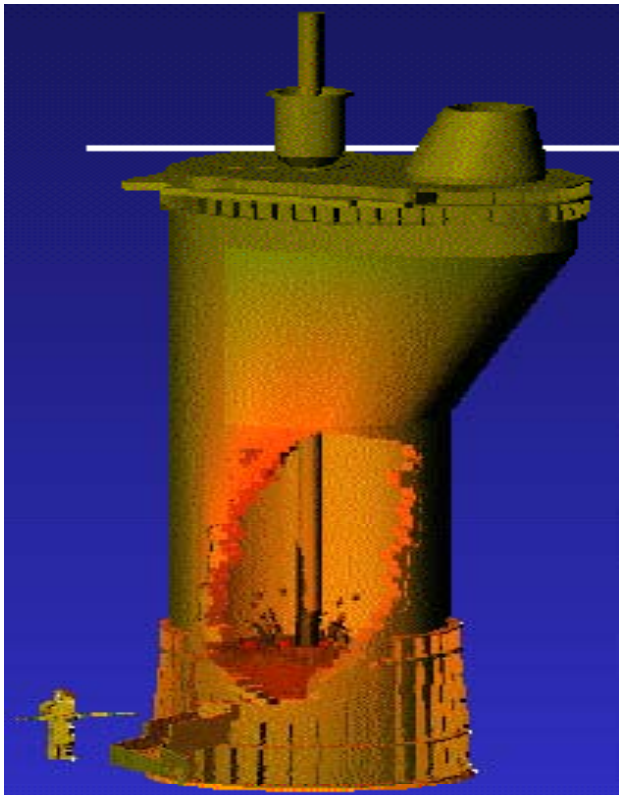
MOPANI COPPER MINES PLC
MUFULIRA MINE

ENVIRONMENTAL PROJECT BRIEF FOR THE SMELTER UPGRADE PROJECT



Isasmelt Furnace

JULY 2004

ENVIRONMENTAL PROJECT BRIEF FOR THE SMELTER UPGRADE PROJECT

Study Team

The following Mopani Copper Mines (MCM) employees constituted the study team:

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Abbreviations used in the document

AHC-MMS	Asset Holding Company – Mining Municipal Services
DCS	Distributed Control System
DRC	Democratic Republic of Congo
ECZ	Environmental Council of Zambia
EIS	Environmental Impact Statement
EPB	Environmental Project Brief
ESP	Electrostatic Precipitator
GRZ	Government of the Republic of Zambia
HFO	Heavy Fuel Oil
ID	Induced Draft
KCM	Konkola Copper Mines
m^3	Cubic meter
MCM	Mopani Copper Mines
mm	millimeter
MSEF	Matte Settling Electric Furnace
MVA	Mega-volt-amperes
MW	Megawatts
Nm^3/hr	Normal cubic meter per hour
SO_2	Sulphur Dioxide
SO_3	Sulphur Trioxide
SRK	Steffen, Robertson and Kirsten
tpa	tonnes per annum
tpd	tones per day
TSL	Top Submerged Lance
USA	United States of America

BACKGROUND

The Mufulira Smelter currently processes over 400,000 tonnes of copper concentrates per annum, most of which is sourced from MCM's mines i.e. Mufulira and Nkana mines. Concentrate and other copper bearing feed materials (e.g. copper oxides) are also obtained from surrounding operations in Zambia and the Democratic Republic of the Congo (DRC).

The main process operations at the Mufulira Smelter are copper concentrate reception and handling, copper smelting and converting, and fire refining. The product is anode copper which is refined electrolytically at the nearby Mufulira Refinery to produce cathode copper. There is no sulphur dioxide abatement facility and all the sulphur dioxide produced in the smelting and converting operations is vented to the atmosphere. Approximately 94,000 tonnes of sulphur dioxide is annually vented to the atmosphere. Slag is discarded onto nearby slag dumps.

The primary smelting vessel is a 36MVA-submerged arc, six-in-line electric furnace that was installed and commissioned in 1971 and last rebuilt in 1991.

It was selected to replace three coal-fired reverberatory furnaces on the basis of its much improved thermal efficiency (70%, compared to 30% for the reverberatory furnaces) and the very low cost of hydroelectric power available in Zambia at that time. The nominal capacity of the furnace is 420,000 tonnes per annum (tpa) of concentrates, or up to 180,000 tpa new copper. The design of an electric furnace permits a relatively long campaign life of typically ten years or more. At the end of this period, due to the inevitable furnace hearth deformation and structural deterioration caused by mechanical and thermal stresses, there is a requirement to shutdown and rebuild the electric furnace, a process which has a duration of up to six months.

