7.0 ENVIRONMENTAL MANAGEMENT PLAN.

CNMC-Luanshya Copper Mines (CLM) Plc has adopted Cleaner Production (CP) as an integral part of its corporate strategy for environmental management. This strategy is clearly stated in the Environmental Policy Statement. In practice, this is the first step in environmental management and it cuts across all the mine processing units. The Mine acknowledges also that sustainable development cannot be attained without putting in place an effective environmental management system. To implement environmental management commitments, CLM adopted a Cleaner Production procedure briefly explained below.

Source reduction: -This strategy involves reducing waste from the source by improving the production process and incorporating waste reduction in the use of materials at all levels of production. The waste minimisation approach goes beyond just producing copper (Cu) and cobalt (Co) concentrates to all the supporting activities. For example, reducing the volume of wastepaper by using electronic mails and sometimes processing of waste rock by way of reclaiming for quarry or mineral processing.

Recycling: -This is the next option of the EMS for CLM and is applicable together with the source reduction strategy or when the source reduction option is not practicable. Examples of processing units at CLM where recycling is highly applied is the concentrator where the process water is recycled. Used oil is also recycled by a subcontractor who buys used oil from the mine.

Treatment : - In cases where source reduction and recycling are not practical, CLM applies "Treatment Method", which is the best possible means of reducing the hazardous nature of waste.

Safe landfill disposal: - Although this is the last option, it is important because it's applicable where the three options above are not feasible or as an integral measure of the source reduction, recycling and treatment options.
All these interventions are in line with the Environmental Protection and Pollution Control Act (EPPCA) of 1990, and the Mines and Minerals (Environmental) Regulations of 1997. During the period of its existence, CLM has developed and revised a number of Environmental Management measures and commitments for the environmental impacts.

7.1 Liquid Effluent Management

Effluent water that will be generated from spillage washings will be channelled into the drain which would lead to the settling pond for suspended solid interception. Sampling of all effluent water for quality monitoring purposes will be conducted weekly and the reference point will be the standards set by Environmental Council of Zambia, as shown in Table 7.1 below.

Table 7.1 STANDARDS FOR EFFLUENT & WASTE WATER INTO AQUATIC ENVIRONMENTS

	PARAMETER	ECZ STANDARD
A.	**Physical**	
1	Temperature (Thermometer	40 0C at point of entry
2	Colour (Hazen Units)	20 Hazen units
3	Odour and Taste (Threshold odour number)	Must not cause any deterioration in taste or odour as compared with natural state
4	Turbidity (NTU scale)	15 Nephelometer turbidity units
5	Total Suspended Solids (Gravimetric method)	100 mg/L must not cause formation of sludge or scum in receiving water
6	Settleable matter sedimentation in 2 hours (Imhoff funnel)	0.5 mg/L in two hours. Must not cause formation of sludge in receiving water
7	Total Dissolved Solids (Evaporation at 105 0C and Gravimetric method)	3000 mg/L The TDS of waste water must not adversely affect surface water
8	Conductivity (Electrometric method)	4300 µS/cm
B	**Bacteriological**	
9	Total Coliform/100 ml (Membrane Filtration method)	25000
10	Faecal Coliform/100ml (Membrane Filtration method)	50000
11	Algae /100 ml (Colony counter)	1000 cells
C	**Chemical**	
12	pH (0-14 scale) (Electro-metric method)	6.0 - 9.0

Process water is expected to be released to the natural ecosystem. Depending on the analysis results of TSS, TDS, and Hydrocarbon contamination among other parameters, once it is effectively settled, effluent water will be re-used for suppressing dust. However, excess water shall be released into the natural environment. Environmental Services Section shall ensure weekly sampling of the effluent is done before discharge is done to the natural environment. Remedial measures shall be employed immediately to correct results that lie out of acceptable standards.

7.2 Generation of Dust/ Fumes

A deliberate routine programme for suppressing dust will be embarked on. This will involve watering of tracks and all areas surrounding the Silica plant. The proposed site comprises an extended outcrop of quartzite rock. Therefore, no meaningful land clearance will be done which could expose the area to fugitive dust in case of wind. At most dust is only expected to be generated from vehicular movements and natural phenomenon such as whirlwind, even though the surrounding mature stands of the Miombo woodlands will block most of harmful winds directed to the Silica Plant.

Routine dust monitoring will be conducted in line with the Mining Regulation 939(1) & (2). This will help us mitigate and control emission levels to well below the maximum allowable concentration of **350 particles per cubic centimetre**. Under the guidance of Ventilation Officers, the Site Foreman shall ensure Routine Dust Monitoring Reports are prepared monthly.

7.3 Soil Compaction

Soil compaction is expected to be confined to the area around the Quarry Facility and heavy duty tracks leading to and from the Project area. As stated in the decommissioning strategy plan, compaction of soils will be inevitable during the construction and operations phase.

During the decommissioning phase, compacted soils will be ripped using Tractor disks. This will result in loose soils which can easily support vegetation growth and other natural ecosystem interactions. Eventually the site would be colonised by indigenous plant species and thus provide natural habitats for fauna and flora.

