Konkola Copper Mines plc

ENVIRONMENTAL ASSESSMENT

VOLUME 1

OVERVIEW
AND
CORPORATE MANAGEMENT PLANS

May 2001

Prepared by:
AMEC Earth and Environmental Limited

and

Khanya… managing rural change cc

GUIDE TO THE KCM ENVIRONMENTAL ASSESSMENT DOCUMENTS

EXECUTIVE SUMMARY

- A summary of all documentation comprising the Environmental, Social, Health and Safety Plans for KCM operations

This Volume

VOLUME 1 - OVERVIEW AND CORPORATE MANAGEMENT PLANS

- Provides the historical background to the forming of KCM and an overview of KCM's operation
- Provides an overview of KCM's corporate structure, corporate safety, health and environmental (SHE) policy and commitments; and a summary of the legal and other SHE requirements
- Describes how the environmental and social management plans were developed
- Presents the corporate level SHE Management Plan, Occupational Health Plan and Social Management Plan

VOLUME 2 - KONKOLA MINE	
2.1 Environmental Management Plan	
A ENVIRONMENTAL ASSESSMENT	• A description of the Konkola Mine operation and its environmental setting • An evaluation of historical impacts and an assessment of potential impacts from future developments (including KDMP)
B ENVIRONMENTAL ACTION PLAN	• Environmental Action Plan by facilities • Environmental Monitoring Plan • Auditing and Reporting Plan • Capacity Development and Training Plan • Emergency Preparedness and Response Plan • Rehabilitation, Decommissioning and Closure Plan
2.2 Social Management Plan	
A SOCIAL ASSESSMENT	• A description of the Konkola Mine operation and its social setting • An evaluation of historical social impacts and an assessment of potential social impacts from future development (including KDMP)
B SOCIAL ACTION PLAN	• Social Management Plan: o Employment and Retrenchment.; Local Economic Development Plan; Land Use and Settlement Plan; Education and Training; Health and Welfare Plan; Physical Infrastructure Plan; Community Management Support Plan; Influx Management Plan; Disclosure and Consultation Plan; Decommissioning and Closure Plan • Management Implementation Plan o Objectives and Principles; Auditing Report; Capacity Building and Training; Social Management Co-ordination Plan
C SOCIAL DEVELOPMENT PLAN (RAP)	• Social Development Plan associated with the Resettlement Action Plan
VOLUME 3 - NCHANGA MINE	
3.1 Environmental Management Plan	
A ENVIRONMENTAL ASSESSMENT	• A description of the Nchanga Mine operation and its environmental setting • A summary of historical environmental impacts based on previous assessments
B ENVIRONMENTAL ACTION PLAN	• Environmental Action Plan by facilities • Environmental Monitoring Plan • Auditing and Reporting Plan • Capacity Development and Training Plan • Emergency Preparedness and Response Plan • Rehabilitation, Decommissioning and Closure Plan

3.2 Social Management Plan	
A SOCIAL ASSESSMENT	• A description of the Nchanga Mine operation and its social setting • An evaluation of historical social impacts based on previous assessments
B SOCIAL ACTION PLAN	• Social Management Plan: o Employment and Retrenchment; Local Economic Development Plan; Land Use and Settlement Plan; Education and Training; Health and Welfare Plan; Physical Infrastructure Plan; Community Management Support Plan; Disclosure and Consultation Plan; Decommissioning and Closure Plan • Management Implementation Plan o Objectives and Principles; Auditing Report; Capacity Building and Training; Social Management Co-ordination Plan
VOLUME 4 - NAMPUNDWE MINE	
4.1 Environmental Management Plan	
A ENVIRONMENTAL ASSESSMENT	• A description of the Nampundwe Mine operation and its environmental setting. • A summary of historical environmental impacts based on previous assessments
B ENVIRONMENTAL ACTION PLAN	• Environmental Action Plan by facilities • Environmental Monitoring Plan • Auditing and Reporting Plan • Capacity Development and Training Plan • Emergency Preparedness and Response Plan • Rehabilitation, Decommissioning and Closure Plan
4.2 Social Management Plan	
A SOCIAL ASSESSMENT	• A description of the Nampundwe Mine operation and its social setting • An evaluation of historical social impacts based on previous assessments
B SOCIAL ACTION PLAN	• Social Management Plan: o Employment and Retrenchment; Local Economic Development Plan; Land Use and Settlement Plan; Education and Training; Health and Welfare Plan; Physical Infrastructure Plan; Community Management Support Plan; Disclosure and Consultation Plan; Decommissioning and Closure Plan • Management Implementation Plan o Objectives and Principles; Auditing Report; Capacity Building and Training; Social Management Co-ordination Plan
VOLUME 5 - ZCCM (SMELTERCO) Ltd.	
5.1 Environmental Management Plan	
A ENVIRONMENTAL ASSESSMENT	• Provides an overview of SmelterCo's corporate structure, corporate safety, health and environmental (SHE) policy and commitments; The history of the project and a brief overview of SmelterCo's operations; a summary of the legal and other SHE requirements • Describes how the environmental and social management plans were developed • Provides description of the SmelterCo operation and its environmental setting • Presents summary of historical environmental impacts based on previous assessments
B ENVIRONMENTAL ACTION PLAN	• Environmental Action Plan by facilities • Environmental Monitoring Plan • Auditing and Reporting Plan • Capacity Development and Training Plan • Emergency Preparedness and Response Plan • Rehabilitation, Decommissioning and Closure Plan

5.2 Social Management Plan	
A SOCIAL ASSESSMENT	• A description of the SmelterCo operation and its social setting • An evaluation of historical social impacts based on previous assessments
B SOCIAL ACTION PLAN	• Social Management Plan: o Employment and Retrenchment; Local Economic Development Plan; Land Use and Settlement Plan; Education and Training; Health and Welfare Plan; Physical Infrastructure Plan; Community Management Support Plan; Disclosure and Consultation Plan; Decommissioning and Closure Plan • Management Implementation Plan o Objectives and Principles; Auditing Report; Capacity Building and Training; Social Management Co-ordination Plan

FOREWORD

This set of five volumes presents the Environmental Assessment[1] for Konkola Copper Mines plc (KCM), including Environmental and Social Management Plans for KCM's mining and processing operations. The plans have been prepared to satisfy the vesting agreement between KCM and the Government of Zambia (GRZ).

In terms of KCM's vesting agreements, the company was only authorised to operate under Interim Environmental and Social Management Plans (IEMPs and ISMPs) for a 24-month period. Within a maximum period of 21 months (i.e. by 31 December 2001), KCM is required to develop Final Environmental Management Plans (FEMPs) and Final Social Management Plans (FSMPs) for its operations. These Plans needed to outline the detailed "life of mine" environmental and social management and will supersede the IEMPs and ISMPs.

In terms of the vesting agreements it may not be possible to seek approval for the Konkola Deep Mining Project (KDMP) from certain of the KCM shareholders or from potential financiers until the FEMPs and FSMPs have been completed. To avoid delaying the implementation of KDMP, KCM has, therefore, opted to complete the final plans sooner than the contractual requirement. To achieve this timescale, the development of the final plans was initiated soon after vesting.

The development of the final plans entailed:

- identifying the planning and investigation required in terms of the IEMPs and ISMPs; and
- thoroughly reviewing the interim plans to determine any additional areas that would require expansion to achieve the content and level of detail required in the final plans.

The FEMP and FSMP include the management requirements for the KDMP.

The FEMPs and FSMPs have been prepared in accordance to the Zambian regulations as well as following the guidelines and policies of the International Finance Corporation (IFC), a shareholder in this project.

The KCM Environmental Approval Process

The Project approval has already gone through a lengthy process which started in 1995 when the Zambian government initiated the privatisation of the state owned mining company – Zambian Consolidated Copper Mines (ZCCM). After much negotiation and rearrangement of bid "packages", an agreement was finally reached between the Government of the Republic of Zambia (GRZ) and Zambia Copper Investments Limited (ZCI), an Anglo American plc subsidiary. This agreement resulted in the formation of Konkola Copper Mines plc (KCM).

A suite of documentation has already been prepared for the KCM project, including audits and Interim Environmental and Social Management Plans for each site. The Plans submitted are interim in nature due to the need to provide details on procedures for implementation of the proposed measures.

[1] This is the terminology favoured by the International Finance Corporation. In terms of Zambian legislation a document of this type is referred to as an Environmental Impact Statement.

The nature of the negotiations for the privatisation of the KCM package prevented ZCI from having access to detailed data necessary for the completion of the documentation at the time (other potential investors were also bidding). Therefore much of the detailed study could only take place once the Heads of Agreement was signed, which occurred on October 26, 1999.

The Interim Environmental and Social Management Plans (IEMPs and ISMPs) focused on:

- The environmental and social issues which need to be addressed and the financial responsibility for addressing these issues.
- The management actions to be implemented during approximately the first two years following take-over.

The management actions outlined in the IEMPs and ISMPs are currently being implemented at the facilities acquired and managed by the KCM Project whilst the final environmental and social management plans are being developed and undergoing a review process.

In addition to the implementation of these plans, a public consultation and disclosure programme initiated in 1997 by ZCI has been continued by KCM. The consultation has taken the form of public meetings and informal meetings with Interested and Affected Parties (I&APs), a media campaign and surveys to ensure that consultation and disclosure has been effective. A significant participatory research was carried out for the preparation of the KDMP Social Impact Assessment. This has been undertaken to conform to IFC guidelines developed in 1998. The consultation programme continued as part of the development of the ISMP. During the preparation of the final SMP consultation through participatory research, stakeholder consultative forums, interviews and discussions took place. The record of all consultation and disclosure has been provided in a series of reports (February 1997, February 2000, June 2000) and a record of stakeholder consultation undertaken in the Social Management plan process is provided in Volumes 2.2, 3.2, 4.2 and 5.2.

The IEMPs and ISMPs form part of contractual agreements reached with the Government of the Republic of Zambia (GRZ). At the time of signing the agreement with the GRZ, ZCI agreed to finalise the environmental and social management plans within two years following take-over.

KCM has developed these plans to address the requirements of the International Finance Corporation's Environmental Action Plan and the Zambian Mining Environmental Regulations (1997).

How these plans satisfy both parties is presented below.

International Finance Corporation (IFC)

The International Finance Corporation, a member of the World Bank group, is an investing partner in the KCM project and therefore requires that its policies and guidelines be adhered to in the development of the project. IFC's procedures require an environmental and social assessment to be carried out for all projects, including public consultation and disclosure (Operation Policy (OP) 4.01).

For a project at existing "brownfield" sites such as the KCM project, the appropriate environmental and social assessment is an Environmental Audit. This audit addresses two main issues, compliance with relevant relocations guidelines and policies and secondly the nature and extent of environmental and social impacts. The KCM project has been classified as

a Category A project by IFC. All Category A projects must have an Environmental and Social Action Plan (sometimes termed a Management Plan) which defines mitigation measures along with associated costs, schedules and responsibilities.

The IFC's environmental operating procedures (OP 4.01 - Environmental Assessment, Annex C - Environmental Action Plan), provides an outline of the contents required in an Environmental Action Plan (EAP). IFC notes that the Environmental Action Plan (EAP) is sometimes known as an Environmental Management Plan. KCM uses the terms 'Environmental Management Plan', or EMP and 'Social Management Plan', or SMP.

Annex C states that:

> "*A project's environmental action plan consists of a set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels*. "

In discussion with the IFC, it was agreed, while the Environmental Audits conducted during the privatisation process provide adequate environmental baseline information and impact assessment for this "brownfield" project, the Konkola Deep Mining Project EA would require updating with the latest plans.

In preparation of the FEMPs and SEMPs, additional studies were conducted to provide information where required to formulate specific plans. Also, the original EA for KDMP was updated to reflect the latest plans according to the feasibility study completed in January 2001.

Government of Zambia - Mines and Minerals (Environmental) Regulations 1997.

