

KAGEM MINING LTD

**PROPOSALS FOR EMPLOYMENT AND TRAINING OF
CITIZENS OF ZAMBIA**

(Appendix No. 5)

**KAGEM MINING LICENCE
(GL-713)**

There are currently 421 employees on the mine site. Housing is being expanded and improved on the site and it is estimated that there will be 525 employees at the optimal level of production. This is a significant number of employees for an emerald mine and an estimate of the beneficial multiplier effect of 5 ranges from 1,970 to 2,625 people.

Contractors are hired for waste mining, drilling, civil engineering and security. There are about 30-40 contracted employees at a given point of time and when there is contract mining going on the number swells to about 100.

There is an on site training centre which imparts professional training to the employees. Company also pursues a policy of sending selected employees for advanced training in order to hone the skills.

Wash Plant

The wash plant has a rated capacity of 50 T/hr. The ore will be trucked to the wash plant and dumped on to the ore stockpiles around the wash plant. A front-end loader will remove ore from the ore stockpiles and feed it into the 50t feed static grizzly feed bin.

Process water will be added using a monitoring gun as the ore is fed into the static grizzly screen. Overflow material $>400\text{mm}$ in diameter will be fed onto the $>400\text{mm}$ transfer conveyor to the oversize ore stockpile. The material $<400\text{mm}$ will pass onto a vibrating grizzly screen with 150mm bars where more process water is added. The overflow material $>150\text{mm}$ will be fed onto the primary crusher feed conveyor.

The conveyor will feed the $>150\text{mm}$ material into the primary crusher feed chute and the primary crusher. The crushed material will then be fed out of the primary crusher discharge chute onto the double deck vibrating screen feed conveyor.

The underflow $<150\text{mm}$ material from the vibrating grizzly, will pass into the scrubber feed chute, where more process water will be added, and then into the scrubber. Process water is added to the scrubber.

The trommel undersize material will be fed to the trommel undersize pump which will pump the $<3\text{mm}$ material to the spiral classifier. The classifier will direct $<3\text{mm}$ undersize material to the slimes pond and $>3\text{mm}$ material to the $3 \leq 60\text{mm}$ stockpile .

The scrubber oversize material $<150\text{mm}$ will pass into the scrubber oversize chute onto the secondary crusher feed conveyor. The feed conveyor will deliver the ore to the secondary crusher feed chute and into the secondary crusher. The crushed ore will pass out of the secondary crusher discharge chute onto the double screen feed conveyor.

The scrubber produces a product in two classes: $3 \leq 60\text{mm}$ and $60 \leq 150\text{mm}$. This material will pass into the trommel product transfer chute. The trommel product will be delivered by the double screen feed conveyor into the double screen feed chute.

The double deck vibrating screen will produce three products. The $>60\text{mm}$ product from the top screen will be transferred to the secondary crusher feed conveyor. The second screen will produce a $3 \leq 60\text{mm}$ that will be transferred to the drum scrubber feed conveyor. The double screen undersize material $>3\text{mm}$ will be fed into the slimes pond.

The drum scrubber feed conveyor will transfer the ore to the drum scrubber. The drum scrubber will feed a hexagonal screen that will produce 5 products. The $>3\text{mm}$ product will be transferred to the tailings pond. The other four products:-

1. $3 \leq 10\text{mm}$;
2. $10 \leq 20\text{mm}$;
3. $20 \leq 40\text{mm}$;
4. $>40\text{mm}$;

will feed on to the stockpile feed conveyor and onto the $3 \leq 60\text{mm}$ stockpile.

The plant will be powered by two 250kVA generators which will be controlled by the synchronisation panel.

Site Water

Site Water Uses

The main uses of water on the Kagem Mine site are:-

- Process water for the wash plant;
- Wash water for the mine equipment fleet;
- Drilling activities during the exploration program;
- Dust minimisation through spraying activities along roads; and
- Mine camp water for washing and cleaning purposes.

Site Water Management

A site water management plan shall be developed to prevent any adverse impact on adjacent watercourses and groundwater, and to conserve natural water resources. The main aims of this plan are to:-

- Separate clean water from contaminated water;
- Monitor and if necessary treat mine effluent and surface runoff prior to environmental discharge;
- Develop, maintain and monitor a site water balance to minimise the consumption of freshwater, increase internal recycling of waste water and reduce effluent released to the environment;
- Develop a site drainage network to ensure the separation of clean runoff from contaminated mine water;
- Develop a monitoring program for surface water, groundwater, effluent streams and flow rates;
- Ensure regular monitoring and inspection of the mine site drainage system and pollution control facilities;
- Ensure compliance with Zambian drinking water quality standards and mine effluent guidelines and where parameters do not exist use the equivalent World Bank guidelines; and
- Prepare formal emergency response procedures for accidental spills and cleanup measures.

Currently a process water dam in the existing wash plant complex will supply the wash plant with water. The process water dam will be approximately 20m long and 20m wide with a storage capacity of 2000m³, based on the consumption requirement of the process plant. The process water dam is lined with concrete. Water will be supplied to the process water dam from the Southwest dam via a pump and HDPE pipeline when required.

