are also assumed to be covered by revenue from sale of cyanide plant, equipment and scrap.

7. A cost of over $300,000 has been ascribed to decommissioning of the tailings storage facilities at Fimiston and Gidji however several significant costs have been included which might equally be costed to an environmental or operating budget in years prior to closure. These include contract costs for tailings water balance and risk assessment exercises and the cost of carrying out water quality monitoring (including water assays). Costs more specific to closure management of the dam facilities are itemised. These do not include water spreading and detoxification as the requirement for these activities is best determined by precursive water balance and risk assessment. The capital cost for any detoxification plant is likely to exceed $50,000 even allowing for reuse of existing plant hardware.

9. KCGM CYANIDE PLANT DECOMMISSIONING SCHEDULE

A schedule of the activities involved in closure of the Fimiston and Gidji cyanide facilities is shown as Figure A1 in Appendix 1.

As a general rule the planning and execution of most safety and plant decommissioning activities should occur in a 12 month period (6 months either side of plant closure). Environmental monitoring activities will continue for up to 5 years post closure with actual requirements to be more specifically defined in the KCGM Public Closure Plan.

10. CONCLUSIONS

Closure and decommissioning of the cyanide facilities at KCGM Fimiston and Gidji sites is a major undertaking that must be carefully planned if full compliance with Principle 5 of the International Cynide Management Code is to be achieved. This document has set out the issues that require to be addressed in the period leading up to closure without in many cases providing much, if any of the required detail. Ongoing review of the plans encompassed in this document will be necessary on a regular basis to ensure continuing relevance.

The total cost of successfully closing the KCGM facilities is likely to exceed A$1 million and an assurance mechanism should be established by the site in order to demonstrate that such funds will be available at the time of mine closure.

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9th May, 2006

Section 6.9 Revised 8th June, 2007
Revised 31st March 2008

APPENDIX 1 –Cyanide Containing Plant at Fimiston

Equipment No	Equipment Description	Classification (by CN level)
F19TK51	PROCESS WATER TANK	Medium
F30TK02A	FLOTATION TAILINGS CARBON IN LEACH TANK "A" 10x10.9 m	Medium
F30TK02E	FLOTATION TAILINGS CARBON IN LEACH TANK "E" 10x9.7m	Medium
F30TK32C	FLOTATION TAILINGS CARBON IN LEACH TANK "C" 12.7x13.5 m	Medium
F75TK01	CYANIDE WATER TANK	Low
F75TK61	CIRCUIT WATER TANK	Medium
F75TK62	CIL CYANIDE WATER TANK	Medium
F75TK64	SALINE/DECANT WATER MIXING TANK	Medium
F65TK61	LEAN ELUATE TANK NO.1	Medium
F66TK61	ELUATE CIRCULATION TANK NO.1	Medium
F66TK62	ELUATE CIRCULATION TANK NO.2	Medium
F66TK63	BARREN ELUATE TANK	Medium
F66TK64	SLUDGE HOPPER	Low
F66TK68	ELUATE STORAGE TANK NO.1	Medium
F66TK69	ELUATE STORAGE TANK NO.2	Medium
F65TK63	ELUTION WATER TANK	Medium
F65TK62	LEAN ELUATE TANK NO.2	Medium
F30TK62A	LEACH TANK "A"- CIL 3 12.7M diam X 13.5M	Medium
F30TK62B	CIL TANK "B" - CIL 3 - FIMISTON 12.7M diam X 13.5M	Medium
F30TK62C	CIL TANK "C" - CIL 3 12.7M diam X 13.5M	Medium
F30TK62D	CIL TANK "D" - CIL 3 12.7M diam X 13.5M	Medium
F30TK62E	CIL TANK "E" - CIL 3 12.7M diam X 13.5M	Medium
F30TK62F	CIL TANK "F" - CIL 3 - FIMISTON 12.7M diam X 13.5M	Medium
F30TK01A	FLOTATION TAILINGS LEACH TANK "A" - 2MT 10x11.5M	Medium
F30TK01B	FLOTATION TAILINGS LEACH TANK "B" - 2MT - AREA 10 x 11.5M	Medium
F30TK02B	FLOTATION TAILINGS CARBON IN LEACH TANK "B" 10 x 10.9M	Medium
F30TK02C	FLOTATION TAILINGS CARBON IN LEACH TANK "C" 10 x 10.3M	Medium
F30TK02D	FLOTATION TAILINGS CARBON IN LEACH TANK "D" 10 X 10.3M	Medium
F30TK02F	FLOTATION TAILINGS CARBON IN LEACH TANK "F" 10 X 9.7 M	Medium
F30TK32A	FLOTATION TAILINGS CARBON IN LEACH TANK "A" 12.7X13.5 M	Medium
F30TK32B	FLOTATION TAILINGS CARBON IN LEACH TANK "B" 12.7X13.5 M	Medium
F30TK32D	FLOTATION TAILINGS CARBON IN LEACH TANK "D" 12.7X13.5 M	Medium
F30TK32E	FLOTATION TAILINGS CARBON IN LEACH TANK "E" 12.7X13.5 M	Medium
F30TK32F	FLOTATION TAILINGS CARBON IN LEACH TANK "F" 12.7X13.5 M	Medium
F66TK72	CATHODE WASH TROUGH	Medium
F66TK65	CATHODE SPRAY WATER TANK	Low
F30TK32FINS	INSTRUMENTATION - CIL 2 TANK F - FIMISTON	Medium
F75TK65	SILT TRAP TANK	Low
F30TK64	PLANT SPILLAGE TRANSFER TANK	Medium
F26TK40	FLOTATION AREA GLAND SEAL WATER STORAGE TANK.	Low
F30TK63	FINAL TAILINGS COLLECTION TANK	Low
F19TK62	CHILLED WATER TANK- FIM SAG MILL CCV HEAT EXCHANGER	Low
F71TK01	CYANIDE STORAGE TANK	High
F66TK04	ACACIA REACTOR AREA PREGNANT ELUATE STORAGE TANK	High
F66TK01	ACACIA REACTOR AREA SOLUTION TANK.	High
F30TL01/31/61	TAILINGS DELIVERY PIPING	Medium