The Zambian Mines and Minerals (Environmental) Regulations, 1997, require that, for project approval, the proponent must submit an Environmental Impact Statement that contains:

- *"An executive summary of the impact of the mining operation on the environment;*
- *An environmental management plan;*
- *A plan for rehabilitation and management; and*
- *The estimated cost of protecting the environment."*

The EMPs address each of these points for each site. In addition, as requested by Mines Safety Department, the plan specifically addresses the following:

- Clean-up obligations
- Proposed Action Plan and Financial Impact on the Following Issues
  1. *Open Pit Mining Operations*
  2. *Underground Mining Operations*
  3. *Rockpiles*
  4. *Tailings*
  5. *Site Water Management (groundwater and surface water)*
  6. *Air Quality*
  7. *Landfill (domestic and industrial waste disposal)*
  8. *Fuels and Chemicals*
  9. *Sewage and Potable Water*

10. Archaeological Sites
11. Hazardous waste (incl. PCB and radioactive waste)

- Environmental Monitoring and auditing
- Socio-economic matters (included within the SMPs)
- Environmental Licenses and Matters
- Environmental Protection Funds
- Rehabilitation and Decommissioning Plan

These documents present the Final EMPs and SMPs for KCM's operations.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
AAC	Anglo American Corporation of South Africa Limited
AA plc	Anglo American plc
ABA	Acid Base Accounting
ACGIH	American Conference of Governmental Industrial Hygienists
AECI	African Explosives and Chemical Industry Limited
AHC	Asset Holding Company
AIDS	Acquired Immune Deficiency Syndrome
AMD	Acid Mine Drainage
ANFO	Ammonium Nitrate/fuel oil explosive
AOL	Anglo Operations Limited
ARD	Acid Rock Drainage
ASCo	Acid Soluble Cobalt
ASCu	Acid Soluble Copper
AusIMM	Australian Institute of Mining and Metallurgy
BATNEEC	Best Available Technology Not Entailing Excessive Costs
BOD	Biological Oxygen Demand
BSA	Bulk Supply Agreement
BS	British Standards
BSS	Banded Sandstone
CCM	Chibuluma Copper Mines
CCPP	Central Coal Pulverising Plant
CDC	Commonwealth Development Corporation
CDOL	Chingola Dolomite
CEC	Copperbelt Energy Corporation
CIF	Customs, Insurance and Freight
COMESA	Common Market for East and South African States
CONEX	Commodity Exchange Division of the New York Mercantile Exchange
CRO	Chingola Refractory Ore
CRUD	Continuous Up-Dip toping Method
CSIR	Council of Scientific Research
CSS	Central Substation
dB(A)	Decibel
DC	Direct Current
DCAP	Double Contact Acid Plant
DRC	Democratic Republic of the Congo
EA	Environmental Analysis
EA	Environmental Assessment
ECC	Evaporative Cooling Chambers
ECZ	Environmental Council of Zambia
EIS	Environmental Impact Statement
EIU	Economist Intelligence Unit
EMP	Environmental Management Plan
EN	European Norms
EPF	Environmental Protection Fund
ESP	Electrostatic Precipitator
EU	European Union
FAO	Food and Agricultural Organisation
FEMP	Final Environmental Management Plan
ft	Foot
ftL	Underground Level in Feet Below Surface
GAC	Gangue Acid Consumption

Abbreviation	Description
GDP	Gross Domestic Product
GFW	Geological Footwall
GHW	Geological Hangingwall
GRZ	Government of the Republic of Zambia
ha	Hectare
HFO	Heavy Fuel Oil
HIV	Human Immuno Deficiency Virus
HPD	Hearing Protection Device
I&APs	Interested and Affected Parties (Stakeholders)
ICP	Inductively Coupled Plasma
ICSID	International Conciliation Settlement of Industrial Disputes
ID	Import Duty
IDF	Import Declaration Fee
IEMP	Interim Environmental Management Plan
IFC	International Finance Corporation
IMF	International Monetary Fund
INR	Institute of Natural Resources
IRR	Internal Rate of Return
ISMP	Interim Social Management Plan
ISO	International Standards Organisation
JORC	Joint Ore Reserve Committee of Australian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Australian Mineral Industry Council
KCM	Konkola Copper Mines Plc
KBC	Kabundi Electrowon Cathode
KDMP	Konkola Deep Mining Project
km	Kilometre
KNNN	The Konkola, Nkhana, Nchanga and Nampundwe Mines
KPI	Key Performance Indicators
kt	Thousand Metric Tonnes
ktpa	Thousand Metric Tonnes Per Annum
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt Hour
l/s	Litres per Second
lb	Pound
LBS	Lower Banded Shale
LFO	Light Fuel Oil
LHD	Load Haul Dump Machine
LIBOR	London Inter Bank Offer Rate
LME	London Metal Exchange
LML	Large-Scale Mining Licence
LOB	Lower Ore Body at Nchanga
LPC	Lower Porous Conglomerate
LRP	Longitudinal Room and Pillar Stoping Method
LSE	London Stock Exchange
m	Metre
M	Million
m^2	Square metre
m^3	Cubic metres
mamls	Metres Above Mean Sea Level
Mbcm	Million Bank Cubic Metres
mL	Underground Level in Metres Below Surface

Abbreviation	Description
mbgl	Metres Below Ground Level
MCM	Mopani Copper Mines plc
MLA	Mining Licence Area
MMA	Mines and Minerals Act
MMD	Movement for Multiparty Democracy
MOM	Zambian Ministry of Mines
Mt	Million Tonnes
Mtpa	Million Tonnes per Annum
Mtpy	Million Metric Tonnes per Year
MUZ	Mineworkers Union of Zambia
MW	Megawatt
MWP	Mine Works Planner Software
NCCM	Nchanga Consolidated Copper Mines
NCL	Ndola Lime Company
NIOSH	National Institute for Occupational Safety and Health
NNP	Net Neutralisation Potential
No.	Number
NOP	Nchanga Open Pit
Nos.	Numbers
NP/AP	Neutralisation Potential and Acid Potential Ratio
NPV	Net Present Value
OCB	Overcut Bench Stoping Method
OHSAS	Occupational Health and Safety Assessment Series
PABX	Private Automatic Branch Exchange
PC	Pebble Conglomerate
PCB	Polychlorinated Biphenols
PCD	Public Consultation and Disclosure
PCR	Periodic Current Reversal
P&G	Preliminary and General
pH	Logarithm of the reciprocal of hydrogen concentrations in moles/litre, giving a measure of acidity or alkalinity
plc	Public Limited Company
ppcc	Particles per Cubic Centimetre (cm^3)
ppm	Parts per Million
PPCF	Post Pillar Cut and Fill Stoping Method
PPI	Producer Price Index
PPZ	Poor People of Zambia
PRA	Participatory Rural Appraisal
PSA	The Power Supply Agreement
RAP	Resettlement Action Plan
RCAT	Root Cause Analysis Training
RCM	Roan Consolidated Mines
REC	Rokana Electrolytic Cathodes Produced by Nkana Refinery
RLE	Roast Leach Electrowinning
SABS	South African Bureau of Standards
SAG	Semi-Autogenous Grinding
SAMRE	South African Mineral Resource Committee
SAMREC	South African Code for Reporting of Mineral Resources and Mineral Reserves
SAPP	South African Power Pool
SCAP	Single Contact Acid Paint
SELF	Square Excavation Level Fill Stoping Method
SHE	Safety, Health and Environment

Abbreviation	Description
SL	Slag Dump
SLOS	Sun-Level Open Stoping Method
SO_2	Sulphur Dioxide
SO_3	Sulphur Trioxide
SRK	Steffen Robertson and Kirsten
SWG	Shale with Grit
t	Metric Tonne = 100kg
t,Mt	Tonne, million tonne
TC/RC	Toll Charge/Refining Charge
TCC	Total Coliform Count
TCo	Total Cobalt
TCu	Total Copper
TDS	Total Dissolved Solids
TLP	Tailings Leach Plant
TLV	Threshold Limit Value
tpd	Metric Tonnes per Day
tpa	Metric Tonnes per Annum
TSS	Total Suspended Solids
UNCITRAL	The United nations Commission on International Trade Law
UOB	Upper Orebody at Nchanga
UOB	Upper Roan Dolomite
US	United States cents
US$	United States Dollars
US$M	Million United States Dollars
US(A)	United States (of America)
VAT	Value Added Tax
WAN	Wide Area Network
WHO	World Health Organisation
WMC	Water Management Consultants
Y2K	Year 2000 Computer Issues
ZAMSIF	Zambian Social Investment Fund
ZAPRA	Zambian Promotions of Rural Art
ZCCM	Zambian Consolidated Copper Mines Limited
ZCI	Zambian Copper Investments Limited
ZESA	Zimbabwe Electricity Authority
ZESCO	Zambian Electricity Supply Corporation Limited
ZRA	Zambian Revenue Authority

SECTION 1

General

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

1.0 GENERAL

Konkola Copper Mines plc (KCM) has prepared an Environmental Assessment[1], including Environmental and Social Management Plans for its mining and processing operations, so as to:

- operate in accordance with the principles embodied in the KCM Policy on Safety Health and the Environment;
- comply with the requirements of the Zambian Mines and Minerals (Environmental) Regulations, 1997;
- satisfy the contractual requirement - relating to the original establishment of KCM - for the preparation of ***Final*** Environmental and Social Management Plans within two years of vesting; and
- provide the environmental documentation required by the International Finance Corporation (IFC) and other potential financiers that may be approached to provide funding for the Konkola Deep Mining Project (KDMP).

The plans have been prepared in accordance with the Zambian regulations and following the policies and guidelines of the International Finance Corporation (IFC), a KCM shareholder.

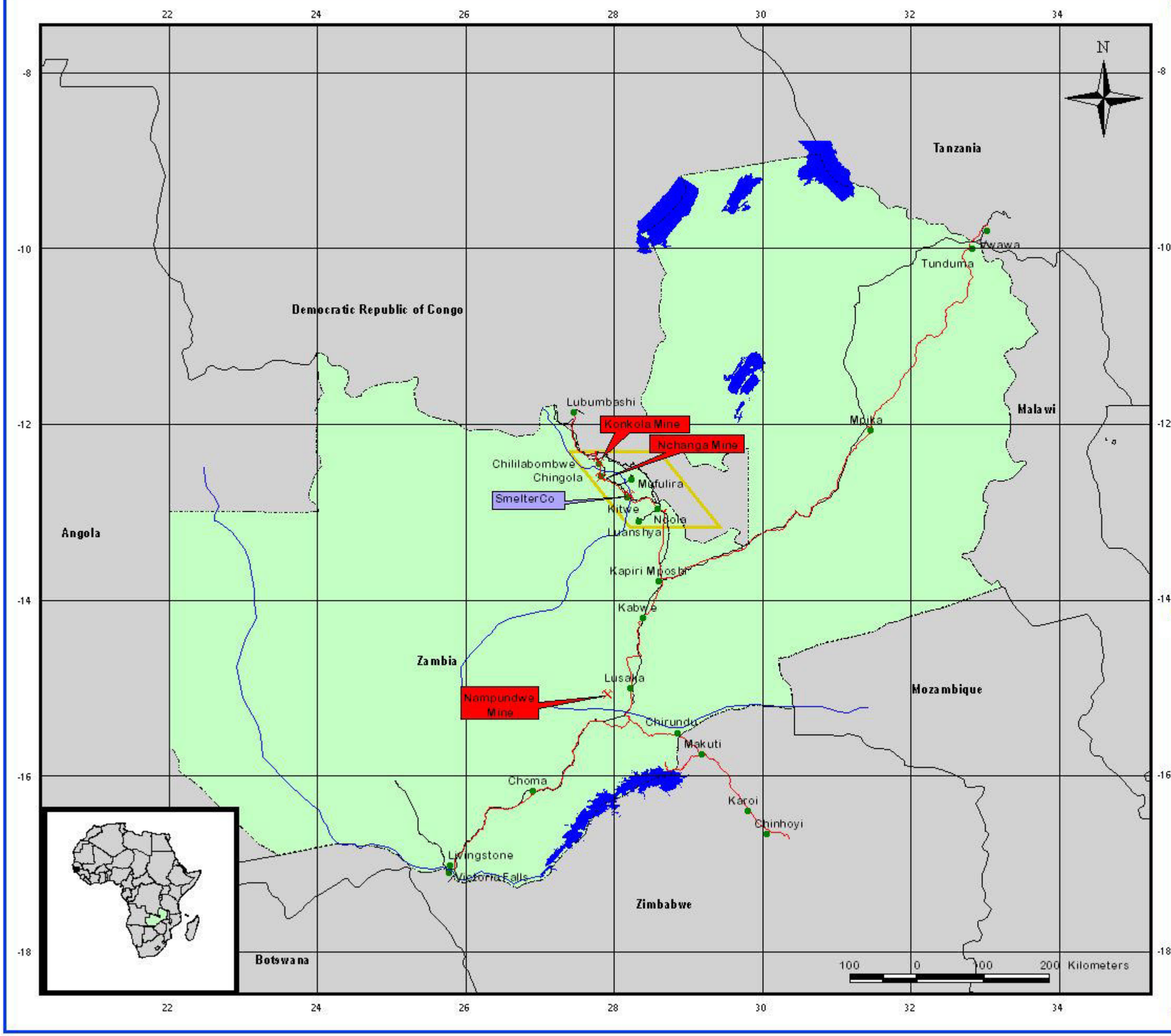
KCM owns and operates the Konkola and Nchanga mines on the Copperbelt, the Nampundwe Mine in Lusaka Province and currently has management responsibilities for the SmelterCo Smelter and Refinery Complex in Kitwe, also on the Copperbelt. Figure 1.1 shows the locations of these operations within Zambia.

This Volume 1 presents:

- A history of the KCM project and an overview of KCM's operations.
- An overview of KCM's corporate structure, corporate safety, health and environmental (SHE) policy and KCM's commitments to SHE management.
- A summary of the legal and other SHE requirements.
- The approach to the environmental and social investigations.
- The corporate level SHE management plan, including an overview of the Safety Risk Management System for KCM (RAMP.K).
- The corporate level social management plan.

Site-specific environmental and social management plans for KCM's operations are included in separate volumes. The "Guide to the Environmental Assessment" at the front of this volume outlines the overall structure.

[1] This is the terminology favoured by the International Finance Corporation. In terms of Zambian legislation a document of this type is referred to as an Environmental Impact Statement.



Legend

- International Boundary
- Road
- Railway
- River
- Town
- Mine
- Africa
- Zambia
- Copperbelt Region
- Lake
- KCM owned operations
- ZCCM (SmelterCo) Ltd., operated by KCM

Konkola Copper Mines plc

ENVIRONMENTAL ASSESSMENT

KCM Operations- Location Plan

Figure 1.1

File Name: Vol1_fig1_1.pdf

Date: March 2001

1.1 Historical Background to the Forming of the KCM Project

Large-scale copper mining in Zambia began in the 1920s with the opening of mines by Zambian Anglo American (later Nchanga Consolidated Copper Mines - NCCM) and Roan Selection Trust (later Roan Consolidated Mines - RCM). The mines were nationalised in 1969. This was followed in 1982 with the merger of NCCM and RCM to form Zambia Consolidated Copper Mines Limited (ZCCM), in which the Zambian government owned a 60.3% share. Thereafter, the ZCCM operations were consolidated into six mining divisions and one power division.

A new government, led by President Frederick T.J. Chiluba, was elected in 1991 and has initiated a process of economic reform. In 1995 the Zambian government set in motion the privatisation of ZCCM. The initial privatisation plan entailed dividing the company into a number of “packages” and offering these to international bidders.