At present one pump is being used to dewater the open pit which is flooded with a mixture of rainfall, surface runoff and groundwater. The dewatering system will be extended to allow 3 70m³/hr pumps to operate in the wet season. Two of these pumps will continue to operate in the dry season. This is equivalent to 5,040m³/d.

All dewatering water from the open pits will be released to surface waters. The dewatering water will be pumped to a settlement pond. This pond should have an adequate storage capacity to allow the water to settle out solids. It is also based on the volume of dewatering being pumped from the open pits. The water in the open pit at 60m is currently precipitation. The possibility of pumping the mine dewatering water to the wash plant has been reviewed. The distance to transfer the water to the process water dam is large. Gravity fed systems of transferring the dewatering water

are impeded by the local topography. Therefore the dewatering water will be sent to a settlement pond and discharged to the Kafubu River.

The mine camp water is supplied via two sealed groundwater boreholes (GW01 and GW02) with submersed pumps and overhead storage tanks. These boreholes supply water around the mine camp.

Water required for exploration activities will be supplied to the drill rig via a pipeline to the nearest water source or supplied by portable water tanks. Sumps will be developed at each drill site to capture contaminated water and suspended solids.

Drinking water is provided by Kagem as bottled water from off site.

Site Water Flow Sheet

At present there is no water balance for operations at the Kagem site. Some estimates have been made for key areas of the process. Areas where flow monitoring will be necessary have been highlighted. **Figure 6** below shows a general water flow sheet for the operations at Kagem Mine. The installation of flow meters on key feeds will assist in maximising water usage and pumping efficiency. During operations a detailed water flow sheet will be developed.

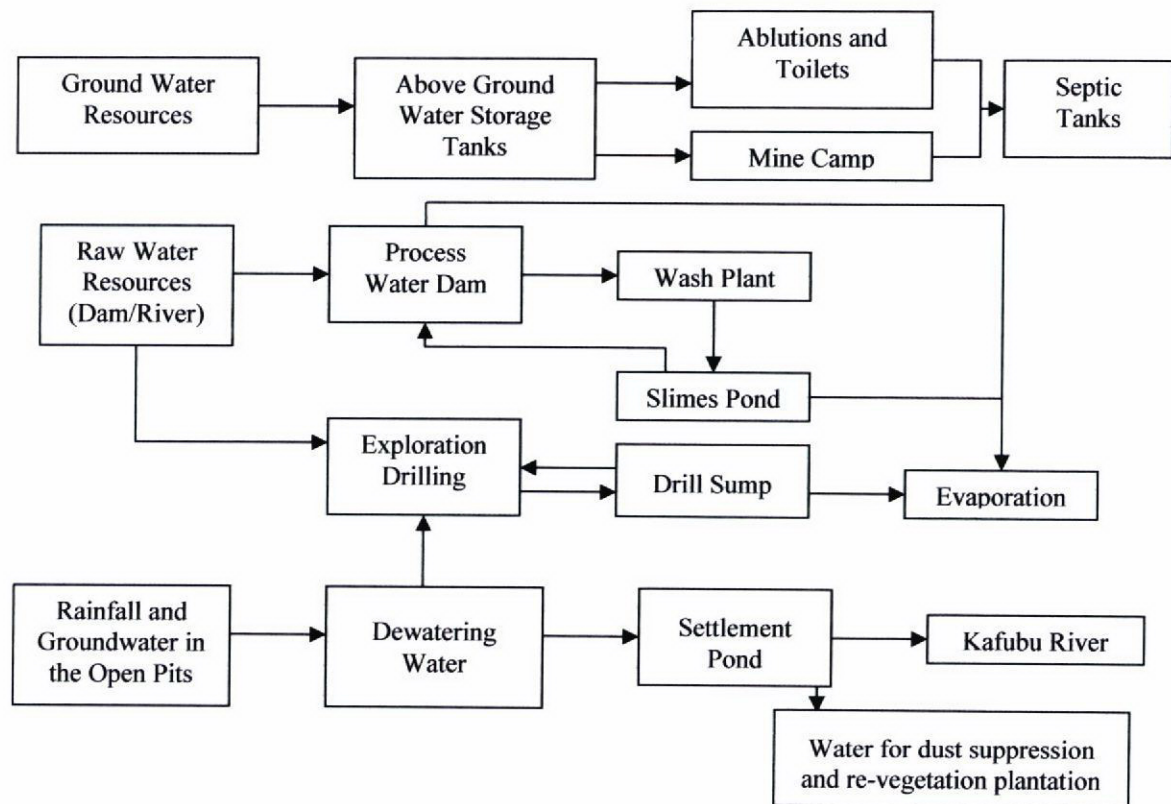


Figure 6 Site Water Flow Sheet

The groundwater boreholes GW01 and GW02 are pumped to meet the requirement of the mining camp. They are each equipped with a water storage tank that is filled when required.

Based on **Figure 6** it is advised that flow meters be installed in the following locations:-