DDT	DECANT TRANSFER TANK	Medium
DDT01PE	DECANT RETURN LINES	Medium
DF1T	DECANT DAM 1	Medium
DF2T	DECANT DAM 2	Medium
DF3T	DECANT DAM 3 (INC STORM WATER POND)	Medium

APPENDIX 2 –Cyanide Containing Plant at Gidji

TANK ID.		Lip Height mm	Tank Diameter mm	Volume m^3	Cyanide Content
50TK03A	LEACH TANK 1 (LT1)	11100	8400	615	Medium
50TK03B	LEACH TANK 2 (LT2)	11100	8400	615	Medium
50TK03C	LEACH TANK 3 (LT3)	11100	8400	615	Medium
50TK01A	LEACH TANK 4 (LT4)	10100	8000	508	Medium
50TK01B	LEACH TANK 5 (LT51)	10100	8000	508	Medium
50TK41	LEACH TANK 6 (LT6)	11900	9000	757	Medium
50TK42	LEACH TANK 7 (LT7)	11900	9000	757	Medium
50TK43	LEACH TANK 8 (LT8)	11900	9000	757	Medium
50TK01C	ADSORPTION TANK 1 (ADS1)	9500	8000	478	Medium
50TK01D	ADSORPTION TANK 2 (ADS2)	9500	8000	478	Medium
50TK02A	ADSORPTION TANK 3 (ADS3)	8900	8000	447	Medium
50TK02B	ADSORPTION TANK 4 (ADS4)	8900	8000	447	Medium
50TK02C	ADSORPTION TANK 5 (ADS5)	8300	8000	417	Medium
50TK02D	ADSORPTION TANK 6 (ADS6)	8300	8000	417	Medium
50TK02E	ADSORPTION TANK 7 (ADS7)	7700	8000	387	Medium
50TK02F	ADSORPTION TANK 8 (ADS8)	7700	8000	387	Medium
65TK02	CYANIDE DAY TANK - Removal Pending Mid 2006	4000	3800	45	Medium
50HP01	TAILS HOPPER				Medium
	SOLAR POND			3600	Medium
G50OGO	TAILINGS DELIVERY PIPING				Medium
G60PN04	TOE DAM				Medium
G60PN01	DECANT DAM			1260	Medium

Appendix 3 - KCGM Cyanide Plant Decommissioning Schedule

ID	Task		Duration	Man Hours	People
			(days)	(hours)	
	Safety				
1	Revise emergency response plan		8	80	1
2	Cyanide safety training		5	2100	42
3	Revise permit to work system		8	80	1
4	Supervisory training-KCGM + contractors		20	1200	6
5	Revise health and safety procedures		16	160	1
6	Develop safety contract exhibit-closure contracts		4	40	1
7	Workplace risk assessments		30	3000	10
	Environmental/Tailings Storage Facilities				
8	Tailings risk assessment		5	50	1
9	Tailings storage water stock reduction		160	160	0.1
10	Modify pumping infrastructure for evaporation		60	120	0.2
11	Modify deposition strategy for closure		160	160	0.1
12	Water spreading/detoxification		unknown requirement		
13	Water quality monitoring		600	3000	0.5
14	Dam stability monitoring		250	1000	0.4
	Processing				
15	Detailed task development (cyanide plant only)		10	100	1.0
16	Cyanide stock reduction		32	32	0.1
17	Processing/Supply interface		40	12	0.03
18	Preclosure cyanide tank cleanout or assessment		7	70	1
19	Residual cyanide disposal		5	25	0.5
20	Plant shutdown				
21	Plant cleanup	"Medium strength" Cyanide tanks	20	4000	20
22		"High Strength" CN tanks (detox)	3	60	2
23		Cyanide pipework	3	60	2
24		Cyanide plant structure	6	180	3
25		Acacia Reactor (external area)	1.6	16	1
26		Goldroom (including elution area)	3	60	2
27	Contaminated soil sampling and testwork		12	60	0.5
28	Cyanide plant dismantling and site contouring