1.1.1 Original Konkola Deep Mining Project (KDMP)

In February 1997, a group of companies, known as the KDMP Consortium, signed an agreement with the Government of the Republic of Zambia (GRZ) granting it the exclusive right to investigate the feasibility of obtaining majority ownership of the following ZCCM assets:

- The existing Konkola mine (the ZCCM Konkola Division).
- Certain unexploited mineral resources located at greater depth, but contiguous with the existing Konkola mine (within the ZCCM Konkola Division).
- The existing Mufulira smelter and refinery (part of the ZCCM Mufulira Division) and associated infrastructure.

At around the same time another group of companies, know as the Kafue Consortium, were granted the right to investigate the feasibility of taking ownership of ZCCM’s Nchanga, Nkana and Chambishi operations. However, the negotiations between the GRZ and the Kafue Consortium broke down in the first half of 1998.

1.1.2 KCM Project

During the second half of 1998, Zambia Copper Investments Limited (ZCI) was asked to consider taking ownership of a different package of ZCCM operations that had not yet been privatised i.e. Konkola, Nkana, Nchanga, and Nampundwe. ZCI and Codelco of Chile undertook the investigations into the feasibility of taking ownership of these assets jointly and the package was referred to as the “KNNN Project”. Subsequently Codelco withdrew, resulting in ZCI formulating a revised assets package involving the privatisation of Konkola, Nchanga and Nampundwe i.e. the KCM Project. The purchase of these assets was successfully concluded and is now owned by a newly formed company called Konkola Copper Mines plc (KCM) – a subsidiary of ZCI. The date of transfer of ownership or vesting was 31 March 2000. KCM’s head office is located at the Nchanga mine in Chingola.

KCM's main shareholder is ZCI and the other shareholders are the International Finance Corporation (IFC), Commonwealth Development Corporation (CDC) and ZCCM-IH, as shown on Figure 1.2.

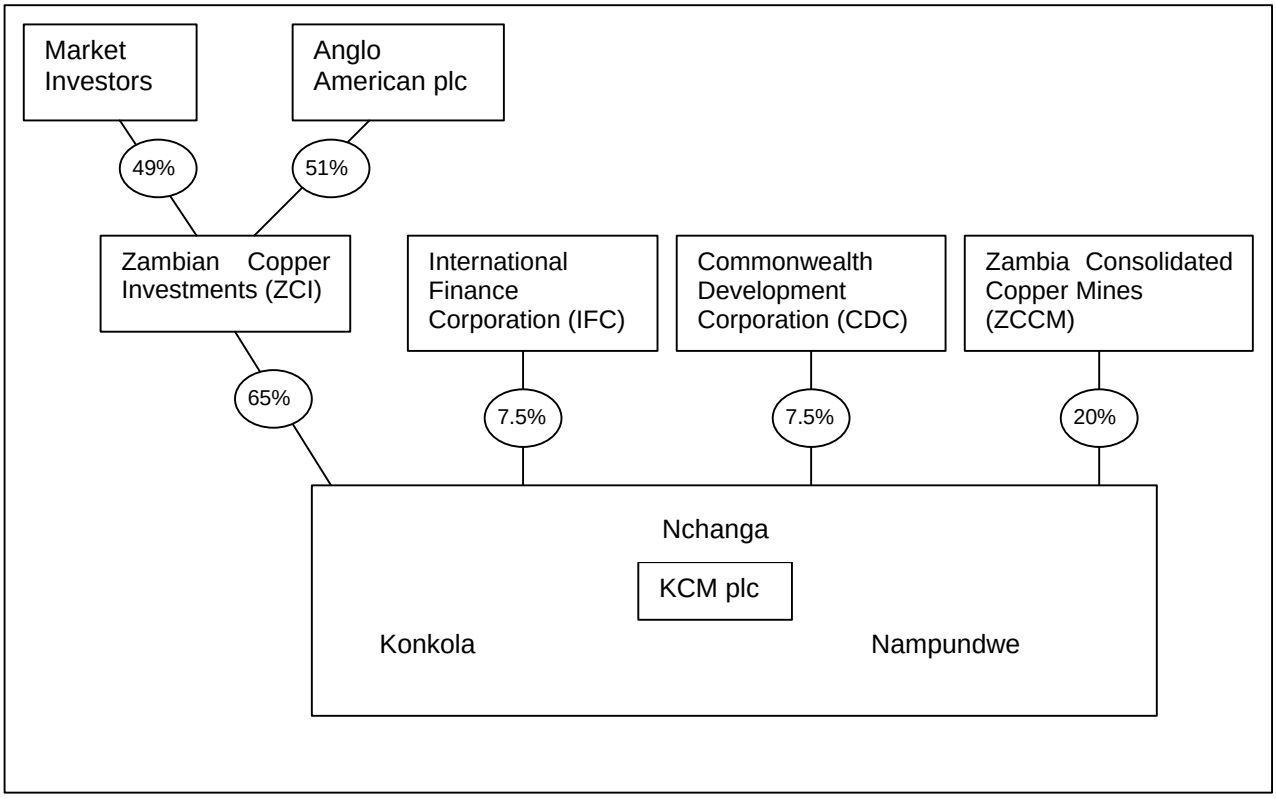


Figure 1.2 - KCM Ownership

The KCM Project now comprises the following operations:

Table 1.1 - Operations Comprising the KCM Project

Name	Nature of Current Operations	Product	Employees at Take-over
Konkola	Underground mine Concentrator	Copper in ore Copper in concentrate	2972
Nampundwe	Underground mine concentrator	Pyrite concentrate	317
Nchanga	Open pit and Underground mines Concentrator Tailings leach plant	Copper in ore Cobalt in ore Copper in concentrate Cobalt in concentrate Copper	6490

The KCM assets have suffered from many years of under-investment, declining production and high operating costs. It will take a number of years to rehabilitate the assets, improve management and reduce operating costs. The long-term production level will be 240 000 tpa of copper (finished metal).

The other ZCCM mining operations that were not purchased by KCM have also been privatised. After KCM the second largest investor is Mopani Copper Mines plc (MCM) whose main shareholders are First Quantum Minerals and Glencore. MCM have taken ownership of the Nkana mines, concentrator and RLE cobalt plant, and the Mufulira mine, smelter and refinery.

Following the privatisation of all its mining operations ZCCM was reconstituted as an investment company and is now called ZCCM Investment Holdings plc (ZCCM-IH).

1.1.3 SmelterCo

At the outset KCM required guaranteed access to smelting and refining facilities during at least the first three years after take over. To facilitate this requirement ZCCM-IH formed ZCCM (SmelterCo) Ltd (hereafter referred to as SmelterCo) on 31 March 2000 with the company's assets comprising the former Nkana smelter, refinery and acid plants in Kitwe.

The GRZ appointed Anglo Operations Limited (AOL) to manage the assets transferred to SmelterCo. KCM in turn manages these operations on behalf of AOL and, hence, KCM is able to have the necessary control over the smelting and refining of the concentrate from its mining operations.

SmelterCo will treat concentrate from the mines owned by KCM and Mopani Copper Mines plc (MCM) and other smaller operations.

The rehabilitation costs for the refurbishment and operation of the SmelterCo smelter, acid plants and refinery facilities were presented in a business plan to the British Government, represented by the Department for International Development, who agreed to provide bridging capital to the GRZ. The GRZ have made the loan available to SmelterCo to continue their operations until the facilities are sold.

KCM has an option to purchase the SmelterCo facilities within the first three years covered by the management agreement, which commenced on 31 March 2000, and the first right of refusal within the last two years of the agreement. KCM is currently proceeding on the basis that the option to purchase will be taken up so as to provide the long-term concentrate treatment route required as part of the KDMP.

1.2 Overview of the KCM and SmelterCo Facilities

1.2.1 The Konkola Facilities

Konkola mine has been in operation since 1957. It is situated immediately to the south and west of the town of Chililabombwe on the Zambian Copperbelt. Chililabombwe is situated at an elevation of 1 360 meters above sea level (masl) on the Central African Plateau.

The Konkola Mining Licence (Large Scale Mining Licence – LML 35) covers an area of 6669 ha. A general layout plan of the Konkola Mine facilities is shown in Figure 1.3. The principal mining activities cover a total area of about 2 276 ha.

The mine consists of underground mining operations at Nos. 1 and 3 Shafts, and a concentrator which currently treats 5000 to 6000 tonnes of ore per day (tpd). Concentrates are shipped presently via rail to the SmelterCo and Mufulira smelters for further processing.

KCM plans to increase production at Konkola Mine by sinking a new shaft (No. 4) next to Shaft No. 3 to access the deeper orebody and constructing a new concentrator capable of a throughput of six million tpa. This expansion project, known as the Konkola Deep Mining Project (KDMP), is scheduled to start in 2002 and be in full production by the first quarter of 2007. The mine life of Konkola Mine, including KDMP, is 30 years, to 2031. Without the KDMP expansion, mining would cease in 2010.

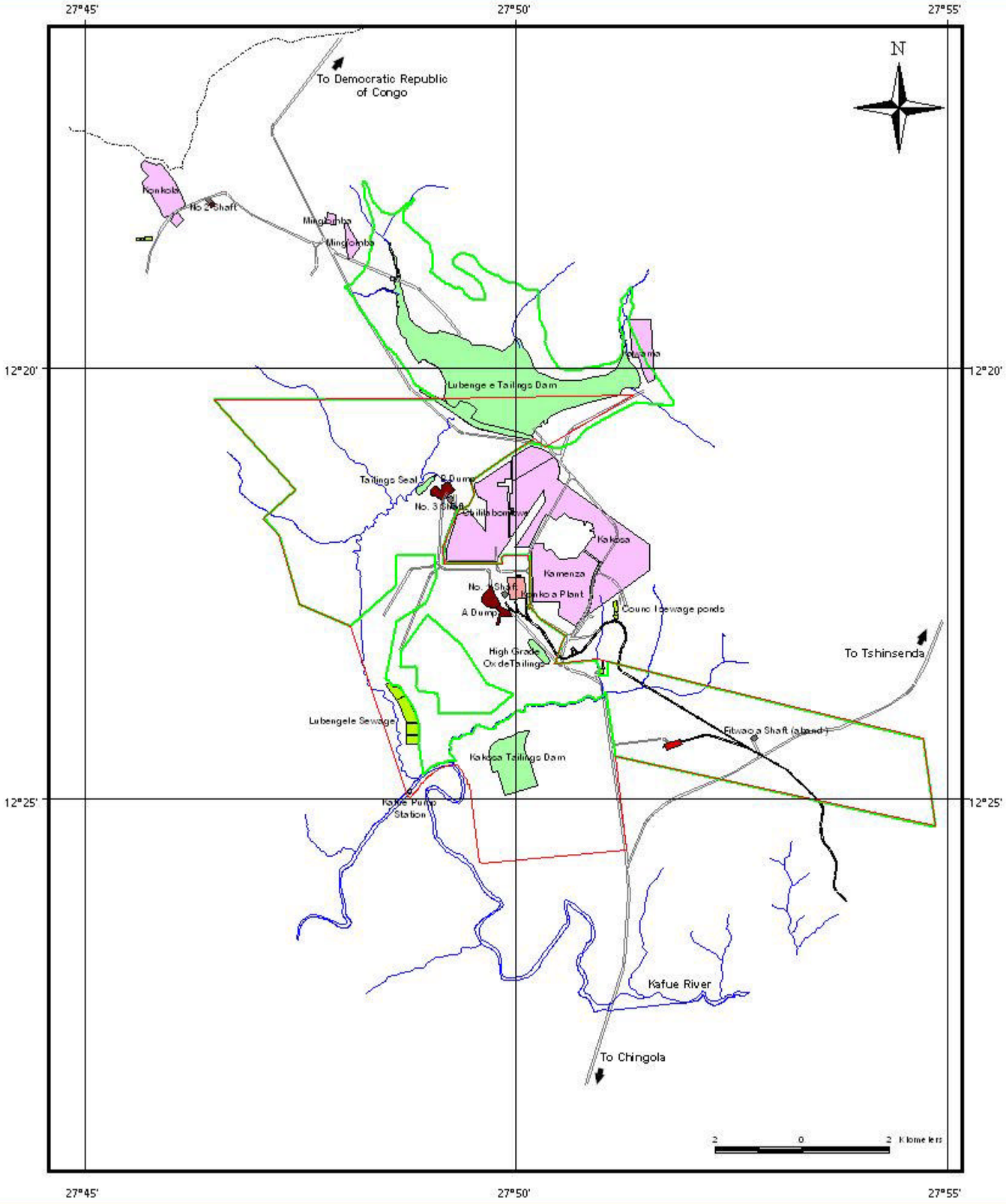
An implementation programme for the individual installations required for KDMP has been scheduled to ensure they are commissioned in time to meet the production schedule. The major engineering and construction milestones for KDMP are shown in Table 1.2.

Table 1.2 - KDMP Engineering & Construction Milestones

Activity	Date
Commence No. 4 Shaft Design	January 2001
Commence Headgear Design	February 2001
Commence Headgear Construction	February 2002
Commence No. 4 Shaft Slyping	July 2002
Commence Ventilation Shafts Sinking	January 2002
Commence Concentrator Design	September 2002
Complete Ventilation Shafts Sinking	December 2003
Commence No. 4 Shaft Blind Sinking	April 2003
Commence Concentrator Construction	September 2003
Commission Concentrator Module 1	October 2005
Commission Backfill Plant	October 2005
Commence Production Build Up	October 2005
Commission No. 4 Shaft	December 2005
Commission Concentrator Module 2	February 2006
Attain Full Production	April 2007

The additional facilities required for KDMP will be within the footprint of the existing facilities and will result in minimal additional impacts.