7.4 Noise level

The noise which is likely to be produced from blasting, crushing and other mobile equipments is expected to be within reasonable health limits. International guidelines recommend a maximum noise exposure of 85 decibels (dB) in a shift of 8 hour-day. Therefore, where noise levels would be likely to exceed 85 dB, adequate precaution measures shall be put in place. However, all employees who would be working around the site would be provided with appropriate personal protective clothing (PPE) i.e. ear muffs/ ear plugs, to protect them from adverse noise effects. Signages shall be posted around to remind employees to adhere to prescribed health and safety regulations. The site Foreman will be responsible for all noise/dust abatement systems, and is mandated to compile monitoring reports. The Site Foreman works in collaboration with CLM Ventilation Officers and Environmental Service Coordinators.

7.5 Management of Waste

In the case of machinery breakdown and subsequent oil spillages, the contamination (spill) shall be cleaned up immediately. Loaders and transport Trucks will be scheduled for routine maintenance and complete overhaul involving change of, oils only at the Mine Garage facility or at the nearby Baluba Diesel Workshop. Both facilities are registered under the ECZ license to generate and store hazardous waste i.e. used oil and oil contaminated filters. Soil contamination which may result from oil spillages will be contained by way of appropriate spillage control kit and in accordance with Material Control Data sheet recommendations. Depending on the level of contamination, contaminated soils may be required to be dug up and isolated so as to bio-remediate them.

Waste bins shall be designated strategically around the Plant area and shall be rebelled in terms of Domestic waste, Industrial Waste, and hazardous waste. The Site Foreman shall work hand in hand with CLM Environmental Services personnel in all aspects related to waste management.

7.6 Fire Hazard

Fires have been anticipated, with the main sources being electrical short circuits and combustible fuels in loaders and transport vehicles working in the proximity area. Fire Services personnel will station appropriate types of fire extinguishers at the proposed Silica Quarry for combating fires. CLM Fire Tender equipped with a radio communication device will always be on alert in case of fire out-brake. Emergency toll free lines will be posted around the site for quick fire service response in case of an inferno. All employees are mandated to protect this facility against fire through collaboration working terms with CLM Fire Services Section.

7.7 Public Health and safety

CLM will endeavour to prevent the spread of malaria as much as possible. An in-house anti-malaria spraying exercise for areas within the mine and surrounding areas is currently conducted and will be intensified even for areas around the project sites.

7.8 Workers' health and Safety

Strict adherence to safety measures and procedures will minimise and to a great extent eliminate risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working around the proposed area. CLM has developed safety procedures on how to operate in different high risk environments.

Prior to blasting activities, a Vehicle mounted with a radio and alarm system will go round the surrounding community to warn residents in the nearby farm settlement to stay away from the project area within a radius to be advised.

First-aid induction shall be conducted on all employees prior to engagement. A standby vehicle for emergence evacuation to the nearby Baluba Mine Clinic will be stationed at the Silica Quarry Plant. The Clinic at Baluba Mine is equipped with modern Ambulance facility for further evacuation to Luanshya Mine Hospital.

8.0 DECOMMISSIONING AND CLOSURE

Decommissioning and closure of the Silica quarrying Plant at Muva Hill is expected to be implemented **3 years** after commencement of actual quarrying and processing. The activities that are expected to characterise the closure and decommissioning of the Quarry Plant includes;

- Isolation of all electrical connections except for security lighting,
- Removal of Crusher unit for storage at Baluba Mine,
- Profiling of dug out areas and general landscaping,
- Demolition of all concrete wall- debris to be filled into dug out areas,
- Isolation of any contaminated soils on site for bioremediation,
- Blocking of other access routes except for the Mine Police patrol route,
- Ripping all soil compacted surfaces on site. Compacted soils will be loosened by ripping or through disking the area, so as to encourage natural colonisation.

Ten percent (i.e. **US$ 21,000.00**) of the total project cost is projected to be spent on decommissioning activities, mainly rehabilitating the Muva Hill site.

9.0 CONCLUSION

CNMC Luanshya Copper Mines (CLM) Plc feels duty bound to report and seek technical advice from state authorized agencies such as ECZ and the Mines Safety Department (MSD) even on matters that relate to modification of historical operations of the Luanshya Copper Mine, which it took over in June, 2009. The proposed Silica Quarry Plant is planned to be located at the foot of the rawmaterial Quartzite outcrop at Muva Hill. The area being applied for is under Muva Hill mining license LML 58 which has since been updated to **License No. 8394-HQ-LML**

This Environmental Project Brief will be referred to during design and actual operational stages of the Silica plant. All mitigation measures would be implemented as outlined, but in certain cases environmentally friendly modification shall be sought. The project is expected to be in active operation for about **3 years**. The construction and all installation works for the Silica Plant are expected to cost CLM a sum of **USD 210,000.00,** whereas decommissioning and closure costs are expected to average **USD 21,000.00.**

Employment creation to the local residents and creation of an extended tax base are some of the socio-economical attributes of this project. Noise and fugitive dust generation constitute the greater health and environmental concerns. CLM Plc would like to emphasize that the benefits accrual on this Silica Quarry Plant establishment on the operations of the **Muliashi Mining Project** and its surrounding environment will greatly outweigh the negative impacts that would be created.

REFERENCE

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ECZ (2000) State of the Environment in Zambia.

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