When the electric furnace began to give operational problems in 2000/2001 due to its age, an early shutdown for rebuild so soon after privatisation was not possible for financial and logistical reasons. In particular, the existence of toll treatment contracts which obliged MCM to treat a significant tonnage of concentrates from Konkola Copper Mines (KCM) until December 2002 was problematic as the cumulative smelting capacity on the Copperbelt meant that both MCM concentrates and the contracted KCM concentrate would either have to be stockpiled for the period of the rebuild, or exported for treatment in South Africa or Namibia. Both options (i.e. stockpile or toll treatment) would have been economically disadvantageous and there were also concerns about the capability of the available transport systems to move the requisite tonnage of concentrates to the custom smelters outside the country.

Consequently a programme to improve the Mufulira Smelter Electric Furnace integrity commenced in 2001 with the aim of extending furnace life to end of 2005. This programme provided time to consider all available options for continued smelting at the Mufulira site. This programme has to date proved successful with the electric furnace operations now re-established at a level that is sustainable and reliable, consistent with the overall aim of extending furnace life to 2005. However the furnace is now approaching the end of its current operating campaign life and requires either a rebuild or replacement.

MCM management has recognized that the recent redevelopment of copper mining activities on the Zambian Copperbelt and the potential development of the industry in the DRC present an opportunity to process an increased quantity of copper concentrates through the Mufulira Smelter. As such, a study has been completed that has evaluated the options of either rebuilding the existing Electric Furnace, or alternatively, replacing the Electric Furnace with a more efficient high-intensity smelting technology that would allow for an expansion of the current copper smelting capacity.

There has never been a provision for sulphur fixation at the Mufulira Smelter following commissioning of the first furnace in the 1930’s, and since then all

process offgas has been vented to the atmosphere. However, as provided for in the Development Agreement signed between MCM and GRZ, MCM has an obligation to achieve compliance with Zambian environmental legislation in relation to sulphur dioxide emissions from the smelting operations. Therefore the above study also included a review of gas collection options and specifically, the economics of installing a sulphuric acid plant at the smelter.

It is evident from the above that the Mufulira Smelter is ripe for a technological change that will on one hand improve efficiencies and capacities and on the other hand improve the environmental performance of the facility with respect to particulates and sulphur dioxide emissions. The combination of the Isasmelt furnace technology selected for the smelting of copper concentrates and the associated sulphuric acid plant, will set MCM on the road to achieving all the above three objectives i.e. improving process efficiencies and capacity and improving environmental performance of the smelter.

EXECUTIVE SUMMARY

This document is the environmental project brief for the Mufulira Smelter Upgrade Project. The main objective for producing this document is to satisfy regulatory requirements outlined in section 2.0 of this document. This document will be submitted to the Environmental Council of Zambia (ECZ) for review and decision.

The principal objectives for carrying out this study were that, after having defined the project activities and their scale of extent and effluence at local, regional and national level:

(a) Establish the project's potential bio-physical and socio-economic significant environmental impacts; and

(b) Subsequently draw up a mitigation and monitoring program for the identified potential significant impacts. This is to include strategies for enhancing any positive impacts from project implementation and operation.

The main objectives for carrying out this project, which are in line with the provisions contained in the Development Agreement signed between MCM and GRZ at vesting, are:

(a) Replace the existing electric furnace, which is coming to the end of its campaign life, with a more efficient high-intensity smelting technology, which will allow for expansion of the current smelting capacity at the smelter. The nominal capacity will increase stage wise from 420,000 tpa to 650,000 tpa then to 850,000 tpa.

(b) Provide for fixation of sulphur dioxide generated by the primary smelting vessel and hence minimise sulphur dioxide emissions. The sulphuric acid produced will be used on MCM operations with excess being availed to other operators in the industry.

The main project features will be:

(i) An Isasmelt furnace, which will replace the existing electric furnace as the primary smelting vessel.
(ii) An oxygen plant to provide tonnage oxygen for the Isasmelt furnace operations.
(iii) Matte settling electric furnace to facilitate separation of matte and slag produced in the Isasmelt furnace.
(iv) Increasing existing converting capacity to handle increased throughput.
(v) Refurbishment of the anode and casting sections to handle increased throughput.
(vi) Construction of an acid plant for fixation of sulphur dioxide generated by the Isasmelt furnace.

It is expected that, subject to MCM obtaining approval of this document, project components construction will commence in August 2004 and commissioning is scheduled for second half of 2005.

Capital expenditure is estimated at $110 million. It is envisaged that 800 to 1,000 people will work on the project during the construction phase with most of these being contract labour sourced locally from the Mufulira district. The existing smelter labour force will operate the new facilities, after undergoing appropriate retraining overseas and locally on site.

The primary anticipated major environmental issues, which may arise due to the implementation and operation of the project relate to the following:

- Air pollution due to venting of sulphur dioxide.
- Air pollution due to dust carry over in gaseous emissions.
- Dust from material stockpiles / storage sheds.
- Noise due to construction and operation of project facilities.