Volume 2 presents the Environmental and Social Management Plans for the Konkola Mine, including an Environmental Assessment and a Social Assessment addressing KDMP.



Legend

- Current Mine Licence Boundary
- Current Surface Rights Boundary
- International Boundary
- Road
- Railway
- River
- Plant
- Tailings Dam
- Shaft
- Sewage Pond
- Explosive Magazine
- Waste Rock Dump
- Settlement

Konkola Copper Mines plc

ENVIRONMENTAL ASSESSMENT

Overall Plan of Konkola Mine Operations

Figure 1.3

File Name: Vol1_fig1_3.pdf

Date: March 2001

1.2.2 The Nchanga Facilities

The Nchanga Mine has been in operation since the 1930s. It is operating under a mining licence designated as Nchanga LML34. The mining licence area covers 11 763 ha around the town of Chingola. The plant complex covers an area of about 198 ha. A general layout of the Nchanga Operations is shown on Figure 1.4.

The mine currently comprises both underground and open pit operations. Underground mining operations are performed using two main shafts (C and D). Open pit mining is carried out at the Nchanga Open Pit. Historically, nine satellite pits have been mined for different periods of time. Most of these pits have been exhausted and have remained under ZCCM responsibility upon transfer of ownership, except for Block "A", Chingola D and F Open Pits that have been retained by KCM for future mining based on existing reserves.

There are two mills at Nchanga (the East and West Mills), each processing separate ores. The concentrator is located within the West Mill. The concentrate is sent to the SmelterCo facilities for smelting and refining.

Further processing of tailings is carried out at the Tailings Leach Plant where tailings from the flotation circuit and reclaim tailings from old impoundments are leached to recover acid soluble copper.

Support infrastructure for the Nchanga operations includes a hospital facility, a railway system, two substations and workshops. In addition, KCM also supports recreational facilities.

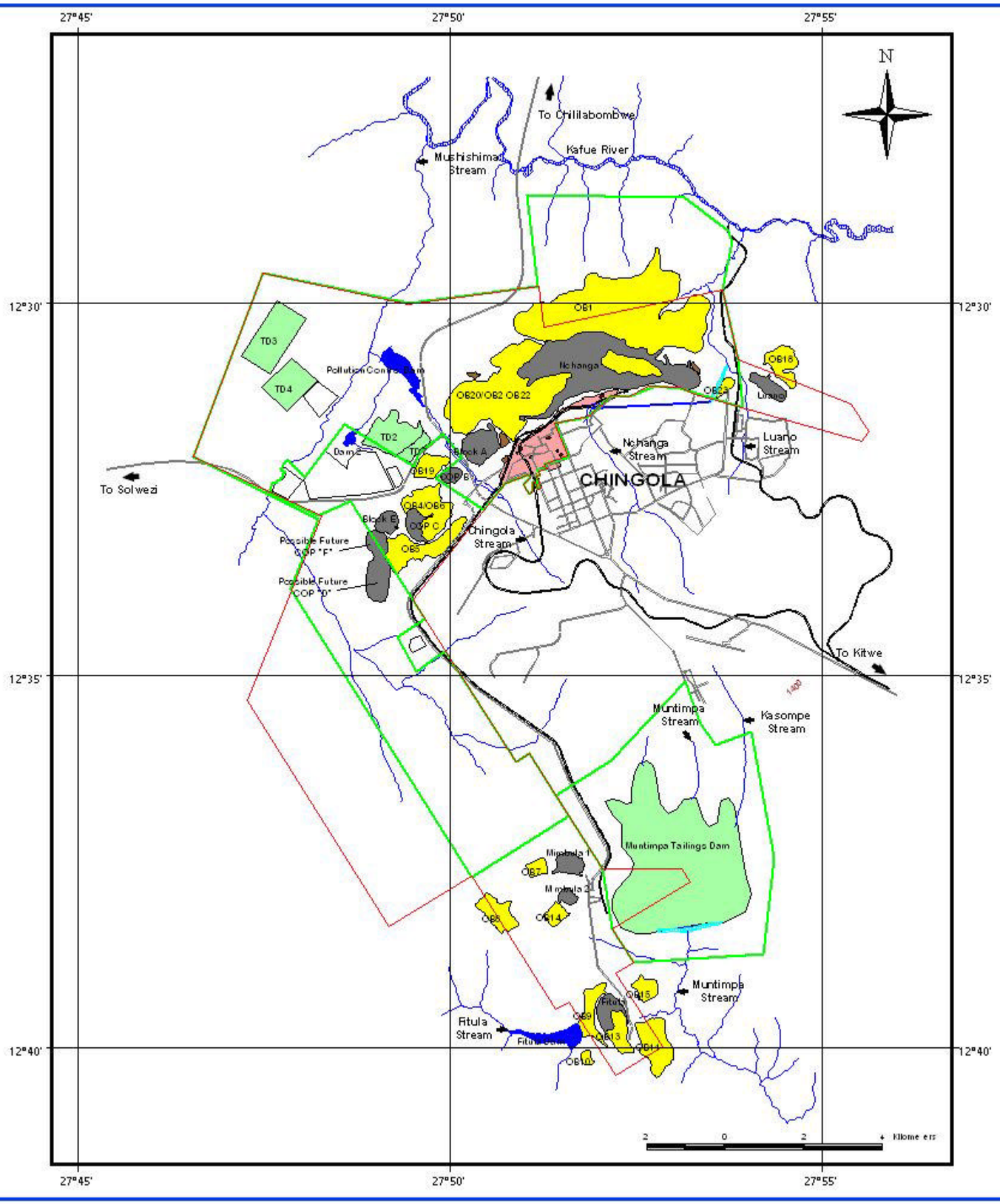
Reserves from the Nchanga Open Pit have been estimated at 15.8 Mt of copper ore containing an average grade of 2.49 %TCu and 2.7 Mt of copper/cobalt ore at an average grade of 1.889% TCu and 0.41% TCo. Based on present geological data and future market price and projections for copper and cobalt, the anticipated life of the Nchanga Open Pit is three more years, to 2003, although milling of some cobalt ore from the pit will continue into 2004.

Estimates of underground ore reserves at Nchanga indicate the presence of 28.9 Mt of mineable copper ore containing an average grade of 2.81% TCu. Underground mining at Nchanga will continue until 2010, according to the current mining plan.

Reclaiming and reprocessing of tailings through the Tailings Leach Plant will continue until 2010. In addition, a total of approximately 139 million tonnes of refractory ore (referred to as Chingola Refractory Ore, or CRO) at an average grade of over 0.87% TCu has been stockpiled at various locations within the Nchanga mining licence area. The Tailings Leach Plant will be modified to process this CRO and processing of CRO is scheduled to commence in 2006 and to continue till 2031.

Therefore all mining and processing activities at Nchanga will cease in 2031, according to the present KCM plans.

The Environmental and Social Management Plans for the Nchanga Mine are detailed in Volume 3.



Legend

- Current Mine Licence Boundary
- Current Surface Rights Boundary
- Road
- Railway
- River
- Plant
- TD — Tailings Dam
- Open Pit Mine
- OB — Overburden Dump
- Dam
- Wasterock Dump

Konkola Copper Mines plc

ENVIRONMENTAL ASSESSMENT

Overall Plan of the Nchanga Mine Operations

Figure 1.4

File Name: Vol1_fig1_4.pdf

Date: March 2001

1.2.3 The Nampundwe Facilities

The Nampundwe Mine is situated in the Central Province, 48 km west of Lusaka and is about 25 km off the Lusaka-Mongu Highway (Figure 1.1). It is the southernmost of the KCM facilities. Nampundwe Area is located on the edge of the Kafue valley or basin, which is a rural area. The Nampundwe mining licence area covers 951 ha and the principal mining activities cover a total area of 114 ha. A general layout of the Nampundwe Operations is shown on Figure 1.5.

Nampundwe facilities are comprised of an underground mining operation which is accessed via two shafts; a concentrator, which currently treats about 800 tpd of pyrite ore; and a tailings disposal facility made up of a series of paddocks.

The mine produces a bulk concentrate of Pyrite (FeS_2), Pyrrhotite ($Fe_{1-x}S$) and lesser Chalcopyrite ($CuFeS_2$) used for metallurgical processing at the copper smelters and the Roast Leach Electrowin (RLE) plants on the Copperbelt. The ore mined assays 12% to 14% S.

Nampundwe provides pyrite concentrate required in the copper smelting process and cobalt refining on the Copperbelt. There are sufficient reserves at Nampundwe to continue producing pyrite concentrate up to 2031.

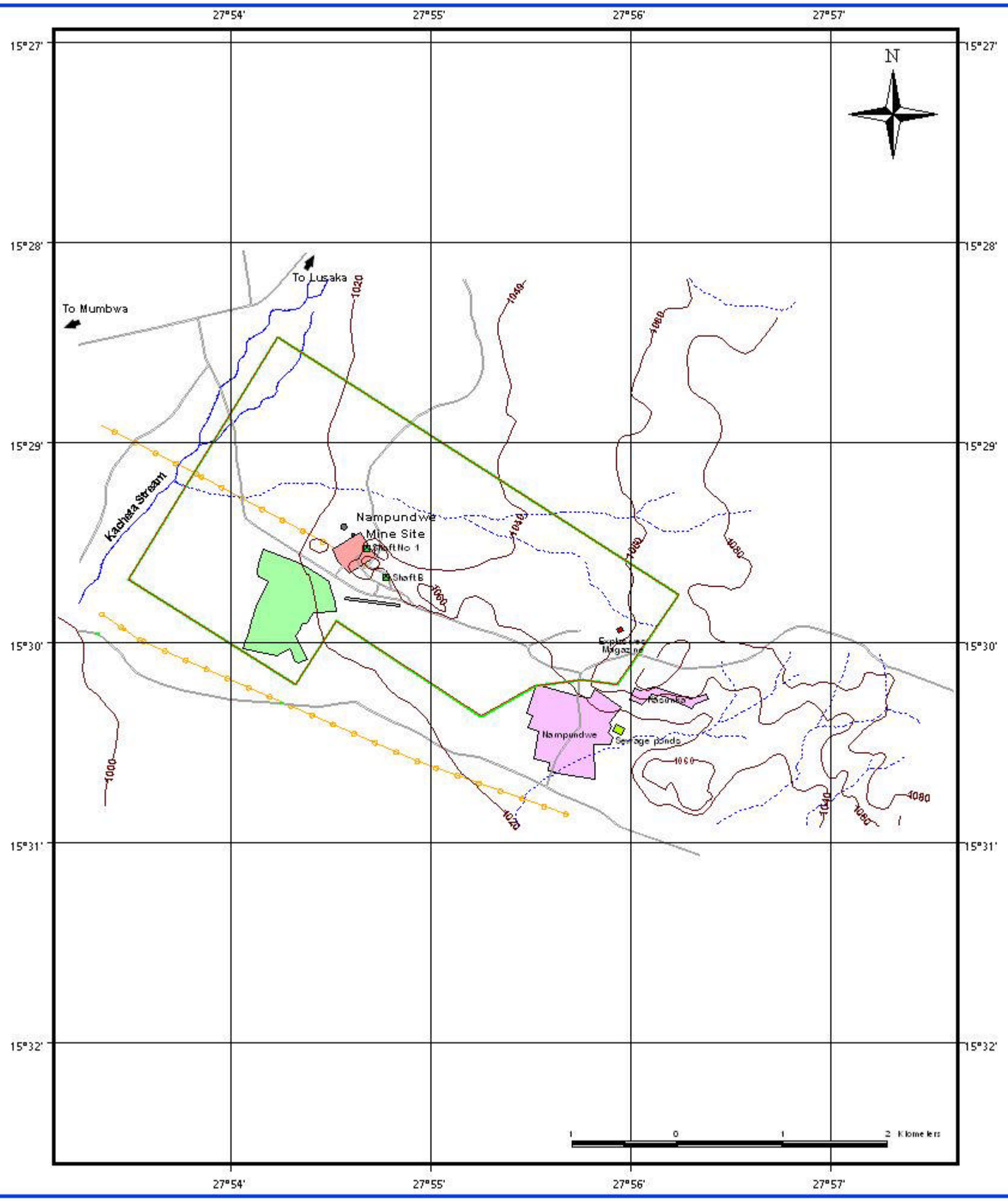
Volume 4 presents the Environmental and Social Management Plans for the Nampundwe operations.

1.2.4 The SmelterCo Facilities

The SmelterCo smelter, acid plants and refinery complex (formerly known as the Nkana Smelter and Refinery) is located immediately south of the city of Kitwe on the Zambian Copperbelt (Figure 1.1). These facilities are owned by ZCCM-IH (see Section 1.1.3 above).

KCM manages the SmelterCo facilities on behalf of Anglo Operations Limited (AOL), which has a five-year contract to manage the assets at SmelterCo. In addition, KCM has an option to purchase the SmelterCo facilities within the first three years covered by the management agreement, which commenced on 31 March 2000. The current KCM plans include exercising this option as the SmelterCo facilities are considered essential for the KCM mines in the Copperbelt (Konkola and Nchanga). Therefore, although not owned by KCM, SmelterCo is considered an integral part of the project and the Environmental and Social Management Plans for SmelterCo have been included as part of this series of documents (Volume 5).

The SmelterCo plants are located within the SmelterCo Licence Area – Large Scale Mining Licence Number 38. The former ZCCM Nkana mining activities, as well as the concentrator and cobalt roaster, leach and electrowinning plants, have been purchased by Mopani Copper Mines plc (MCM). Figure 1.6 presents an overview of the SmelterCo facilities within the MCM mining licence area.



Legend

- Current Mine Licence Boundary
- Current Surface Rights Boundary
- Road
- River
- Powerline
- Contours(20m intervals)
- Airstrip
- Plant
- Tailings Dam
- Sinkhole
- Sewage Pond
- Settlement
- Explosive Magazine
- Shaft

Konkola Copper Mines plc

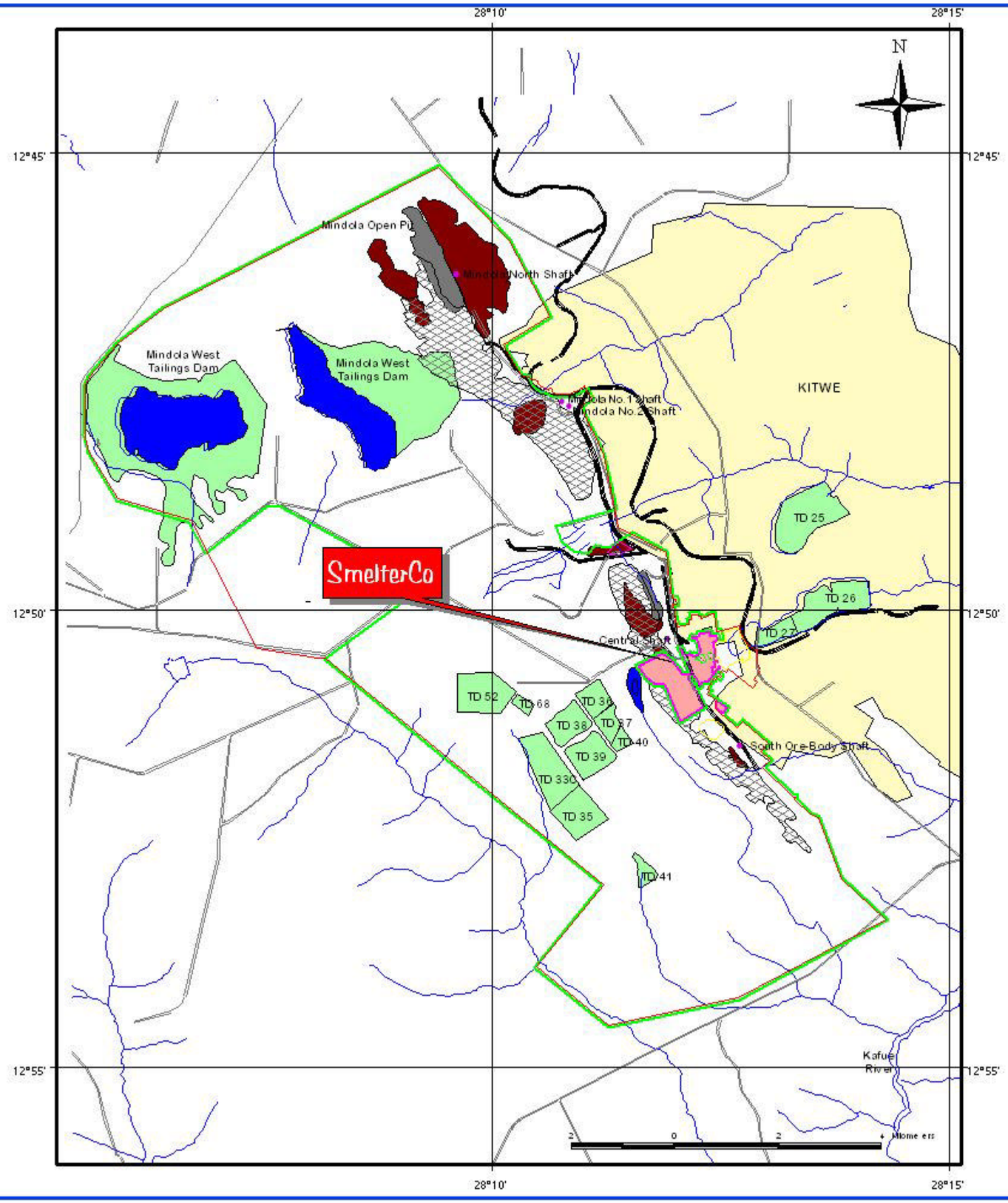
ENVIRONMENTAL ASSESSMENT

Overall Plan of the Nampundwe Mine Operations

Figure 1.5

File Name: Vol1_fig1_5.pdf

Date: March 2001



Legend

- MCM Mine Licence Boundary
- MCM Surface Rights Boundary
- SmelterCo Surface Rights Boundary
- Current AVMIN Licence Boundary
- Road
- Railway
- River
- SmelterCo Plant Area
- Non-SmelterCo Facilities within Nkana Plant Area
- Tailings Dam
- Open Pit Mine
- Underground Mining
- Wasterock Dump
- Dam
- Settlement

ENVIRONMENTAL ASSESSMENT

Overall Plan of SmelterCo Facilities

Figure 1.6

File Name: Vol1_fig1_6.pdf

Date: March 2001

The SmelterCo surface rights area covers the following main facilities:

- concentrate receiving, storage and blending facilities;
- primary smelting furnaces;
- conventional copper converters;
- anode casting;
- electro-refining;
- sulphuric acid production;
- Slag Dumping (SD67);
- workshops, administration and other buildings;
- acid tanks and a lime rock storage area separate from the main complex;
- Salvage Yard; and
- Power Plant.

MCM facilities are located immediately adjacent to SmelterCo, with two areas under MCM surface rights located within the SmelterCo area.

Concentrates from the Nkana (MCM), Chibuluma (Chibuluma Copper Mines - CCM), Nchanga (KCM) and Konkola (KCM) mines are processed at SmelterCo. Sulphuric acid is produced as a by-product from the process. This acid is shipped primarily to the Nchanga facilities for use in the tailings leach process and also to the MCM cobalt plant at the Nkana Mine and the MCM refinery at Mufulira.

The planned refurbishment of the SmelterCo plants will improve the efficiency of the plants as well as address the environmental impacts from air emissions, in particular sulphur dioxide and particulates. This will require a capital injection of US$91.3 million and will use ‘best-available-technology-not-exceeding-excessive-costs’ (BATNEEC). This refurbishment, to be substantially completed by March 2003, includes design, construction and training. KCM plans to take ownership of the smelter facilities for the future treatment of its concentrate. When KCM purchases SmelterCo, additional expansionary capital will be invested in further improvements of the facilities, as detailed in Volume 5.

Volume 5 presents the Environmental and Social Management Plans for SmelterCo. Volume 5 was prepared for ZCCM (SmelterCo) Ltd. by KCM as part of the management contract. Therefore, Volume 5 is presented as a complete document. SmelterCo’s Corporate Management structure and policies, legal and other requirements and overall approach to environmental and social management are included in Chapter 5, together with the EMP and SMP for SmelterCo’s facilities.

SECTION 2

KCM Commitment to SHE Management

TABLE OF CONTENTS

Page

2.0 KCM COMMITMENT TO SHE MANAGEMENT

2.1 Influence of KCM's Major Shareholder: Anglo American plc

The shareholding attributable to Anglo American plc (AA plc) in KCM is 33%, which makes AA plc the largest individual shareholder. The size of the shareholding and the level of control are such that AA plc categorises KCM as a "managed" operation. Hence, KCM is expected to adhere to AA plc's Safety, Health and Environment Policy and Management Guidelines.

AA plc comprises a number of commodity Divisions, including: Base Metals, Coal, Platinum, Industrial Minerals, Exploration and Acquisitions, Ferrous Metals, Industrial Minerals and Forest Products. KCM is located within the Base Metals Division.

As one of the top 100 companies listed on the London Stock Exchange and as the largest mining company in the world, AA plc is open to considerable scrutiny by the investment community and other stakeholders. The London listing requirements include adherence to the Combined Code on Corporate Governance and its Internal Controls (commonly known as the "Turnbull Report"). The "Turnbull Report" essentially requires risk identification and management systems to be established within the company.

AA plc's commitment to Safety, Health and Environment (SHE) management is demonstrated by the establishment of a SHE Committee of the Board to broadly direct SHE management within the company's commodity Divisions. The Board has also approved a corporate SHE Policy and Management Guidelines. (The guidelines are consistent with ISO 14001 and OHSAS 18001).

The Anglo Base Metals Division has a SHE Committee in place, which is mandated to oversee and influence SHE management within the Division's operations. The KCM Vice President – Safety Health and Environment is a member of this Divisional SHE Committee.

The AA plc management system requires, amongst other things, regular reporting on SHE related issues and performance. The SHE reports that the Divisions are required to submit include the following:

- Emergency reports – to be submitted following:
    - a fatal accident;
    - major environmental incident; or
    - material event likely to lead to adverse national publicity.
- Quarterly reports – updates of the previous annual report, including the latest SHE performance data and reporting "by exception" of significant new issues.
- Annual reports – reports covering:
    - extent of compliance with the AA plc SHE Policy;
    - SHE data and Performance indicators;
    - awards or public recognition;
    - benchmarking; and
    - the programme for SHE audits for the coming year.

- Letters of Assurance – letter from the Divisional Executive commenting on:

    - extent of legal compliance;
    - instances of compliance with AA plc's SHE Policy and Management Guidelines;
    - a review of the past year objectives and the extent to which they have been met;
    - main plans and objectives for the coming year; and
    - a view as to the effectiveness of risk management.

In the light of the Divisional reporting requirements, each operation (e.g. KCM) is required to report similar information to the Division under which they operate (e.g. Base Metals).

Commencing in 2001, AA plc intends publishing an annual public SHE report covering the performance of all its Divisions. The intention is also to move towards public reporting by each of the commodity Divisions. A number of individual operations are already producing public SHE reports.

AA plc has established an internet-based computer system, which enables SHE performance data to be directly entered by each operation into a central database. The database is then able to roll-up the data by Division for transfer to AA plc. The data is also available to the Divisions and operating companies as a management tool.

Companies are expected to set their own targets (consistent with the SHE Policy), and determine the key performance indicators that best reflect their operating circumstances.

2.2 Commitments by KCM

KCM's commitment to effective SHE management is demonstrated by the formation of SHE Committees, the adoption of a SHE Policy and the establishment of a SHE Department.

2.2.1 SHE Committees

The Board of KCM has appointed a SHE Committee of the Board to oversee SHE management within the company. In addition to this Board Committee, the following SHE committees have been established:

- SHE Executive Committee
- Safety Implementation Committee
- Occupational Health Implementation Committee
- Environmental Implementation Committees, divided as follows:

    - Konkola mining
    - Nchanga mining
    - Konkola and Nchanga Metallurgy
    - Konkola and Nchanga Engineering
    - Nampundwe Mine (all disciplines)
    - SmelterCo (all disciplines)
    - KCM Materials Management/ Supply
    - KCM Hospitals
    - Capital Projects (when necessary)

2.2.2 KCM Corporate SHE Policy

KCM have adopted a SHE Policy (see below), which is consistent with the AA plc SHE Policy. KCM has developed its own environmental policy that came into effect upon vesting in April 2000. KCM's SHE Policy is as follows:

Vision

Konkola Copper Mines plc aims to be a world leading copper and cobalt producer. It is our objective to provide attractive returns to our shareholders in a socially and environmentally responsible manner. Konkola Copper Mines will uphold the values of good corporate citizenship and seek to contribute to the wider economic, social and environmental well being of Zambia.

We are committed to the principles of sustainable development - which we take to mean **"development that meets the need of the present without compromising the ability of future generations to meet their own needs[1]"** because we believe it is fundamental to our long term success. We recognise that the full implications of sustainable development are still being explored by society and will be part of that process by pursuing practical ways of realising the concept.

This policy addresses the core challenges of safety, health and environment that we face as part of global business.

Aims

In order to give practical expression to our Vision and to measure our progress, we have the following aims:

Safety

- Prevent work-related injuries of employees and contractors.
- Benchmark our Safety Management System against international standards.

Occupational Health

- Identify, eliminate or control health risks in the workplace and the environment.
- Benchmark our operations against international standards with regard to the prevention, treatment and rehabilitation of disability and impairment which may arise in the course of an employee or contractors work.

[1] "Our Common Future" – Brundtland Report, 1987

Environment

- Conserve environmental resources.
- Prevent or minimise adverse impacts arising from our operations.
- Demonstrate active stewardship of land and biodiversity.
- Promote good relationships with and enhance the capacities of the local communities of which we are part.
- Respect people's culture and heritage.

Management Principles

➢ Commitment

Senior executives, line management and all employees are accountable for safety, occupational health and environmental issues. Management will allocate adequate financial and human resources to ensure that these issues are dealt with in a manner that reflects their high priority.

➢ Competence

Ensure the work force has the appropriate qualifications, skills and safety knowledge to undertake their duties in a responsible and safe manner.

➢ Risk Assessment

Identify, assess and prioritise the hazards and risks associated with all operational activities.

➢ Prevention and Control

Prevent, minimise or control priority risk through planning, design, investment, monitoring, surveillance, management and workplace procedures. Test emergency response plans. Investigate root causes and take remedial action.

➢ Performance

Set appropriate goals, objectives, targets and performance indicators for all operations. Meet all applicable laws and regulations as a minimum and, where appropriate, apply international best practice.

➢ Evaluation

Monitor, review and confirm the effectiveness of management and workplace performance against company standards, objectives,, target and applicable legal requirement.

➢ **Stakeholders Engagement**

Promote and maintain open constructive dialogue and good working relations with employees, local communities, regulatory agencies, business organisations and other affected and interested parties.

➢ **Continual Improvement**

Foster creativity and innovation in the management and performance of our business and our approach to solving the challenges facing our company. Support research and development into safety, health and environmental issues, and promote the implementation of international best practice and technologies where appropriate.

➢ **Medical and Occupational Health Services**

Provide free healthcare benefits for all employees and their dependants at the company's hospitals. Ensure that occupational health services consist of medical and industrial hygiene components. Provide medical services to the surrounding community on a marginal cost recovery basis.