- Surface water contamination by acidic spills and discharges into storm drains.
- Groundwater contamination by seepage from storage tanks areas
- Human exposure to hazardous substances.
- Employment opportunities
- Land use conflict
- Water resources availability
- Local / national economy

These issues will be mitigated as follows:

(i) Air pollution due to venting of sulphur dioxide

Compared to the existing scenario where all sulphur dioxide produced is vented, the project will allow for fixation of 55% to 59% of the total sulphur dioxide produced (at the 650,000 tpa rate) through the fixation of Isasmelt furnace offgas and converting it into sulphuric acid. Sulphur dioxide capture at the 850,000 tpa rate will be approximately 50%. Only sulphur dioxide from the converters will be vented. Fugitive sulphur dioxide emissions will be eliminated in the new Isasmelt furnace and MSEF set up. The reduction in sulphur dioxide vented at the 650,000 tpa rate will be 18% when compared to the current operation though the concentrate treatment will increase by 51%.

On going sulphur dioxide monitoring on the plant site and in the residential areas will continue. The meteorological station is being refurbished to facilitate collection of weather information data for modelling of sulphur dioxide dispersion.

(ii) Air pollution due to dust in gaseous emissions

The electrostatic precipitators and the evaporative coolers will capture dust entrained in gaseous discharges for recycling to process. Dust not captured in the electrostatic precipitator will be collected in the Acid Plant gas cleaning

section. Dust emissions will be significantly reduced compared to the current operation.

The ongoing stack emissions dust monitoring will continue

(iii) Dust from material stockpiles / storage sheds

The concentrate shed with a nominal capacity of 30,000 tonnes will be fully enclosed. Concentrates will be received in moist form with moisture content of between 8 and 10% and will be offloaded through hopper offloading facilities, with rail wagons using the tippler station and road trucks using a purpose built offloading facility.

Coal for use will be purchased in pellet form (with sizes ranging from 6mm to 38mm) and will be used in this form to minimize potential for dust generation.

The current on going monitoring of dust in the smelter will continue and will include the new facilities.

(iv) Noise due to construction and operation of project facilities

Workers will be issued with appropriate personal protective equipment at all stages of the project, and in addition the design and selecting of construction materials will take into account use of materials with potential for noise reduction during the operation phase.

(v) Surface water contamination by acidic spills and other discharges into storm drains

All acid storage tanks will be in a bund wall enclosure. The enclosure will have a capacity of 110% by volume that of the largest tank in the enclosure. Acid pipelines will as far as is practical be above ground for early detection of leaks and hence repairs and neutralization of leaked acid and disposal. Acidic

effluent generated by the process will be neutralized for disposal through the concentrator tailings disposal system to the tailings dump.

An appropriate bund wall will be constructed at the acid-loading bay for spills containment.

(vi) Groundwater contamination by acidic spills

Enclosures floors will be lined with impermeable material. The acid loading bay floor will also be lined with impermeable material to prevent seepage of acid into the ground.

One or two groundwater monitoring boreholes will be sunk in the vicinity of the storage tanks and the loading bay.

(vii) Human exposure to hazardous substances

A procedure incorporating storage, handling and transportation of sulphuric acid will be developed. A similar procedure for the management of the catalyst to be used in the acid plant will also be developed by taking into account details contained in the substance material safety data sheets.

In respect of foreign concentrates supplied for treatment at the smelter, there is an existing procedure used to screen the materials to ensure that they are not radioactive. Materials showing above limit levels of radioactivity will not be accepted for processing through the smelter.

(viii) Employment opportunities

It is anticipated that an additional 800 to 1,000 people will be employed during the construction phase of the project. With the exception of components of the project where specialist skills will be required, most of the contract labour requirement will be sourced within Mufulira. There will be no significant

increase in labour from the current 570 smelter employees during the operation phase. However, certain employees within the smelter will be retrained and redeployed to take up positions in operations of the new facilities.

(ix) Land use conflict

There will be no land use conflict with the local community as the project facilities will all be located within the existing plant site boundaries.

(x) Water resource availability

The project water requirements will be met by water currently being pumped to surface for dewatering the underground workings. The quantity, 110,000m^3 per day of water is more than adequate to meet the needs of the whole mine operations.

(xi) Local / national economy

The local economy is largely dependent on the mine for its sustenance and patronage. This project will have a significant positive impact on the local economy.

At the national level the mining industry still accounts for the bulk of the country's foreign exchange earnings. This project will provide an increased capacity for treatment of not only MCM concentrates but also materials from other operators within the Zambian mining industry. At full production it is expected that the project will put in excess of 295,000 tonnes of cathode copper on the international market and thereby significantly increase the country's foreign exchange earnings.

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