2.2.3 Key Corporate Objectives

The Company is committed to the following:

- Provide an attractive return to shareholders;
- Aim to become a world class, low cost producer;
- Become the preferred employer in the Zambia copper industry;
- Conduct its business in the most responsible manner by efficiently exploiting the resources available to the Company;
- Undertake a rehabilitation programme of plant and equipment and the environment;
- Optimise future resources available in all its operating units by investment in exploration drilling and research and development;
- Inject additional skills in the short term in order to accelerate the rehabilitation programme and to undertake retraining and development of the Zambian workforce;
- Encourage, promote and support local businesses and suppliers of goods and services;
- Adopt a responsible position in the community with regard to the environment, both physical and social; and
- Introduce new industrial safety and community health programmes.

2.2.4 Funding of the SHE Management Programme

KCM is committed to ensuring that adequate funding is made available to fund its SHE management programmes. The possible categories of environmental and social expenditure during the various phases of the project are summarised in Table 2.1 and 2.2.

No attempt has been made to estimate the costs associated with compensation claims, which could result from damage caused in the past. KCM is contractually indemnified from such claims.

Table 2.1 - Categories of Environmental Expenditure and Cost Estimate

Environmental Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issue	**Examples of Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
PHASE: REFURBISHMENT (CONSTRUCTION)					
More detailed investigations to develop KCM final EMP and SMP plans	Soil contamination survey	Capital	KCM	Yes	±US $ 2 100 000 Budget for consultants etc.
Upgrading of existing infrastructure to achieve environmental compliance	Tailings leach plant refurbishment	Capital	KCM	No	Part of the overall project refurbishment capital. The environmental component cannot be easily separated out.
Upgrading of existing infrastructure to achieve safety and health compliance	Improved fire fighting systems	Capital/ Operating	KCM	Yes	±US $ 17 000 000 Costed as part of initial compliance audit (see Section 3.3.4)
Erosion control measures at Nchanga overburden dumps	Perimeter bund walls	Capital	KCM	Yes	±US $ 2 200 000 Preliminary cost estimate based on pre-vesting study (see Section 3.2.5)
Construction of new infrastructure in accordance with requirements	New KDMP concentrator	Capital	KCM	No	Part of the overall project expansion capital. The SHE component cannot be easily separated out.
Decommissioning and closure of defunct facilities and removal of historical waste	Kakosa tailings dam, High grade leach plant	-	ZCCM-IH	Yes	±US $ 5 700 000 Preliminary cost estimate determined via a pre-vesting audit (see Section 3.2.4)
Rehabilitation of environmental damage caused in the past	Soil contamination	-	ZCCM-IH	No	Scope not yet adequately defined.

Environmental Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issue	**Examples of Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
PHASE: OPERATIONAL					
Progressive rehabilitation	Vegetating the sides of tailings dams	Operating	KCM	Yes	Included in site-specific Decommissioning and Closure Plans (see Volumes 2 to 5)
Operational control	Desilting of settling ponds	Operating	KCM	No	Part of facility-specific budget. The SHE component cannot be easily separated out.
Maintenance of erosion control measures at Nchanga overburden dumps	Desilting of toe paddocks	Operating	KCM	Yes	±US $ 250 000/ annum until closure and for three years thereafter Preliminary cost estimate based on pre-vesting study (see Section 3.2.5)
Management and monitoring	Environmental monitoring	Operating	KCM	Yes	±US $ 1 200 000/ annum SHE Department budget including appointment of Social Manager.
RAMP-K Project (see Section 4.4 for description)	Training programmes	Operating	KCM	Yes	±US $ 350 000 Approved budget
SHE Projects	Improved waste collection systems	Capital	KCM	Yes	±US $ 300 000/ annum SHE Department capital budget,
PHASE: DECOMMISSIONING AND CLOSURE					
Final decommissioning and closure of facilities	Demolition of infrastructure	Closure fund	KCM	Yes	Included in site-specific Decommissioning and Closure Plans (see Volumes 2 to 5)
PHASE: POST CLOSURE					
Monitoring and maintenance for a three-year period.	Environmental monitoring	Closure fund	KCM	Yes	Included in site-specific Decommissioning and Closure Plan (see Volumes 2 to 5)

Table 2.2 - Categories of Social Expenditure and Cost Estimate

Social Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issues	**Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
PHASE: SYSTEMS DEVELOPMENT (CONSTRUCTION)					
Employment and Retrenchment	Retrenchment training feasibility study and curriculum development	Operating	KCM	Yes	Part of existing operating cost budgets
	Development of service conditions for contractors	Operating	KCM	No	Part of existing operating cost budgets
Local Economic Development	Development of local procurement strategy, procedures.	Operating	KCM	Yes	Part of existing operating cost budgets .
	Establishment of Business Development Centre (materials, equipment, publishing, refurbishment)	Capital	KCM	Yes	±US 30 000 Costed as part of Economic Diversification Strategy
	Establishment of Economic Diversification Strategy and Fund	Capital	KCM	Yes	±US $ 100 000 budget
Land Use and Settlement	Development and compilation of a database of settlement residents	Capital	KCM	Yes	±US $ 10 000 Budget for consultants etc. and in-house expertise
	Undertaking more detailed studies of land use and implementation of sustainable land use management system.	Operating	KCM	No	Part of existing SHE operating cost budget
	Clarification of land ownership boundaries, production of maps and distribution. New signs erected on boundaries and hazardous areas.	Operating	KCM	No	Part of existing SHE operating cost budget.
	Development of economic displacement plan for contractor village and other KDMP development issues.	Capital	KCM	Yes	±US $ 20 000 Study will determine costs for securing new land for current land users.

Social Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issues	**Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
Education and Training	Investigation of economic viability of creating independent Trust Schools	Capital	KCM	Yes	±US $ 10 000
	Provision of bursaries to School of Mining and Engineering	Operating	KCM	No	Part of existing operating cost budgets.
	Feasibility study for establishment of a technical college using the contractor village.	Capital	KCM	Yes	±US $ 50 000 Budget for consultants etc.
	Establishment of environmental awareness programme and publication of materials.	Operating	KCM	No	Part of existing operating cost budgets
Heath and Welfare	Continued collaboration with Government on provision of medical services and programmes such as malaria spraying.	Operating	KCM	Yes	±US $ 250 000 Funds already allocated.
	Design and implementation of HIV/AIDS strategy.	Capital	KCM	No	Already allocated for prevalence survey Require funds for awareness programme.
	Continued support to clubs until new measures implemented.	Operating	KCM	No	Part of existing operating cost budgets.
	Feasibility study for all clubs and recreational facilities on an individual basis.	Operating	KCM	Yes	Part of existing operating cost budgets
Disclosure and Consultation	Consultative Forums (2 years)	Operating	KCM	Yes	±US $ 35 000 Budget for consultants, materials etc
	Database development	Capital	KCM	No	Part of existing SHE operating cost budget
	Setting up of complaints and comments system	Capital	KCM	No	Part of existing SHE operating cost budget
	Communications material development and publication	Operating	KCM	No	Part of existing SHE operating cost budget

Social Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issues	**Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
Training and Capacity Building	Management Training workshops	Capital	KCM	No	Part of existing SHE operating cost budget
	Training for Social Management team	Capital	KCM	No	Part of existing SHE operating cost budget
Establishment of Corporate Citizenship Unit	Audit of KCM social expenditure	Operating	KCM	Yes	Will be done in the Financial Department
Konkola Resettlement	Implementation of the Resettlement Action Plan (RAP)	-	ZCCM-IH	Yes	±US $ 2 000 000 Approved budget.
PHASE: OPERATIONAL					
Social Development	Implementation of Social Development Plan for Konkola Resettlement	Capital	ZCCM	Yes	±US $ 85 000 allocated. ±US $ 140 000 from contingency fund Part of RAP implementation.
Employment and Retrenchment	Implementation of retrenchment training.	Operating	KCM	No	Depends on split between in-house and outsourced services.
Local Economic Development	Operation of Employment Centre.	Operating	KCM	No	Costed as part of Economic Diversification Strategy
	Implementation of Economic Diversification Strategy and Fund	Capital	KCM	No	Costed as part of Economic Diversification Strategy
Land Use and Settlement	Maintenance of a database of settlement residents.	Operating	KCM	No	Part of existing SHE operating cost budget
	Monitoring of land use and settlements and patrolling of hazardous areas.	Operating	KCM	No	Part of existing SHE operating cost budget
Education and Training	Operation of Trust Schools until alternative management is secured by closure	Capital	KCM	No	Part of existing operating cost budget
	Provision of bursaries to School of Mining and Engineering	Operating	KCM	No	Part of existing operating cost budget

Social Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issues	**Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
	Management of environmental awareness programme and publication of materials.	Operating	KCM	No	Part of existing operating cost budget
Health and Welfare	Operation of medical facilities and collaboration with Government.	Operating	KCM	No	Part of existing operating cost budget
	Implementation of HIV/Aids intervention.	Operating	KCM	No	Depends on feasibility study
	Continued support to clubs until new measures implemented.	Operating	KCM	No	Part of existing operating cost budget
Disclosure and Consultation	Consultative Forums (2 years)	Capital	KCM	Yes	±US $ 35 000 / year Budget for facilitators, materials etc
	Communications material development and publication	Operating	KCM	No	Part of existing SHE operating cost budget
Management of Corporate Citizenship Unit	On-going audit of KCM social expenditure	Operating	KCM	No	Part of existing operating cost budget Will be done in the Financial Department
	Feasibility study of a KCM Corporate Foundation	Capital	KCM	Yes	±US $ 10 000
Monitoring and evaluation	Six-monthly internal evaluation against targets	Operating	KCM	Yes	Included in SHE operation's costs.
	Annual evaluation against targets	Operating	KCM	Yes	Included in SHE operation's costs. Costs will be incurred if external evaluation is done.
	Annual benchmarking report	Operating	KCM	Yes	±US $ 20 000 / annum
PHASE: DECOMMISSIONING AND CLOSURE					
Final decommissioning and closure of facilities, retrenchment training etc.	Feasibility study for handover of suitable infrastructure.	Closure fund	KCM	Yes	Included in site-specific Decommissioning and Closure Plans

Social Expenditure		Cost Type	Resp. for Costs	Cost Estimate	
Management Issues	**Management Actions**			**Separately Costed?**	**Approximate Cost/ Comment**
PHASE: POST CLOSURE					
Monitoring and maintenance for a three-year period.	Social monitoring	Closure fund	KCM	Yes	Included in site-specific Decom. and Closure Plan (see Volumes 2 to 5)

2.3 Legal and Other Requirements

Zambian legal requirements, contractual agreements governing the privatisation process and IFC/ World Bank policies and guidelines have had important bearing on the contents of the various documents submitted to date and, in particular, on the management actions outlined in the environmental and social management plans.

2.3.1 Contractual Agreements

The transfer of ownership of the ZCCM assets to KCM was in terms of a Development Agreement under the Mines and Minerals Act. Table 2.3 illustrates, in simple terms, the overall environmental management process set in place by the agreement.

The Development Agreement contains specific references to how the Zambian legislation applies to cater for the transition period during which KCM is to manage environmental affairs. By virtue of the Development Agreement and pursuant to Statutory Instrument No 19 of 2000 (the Mines and Minerals (Environmental) (Exemption) Order, 1999), KCM has been granted a temporary derogation from the standards set out in legislation provided that KCM is not in breach of its applicable environmental plan. During this period , GRZ will not take any action to secure KCM's compliance with environmental laws earlier or to a greater extent than agreed in KCM's environmental plans or impose fines or other penalties upon KCM. Once KCM has brought its operations into compliance with legislative standards then general legislation will apply, stabilised under the Development Agreement to apply in the form in force on 31 March 2000. During the Stability Period, GRZ has undertaken not to effect changes to the environmental laws which:

- prevent KCM from complying with its environmental and social plans;
- materially effect the maintenance or operation of the Environmental Protection Fund; or
- impose requirements that are more onerous than those specified in the environmental plans.

In terms of the vesting contracts KCM was required to determine within 24 months the full extent to which the facilities are non-compliant with Zambian legislation and IFC policies. During this period, justifiable site-specific environmental and social standards needed to be negotiated and agreed with IFC and GRZ, where necessary. The results of the investigation and negotiations and the mitigation measures necessary to achieve the agreed standards are contained in the EMPs and SMPs contained in this Environmental Assessment.

KCM is committed to meeting GRZ and IFC/World Bank requirements for their facilities with 3 years of vesting, i.e. by 31 March 2003.

Table 2.3 - Environmental Management and Performance during Different Time Periods

	Project Time Periods		
	Take over	**Year 2**	**Year 3**
	"Implementation Period"		"Normal Operation"
EMP to be followed:	IEMP	Final EMP	Final EMP
Main environmental management requirements contained in EMPs:	• Improve performance, where practical. • Maintain existing controls. • Undertake further investigations, where necessary. • Decommission and close defunct facilities. • Compile Final EMP.	• Complete outstanding rehabilitation. • Complete upgrading.	• Undertake progressive rehabilitation. • Decommission and close facilities
Environmental performance:	• Best performance possible with management actions outlined in the Interim EMP in place. • Full legal compliance cannot be guaranteed, since upgrading will only just have been started.	• Best performance possible with management actions outlined in the Final EMP in place. • Full compliance with Zambian law and IFC requirements cannot be guaranteed, since upgrading will only be complete at the end of the period.	• Full compliance with Zambian law, unless amended in terms of the Final EMP. (Relaxation of the ambient air quality standards for SmelterCo is the only amendment currently anticipated). • Full compliance with IFC requirements

2.3.2 Zambian Legislation and IFC Guidelines

A survey of Zambian legislation and the IFC/ World Bank policies and guidelines was undertaken as part of the EA process for the original KDMP to identify the requirements for environmental protection. The following Acts were surveyed:

- Actions for Smoke Damage (Prohibition) Act Cap.327 of the Laws of Zambia.
- The Bancroft Mine Township By-Laws.
- Electricity Act No. 15 of 1995.
- Energy Regulation Act No.16 of 1995.
- The Environmental Protection and Pollution Control Act No.12 of 1990 and its regulations, including:
  - the Environmental Protection and Pollution Control (Environmental Impact Assessment Regulations, 1997);
  - the Air Pollution Control (Licensing and Emission Standards) Regulations, SI No. 141 of 1996;
  - the Water Pollution Control (Effluent and Waste Water) Regulations SI No.72 of 1993;
  - the Pesticides and Toxic Substances Regulations SI No. 20 of 1994, and
  - the Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations 1993.
- Explosives Act Cap.102 of the Laws of Zambia.
- Forests Act Cap. 311 of the Laws of Zambia.

- The Ionising Radiation Act Cap.552 and its regulations,
  - the Ionising Radiation Protection Regulations SI. No. 171 of 1992.
- The Investment Act No.39 of 1993.
- The Land Act No.29 of 1995.
- The Local Administration Act No. 15 of 1980 and its regulations,
  - the Local Administration (Trade Effluent) Regulations SI No. 161 of 1985.
- The Local Government Act No.22 of 1991.
- The Mines and Mineral Act No.31 of 1995 and its mining regulations,
  - the Mines and Minerals (Environmental) Regulations SI. No.29 of 1997; and
  - the Mining (Mineral Resources Extraction) Regulations SI No.119 of 1994.
- The Mufulira Mine Township By-Laws.
- The National Heritage Conservation Commission Act No.23 of 1989.
- The National Parks and Wildlife Act No.10 of 1991.
- Pneumoconiosis Act Cap.326 of the Law of Zambia.
- Public Health Act Cap.535 of the Laws of Zambia.
- Town and Country Planning Act Cap. 475.
- Water Act Cap. 312 of the Laws of Zambia.

The Mining and Minerals (Environmental) Regulations SSI No. 29 of 1997 outlines the process to be followed in producing an EIS for project approval by the Zambian authorities. The Mines Safety Department administers these regulations. In the case of mining projects the requirements of the Mining Environmental Regulations have precedence over the Environmental Protection and Pollution Control Regulations. The latter regulations outline the EIA process to be followed for non-mining projects.

The following World Bank/ IFC polices and guidelines were considered:

- Procedure for the Environmental and Social Review of Projects, December 1998.
- Pollution Prevention and Abatement Handbook, 1998.
  - Base Metal and Iron Ore Mining; and
  - Copper Smelting.
- Operational Procedures/ Directives/ Policy Notes:
  - Environmental Assessment (OP 4.01), October 1998;
  - Natural Habitats (OP 4.04), November 1998;
  - Safety of Dams (OP 4.37), January 1999 daft version;
  - Involuntary Resettlement (OP 4.30), June 1990; and
  - Managing Cultural Property (OP 11.03), September 1986.
- Child and Forced Labour, March 1998.
- Environmental, Health and Safety Guidelines:
  - Forestry Operations: Logging
  - General Health and Safety
  - Guidelines for Hospitals
  - Polychlorinated Biphenyls (PCBs)

Other national and international standards were consulted for comparison or where no Zambian or World Bank/ IFC standards were available.

A summary of legal requirements applicable to the KCM Project is included in Appendix A of this volume. These legal requirements, particularly with regards to allowable discharge limits, will be referred to throughout other volumes.

SECTION 3

Approach to the Environmental and Social Investigations

TABLE OF CONTENTS

Page

LIST OF TABLES

3.0 APPROACH TO THE ENVIRONMENTAL AND SOCIAL INVESTIGATIONS

The history of the investigations associated with the KDMP and KNNN Project and more recently with the KCM Project commenced in January 1996 when the KDMP Consortium commissioned its environmental consultant, Envirolink, to undertake an Environmental Assessment (EA) of the original KDMP, which included the Mufulira smelter and refinery. The EA report for the original project was completed in draft in October 1997, but was never formally submitted for approval due to the changes in project scope outlined in Section 1.1, above.

In February 1999 ZCI commenced compilation of the environmental documentation, largely based on the existing information, for the KNNN Project (excluding KDMP) to gain approval from the Zambian authorities and its shareholders, including the IFC. This documentation was completed in July 1999, but was not submitted for approval, as the negotiations with GRZ were not finalised.

In line with the project developments outlined in Section 1.1.2 and 1.1.3, the KNNN documentation was then amended to reflect the KCM package and SmelterCo (initially the entire former Nkana operations). This documentation was completed in November 1999, and was placed on public display in Zambia and in Washington (IFC/ World Bank) from 24 November 1999 to 22 January 2000. The key components of this documentation are KCM and SmelterCo's Interim Environmental Management Plans (IEMPs) and Interim Social Management Plans (ISMPs) and the Resettlement Action Plan for KCM's Konkola Mine and the PCDP.

The original KDMP EA has been up-dated to include the latest developments in the feasibility study. This up-dated document, together with the information contained in additional specialist studies, has been used as the basis for the Final Environmental Management Plan (FEMP) and (FSMP).

The approach to developing the documentation outlined above is described in greater detail below.

3.1 Original KDMP Environmental Assessment

The approach adopted to develop the EA for the original KDMP was intended to satisfy the requirements of, amongst others, the GRZ and the IFC. The original KDMP documentation has been used for background information on the Konkola Mine site (Volume 2) as well as for other sites as applicable (Volumes 3, 4 and 5).

3.1.1 Public Consultation

A public consultation process was initiated as part of the environmental assessment process and commenced in March 1996 as part of the EA Scoping Phase. Consultations during the Scoping Phase included:

- meetings with representatives from the Zambian Ministry of Environment and Natural Resources, Ministry of Mines and the Environmental Council of Zambia;

- distribution to approximately 200 stakeholders of a "Summary Information Document" which outlined the proposed KDMP, the alternatives under consideration and some of the important facts about the project; and
- public and informal meetings with approximately 70 locally affected people and other stakeholders.

Minutes from these meetings were sent to the attendees and they accepted their contents. Written comments on the proposed project have been received from 27 stakeholders.

The results of the consultations during the Scoping Phase were recorded in a report which was, amongst others, issued to the consultants commissioned to undertake specialist studies. The issues were also summarised and incorporated into the Environmental Assessment.

Following the Scoping Phase, the Institute of Natural Resources – the specialist consultants appointed to undertake the social assessment – undertook further consultations with stakeholders. During an initial reconnaissance visit in February 1997 and fieldwork from mid-March to mid-May 1997, the following contacts with locally affected people and other stakeholders were established:

- **Key informant interviews** and public consultation with representatives of a broad range of interest groups were held. Key informants included personnel within local government and administrative systems, community leaders, mine officials, entrepreneurs and business people as well as non-governmental organisations (NGOs). The interviews were recorded in detailed notes taken by the interviewers.

- **Questionnaire surveys** of households in the various communities in the vicinity of the Konkola and Mufulira mines. The household questionnaire survey was primarily used to capture the profiles of various local socio-economic environments.

- **Participatory Rural Appraisal** i.e. group discussions using mapping, drawing, and the construction of matrices were used to generate information and to capture perspectives which might have been missed through the use of standard interview methods and questionnaire surveys.

- **Stakeholder Workshops** were held at Konkola and Mufulira towards the end of the study to facilitate transfer of information between stakeholders in the privatisation process, to provide feedback on the socio-economic assessment to date and to provide a forum to identify and discuss some possible solutions to key privatisation issues. These workshops were attended by a wide range of interest groups including representatives from government, community leaders, ZCCM and NGOs.

The above was undertaken by a multi-disciplinary team from the Institute of Natural Resources, specialist sub-consultants from the two Zambian universities and twelve Zambian assistants (mainly teachers).

In addition, public consultations were carried out under the auspices of ZCCM that primarily took the form of public meetings. These meetings did not identify any additional concerns.

3.1.2 Literature Surveys

Since the ZCCM mines have been in operation for many decades, there is a substantial volume of technical information available. However, it is only in relatively recently times that ZCCM has undertaken studies primarily focused on environmental management. The most significant of these studies are the Environmental Impact Statements (EISs) for each of the ZCCM Divisions which were completed in March 1997 to achieve compliance with new Zambian Mining Environmental Regulations. The main focus of these documents was the eventual decommissioning and closure of the existing operations. Subsequently many of the management recommendations have been outdated by the events surrounding the privatisation of the mines. However, the specialist baseline and environmental engineering studies undertaken to produce the EISs contain useful background information concerning the existing operations.

3.1.3 Specialist Investigations

The specialist investigations that were commissioned as part of the KDMP EA are listed in Table 3.1.

Table 3.1 - KDMP Environmental Assessment: Specialist Investigations

Field	Consultant/ Organisation
NEW INVESTIGATIONS:	
Socio-economic	Institute of Natural Resources, University of Natal (Pietermaritzburg) Assisted by: Copperbelt University (Kitwe), University of Zambia (Lusaka) and Integrated Planning Services (Pietermaritzburg)
Air quality	Environmental Management Services (Pretoria)
Community health	Health Technology Research Group, Medical Research Council (Cape Town)
Timber use	Loxton, Venn and Associates (Johannesburg)
Ecology	University of Zambia, Department of Biological Sciences (Lusaka)
Soil	University of Zambia, Department of Soil Science (Lusaka)
Occupational health and safety	Anglo American Corporation, Environmental Engineering Department (Johannesburg)
Metallurgical processes	Anglo American Research Laboratories (Johannesburg)
Groundwater	E. Martinelli and Associates (Johannesburg)
Residue deposits	Knight Piesold (Pty) Ltd (Johannesburg)
Infrastructure and water management	Steffen, Robertson and Kirsten (Johannesburg)
DIRECTLY ADOPTED FROM ZCCM EISs:	
Aquatic resources	Department of Fisheries (Kitwe)
Archaeology	Copperbelt Museum (Ndola)
Surface disturbance by underground mines	Steffen Robertson and Kirsten (Vancouver)
Geochemistry	Individual specialist (Vancouver)

In 1997, the areas covering the Konkola and Mufulira mines were over-flown and black and white and false-colour infrared aerial photographs obtained.

3.2 Pre-Vesting Environmental Investigations and Documents

The original KDMP investigations outlined above were focussed on the Konkola mine and Mufulira smelter and refinery. When ZCI commenced with the KNNN and KCM Project investigations (see Section 1.1.2) it was necessary to include the Nchanga, Nampundwe and Nkana mines in the environmental investigations required to gain approval. (The original Mufulira work is of no further use to KCM and has been made available to MCM). Throughout the KCM pre-vesting investigations all the facilities at Nkana were covered. Ultimately, only the work covering the SmelterCo assets became relevant to KCM, since the mining assets were sold to MCM (see Section 1.1.3).

3.2.1 Environmental Audit

The IFC's operating procedure (OP 4.01) requires an environmental assessment to be carried out for all projects. For a project at an existing "brownfield" site, such as KCM, the appropriate EA is an Environmental Audit (EA). This audit focuses on two elements: compliance with relevant regulations, guidelines and policies; and the nature and extent of environmental impacts. The KCM and SmelterCo operations have been classified as category A projects by the IFC. All category A projects must have an "Environmental Action Plan" (sometimes, as in this case, termed a Management Plan) which sets out mitigation measures with costs, schedules and responsibilities.

The suite of documentation prepared for the KCM Project comprised "audits" and interim environmental and social management plans for each site. The plans were interim in nature due to the urgency for ZCI to assume ownership following GRZ approval of the Heads of Agreement on the 26th October 1999.

The "audit" process adopted for the KCM Project entailed a review of available documentation and additional investigations designed to fill the information gaps.

3.2.1.1 Review of Available Documentation

The 1999 Environmental Audit has utilised relevant available documentation, the most significant being:

- The original KDMP Environmental Assessment (EA) and the public consultations and various specialist studies undertaken to support the EA. The original EA, which considered the Konkola mine and the Mufulira smelter and refinery, was reworked to accommodate subsequent developments in the privatisation process.

- The Environmental Impact Statements that were completed in March 1997 for all the ZCCM Divisions were referred to. During September to December 1998 audits on these Environmental Impact Statements were undertaken in accordance with the Zambian Mines and Minerals Environmental Regulations to assess whether they were being adequately implemented. The relevant information was extracted and included in the Environmental Audit documentation.

A literature review of technical papers dealing with mining in Zambia and the Copperbelt, in particular, was also undertaken.

3.2.1.2 Additional Investigations

Additional fieldwork and investigation were undertaken to supplement the readily available information. This work included:

- site inspections;
- a single campaign of water, soil and sediment sampling and analysis;
- analysis and interpretation of ZCCM's water and air quality monitoring data for approximately the past two years;
- additions to the scopes of work of the process design consultants appointed to undertake technical investigations to include environmental issues;
- a health and safety audit;
- an independent tailings dam safety review; and
- appointment of social specialists to assist with the compilation of an Interim Social Management Plan.

3.2.1.3 Structure of the Environmental Audit Documentation

Due to the complexity of the project it was decided not to present the information as a single report, but rather to present in the form of an "Environmental Audit" comprising a series of documents. The Audit comprised the following documents:

Table 3.2 - Structure of the Environmental Audit Documentation

	EXECUTIVE SUMMARY		
Part A:	BACKGROUND	Volume 1:	Environmental Assessment – Konkola
		Volume 2:	Descriptions of Current Operations and Environmental Baseline 2.1 Nchanga 2.2 Nampundwe
		Volume 3:	Health and Safety Audit
Part B:	INTERIM MANAGEMENT PLANS	Volume 1:	Interim Environmental Management Plan (IEMP)
		Volume 2:	Interim Social Management Plan (ISMP)

The management actions outlined in the IEMP and ISMP form part of the contractual agreements with the GRZ and were followed whilst the final management plans presented in this Environmental Assessment were being developed.

The IEMP and ISMP were focussed on:

- the environmental issues which need to be addressed and the financial responsibility for addressing these issues;
- the management actions to be implemented during approximately the first two years following take-over; and
- the principles to be adopted in developing the final, life-of-mine Environmental Management Plans.

At the time parallel sets of documentation were prepared for the KCM operations and for all the operational facilities at the former Nkana Division. SmelterCo has been implementing the sections of the Nkana IEMP and ISMP relevant to its facilities.

3.2.2 Resettlement Action Plan

The KDMP will result in additional tailings production that will necessitate the raising of the embankment of the Lubengele Tailings Dam by 10m. The water level on the raised dam, in the event of a 1:100 year storm event, will inundate existing dwellings in Kawama village and Ming'omba informal settlement thus necessitating the resettlement of the effected villages. This necessitated the preparation of a Resettlement Action Plan (RAP) in terms of the World Bank Operational Directive 4.30. The Institute of Natural Resources (INR) was appointed to lead a consortium of resettlement specialists to carry out the necessary fieldwork and to prepare the documentation for approval.

The fieldwork was carried out during November and December 1999, during which time a team of enumerators embarked on a process of consultation and consensus building among the affected residents and community and leadership organisations. This lead to a process of site selection for alternative settlements and it was agreed that the affected Kawama residents would be relocated within Kawama, while the affected residents in Ming'omba will move to a site near the border town of Kasumbalesa. In addition there are a few freehold farms that are affected, that will be acquired by KCM, based on purchase at market related values. All resettlement will be based on replacement dwellings being provided and full compensation being made for loss of fruit trees and other immovable assets.

A report titled "Resettlement Action Plan - Ming'omba Village and affected portions of Kawama Township and Momba Farms" dated February 2000 was produced and placed on public display in Zambia and Washington (IFC/ World Bank offices) as part of the approval process.

In terms of the vesting agreements the cost of the resettlement will be borne by ZCCM-IH. The resettlement process itself will, however, be managed by KCM.

3.2.3 Public Consultation and Disclosure

During the period November 1999 to January 2000, the next phase of the public consultation and disclosure process took place. The process primarily involved the public display of the Environmental Audit documentation (see Section 3.2.1) and the Resettlement Action Plan (see Section 3.2.2) on the mine sites, in Lusaka and at the IFC/ World Bank offices in Washington DC. An initial advertising campaign in Zambian newspapers was used to notify the public of the public display and to invite comments. This was followed by a series of key stakeholder meetings on each site interspersed with a poster and pamphlet distribution campaign.

A report titled "Public Consultation and Disclosure of the Environmental Audit" dated January 2000 was prepared and also placed on public display in Zambia and Washington.

3.2.4 Environmental Remedial Work Agreement

Negotiations between ZCI and ZCCM during the period up to July 1999 concluded that historical environmental damage would remain the responsibility of ZCCM (see Section 2.3.1). In order to identify the extent of ZCCM's responsibility and to assign a cost to the required work so as to enable ZCCM to source funding, a site inspection was held during July and August 1999. During this visit the sites requiring remedial action that are situated on land that was to become part of the KCM surface rights (although it was the KNNN Project at that time) were visited and the likely costs of the remedial work estimated.

A joint report, signed by ZCCM and representatives of ZCI, was prepared in August 1999 and subsequently amended in October 1999.

3.2.5 Nchanga Overburden Dump Rehabilitation

Prior to vesting it was recognised that the lack of rehabilitation of the overburden dumps at Nchanga represented a significant environmental liability. Owing to the relatively short operating life anticipated for the Nchanga open pit, KCM was unwilling to take responsibility for rehabilitating the overburden dumps to a state of permanent closure since at closure the dumps would primarily comprise overburden dumped during the historical operations.

In consultation with the Zambian authorities it was agreed that KCM's responsibility should be limited to installing and maintaining until three years after final closure control measures capable of arresting the release of silt eroding from the un-rehabilitated overburden dumps. KCM commissioned a study to determine the most appropriate method for containing the eroded material. The findings were presented in a report entitled: "Proposed Erosion Control Measures for the Nchanga and Block A Open Pit Overburden Dumps" (December 1999). The report outlines a system of bund walls and paddocks for containing the eroded material.

The report commissioned prior to vesting forms the basis of agreement between the Zambian authorities, the IFC and KCM whereby KCM will not be liable for rehabilitating the overburden dumps to a "walk away" state.

3.3 Post-Vesting Environmental Investigations and Documents

3.3.1 Final Environmental and Social Management Plans

In terms of KCM's vesting agreements, the company was only authorised to operate under the IEMP and ISMP for a 24-month period. Within a maximum period of 21 months (i.e. by 31 December 2001) KCM is required to develop a Final Environmental Management Plan (FEMP) and a Final Social Management Plan (FSMP). These Plans needed to outline the detailed "life of mine" environmental and social management and will supersede the IEMP and ISMP.

In terms of the vesting agreements it may not be possible to seek approval for KDMP from certain of the KCM shareholders or from potential financiers until the FEMP and FSMP have been completed. To avoid delaying the implementation of KDMP KCM has, therefore, opted to complete the final plans sooner than the contractual requirement. To achieve this timescale, the development of the final plans was initiated soon after vesting.

The development of the final plans entailed:

- identifying the planning and investigation required in terms of the IEMP and ISMP; and
- thoroughly reviewing the interim plans to determine any additional areas that would require expansion to achieve the content and level of detail required in the final plans.

The FEMP and FSMP need to include the management requirements for the KDMP.

3.3.1.1 Lead Environmental and Social Consultants

KCM appointed lead environmental and social consultants to undertake the development of this Environmental Assessment and, in particular, the FEMPs and FSMPs.

The Canadian offices of AMEC Earth & Environmental Limited were appointed to assist with the development of the FEMPs. AMEC's work entailed:

- a review of previous documents and literature and in particular, the original ZCCM Environmental Impact Statements (see Section 3.1.2);
- co-ordination of the specialist investigations (see Section 3.3.1.2); and
- compilation of the final Environmental Management Plans.

AMEC is one of the world's largest engineering firms with offices all over the globe. Each office brings their own experience and expertise to AMEC plc allowing them to provide services that are unmatched by their competitors. AMEC Earth & Environmental provides services in: environmental assessment and management, socio-economic and health assessment and management, capacity building, public consultation, institutional strengthening, environmental training, environmental monitoring, analytical laboratory services, and geotechnical and materials engineering.

AMEC offers a broad range of multi-disciplinary services to the mining sector. From project evaluation and development to mine closures helping clients achieve their objectives in all aspects of mining operations. Their experience extends from copper, gold, silver, lead, zinc, nickel, cobalt and platinum group metals through to potash and phosphate, diamonds, light metals and iron ore.

Khanya – Managing Rural Change (mrc) - of South Africa, in association with ZAPRA of Zambia, were appointed to facilitate the process of developing FSMPs. Key issues that need to be addressed were employment and retrenchment, social services, land use and settlement management and public consultations and disclosure. ZAPRA specialises in rural development with a specific focus on the development of rural arts and performance. In addition to the skills Khanya – mrc and ZAPRA provided extensive use was made of local facilitators and researchers and specialists from the School of the Built Environment located at the Copperbelt University.

Khanya – mrc specialise in social development with a focus on rural development. With experience throughout southern Africa as well as West Africa and East Africa Khanya - mrc aims to be a world class African company which is socially responsible, and which is recognised as making a significant contribution to transformation and development. Khanya – mrc works in the following way:

- in an action-learning partnership with our clients;

- building capacity in our clients and staff;
- promoting a culture of honesty, trust, sharing, transparency, accountability and participatory management, both internally and with our clients, evaluating ourselves and reporting on our performance;
- working through networks and partnerships, maximising cooperation in the SADC region; and
- integrating social, environmental, economic and institutional issues around sustainable development

Khanya – managing rural change work as partners with government, business, and civil society, to develop policies and implement sustained transformation of institutions to promote sustainable livelihoods for the rural poor. Khanya – mrc provides advice, facilitation, research, and training for rural development and change management for poverty eradication. When engaging the business sector Khanya - mrc integrates approaches to corporate citizenship with social development in a way that maximises both shareholder value and stakeholder value.

In simple terms, the methodology used by the social consultants entailed:

- review of previous reports and literature and, in particular, the Social Assessment undertaken for the original KDMP Environmental Assessment (see Table 3.1);
- data collection using the Sustainable Livelihoods Approach and Corporate Citizenship models;
- generation of social information using participatory methodologies from the micro – level (settlement) to the macro – level (Lusaka);
- stakeholder analysis; and
- establishment of consultative forums to discuss key issues.

3.3.1.2 Specialist Investigations

In preparation of the Final EMP, KCM commissioned a number of studies to fill information gaps identified in the IEMP. Table 3.3 provides a listing of the studies conducted in preparation for the final EMP.

Black and white and false colour infrared aerial photographs were obtained during 2000 for all the KCM sites, SmelterCo and the Kafue River in the vicinity of the Copperbelt operations.

Table 3.3 - Studies undertaken for the preparation of the Final EMP and Final SMP

Study	Consultant/ Organisation	Scope
Air quality	Environmental Management Services	• Design of an air quality monitoring network around SmelterCo smelter in Kitwe • Evaluation of historical air emissions from the SmelterCo Smelter and modelling of future emission levels.
Soil contamination	African Mining Consultants	• Delineation of soil contamination at each site and development of mitigation strategy.
Mine waste management	Knight Piésold	• Development of tailings disposal management plans for each site, including emergency and contingency plans.
Hydrogeology	Water Management Consultants	• Delineation of groundwater conditions at each site. • Development of a groundwater monitoring programme.
Timber utilisation	Fractal Forest Africa/ Forest Wood	• Evaluation of the mines' current and future indigenous timber utilisation in the context of the regional timber utilisation and availability. • Assessment of alternatives to indigenous timber.
Fish contamination	RauEcon Biomonitoring	• Possible human health risk assessment from the consumption of fish from the Lubengele and Muntimpa tailings.
Archaeology	Lusaka National Museum	• Assessment of two known archaeological site within the Lubengele tailings impoundment that will be inundated with the expansion of the dam. • Includes recording and/ or removal of valuable artefacts in accordance with Zambian regulations. • Archaeological investigations are also required in the proposed Ming'omba resettlement area to determine whether or not there are any sites of archaeological significance.
Acid rock drainage	CSIR	• Compilation and review of all past work on ARD and geochemistry at all site • Gaps to be filled with collection and testing of additional samples.
Water monitoring	Anglo Coal Environmental Services	• Review of current practices for site monitoring and development of improved techniques where required.
Water management	AMEC Earth & Environmental Limited	• Development of conceptual surface water management plans for each site, including the evaluation of existing storm water systems, emergency and contingency planning.
Social management plan	Khanya	• Development of social management plans for each site.
Site rehabilitation and closure plans	AMEC Earth & Environmental Limited	• Development of conceptual decommissioning and closure plans and estimation of associated costs.

3.3.2 Social Development Plan (Resettlement)

The Resettlement Action Plan prepared prior to vesting (see Section 3.2.2) contained an outline of the Social Development Plan (SDP) for the communities to be affected by the resettlement at KCM's Konkola Mine. However, it was recommended that a more detailed SDP be developed during the early stages of the RAP implementation.

A planning specialist from the Copperbelt University under the direction of Khanya was appointed to develop the SDP, which forms part of this Environmental Assessment (Volume 2.2C).

3.3.3 KDMP Environmental Assessment

The scopes of work of the specialist consultants listed in Table 3.3 have been expanded, where appropriate, to include the additional work required to assess the environmental and social implications of the KDMP feasibility study. These studies were used as the basis for the updating of the EA that was prepared in 1997, in order to bring it to a standard that is suitable for submission to the IFC. The revised EA forms part of Volume 2.

3.3.4 Health and Safety Legal Compliance Implementation Programme

In terms of the Development agreement (Part C, Section 12, Environmental issues, Clause 12.23), between the Government of the Republic of Zambia (GRZ) and KCM, a listing of safety and health legal non-compliance issues should be registered with the GRZ within one month following closure. Clause 12.24 requires that a preliminary programme, to address matters identified in respect of Clause 12.23, be submitted within three months with the intention to reach mutual agreement on a final implementation programme within a period of six months from vesting.

The requirements of Clause 12.23 were met by conducting a Mine Health and Safety Legal Compliance Audit that was submitted to the GRZ during April 2000. In recognition of the lead author, this report is commonly referred to as the "Guthrie Report".

Clause 12.25 of the Development Agreement specifies the provision of a timetable for the commencement of upgrades as soon as reasonably practicable, but not later than 12 months following closure, and the early completion of projects, having regard to the need to continue normal operations. This final version of the Implementation Programme is based on a rating of compliance infringements in relation to the potential severity and has been categorised as high, medium or low priority. The high priority projects were scheduled to start in July 2000 (8 months earlier then required by Clause 12.25) and the completion dates stipulated are deemed reasonable and realistic. The medium and low priority projects are scheduled to commence in January 2001 and January 2002, respectively. The intention is to complete all improvement projects by the end of 2002. It is possible, however, that a small proportion of the low priority projects (typically long-term training programmes) may extend beyond 2002.

3.3.5 Structure of the Environmental Assessment

This volume is one of five comprising the current KCM Environmental Assessment. The "Guide to the Environmental Assessment" at the front of this volume outlines the overall structure.

SECTION 4

Corporate Level SHE Management Plan

TABLE OF CONTENTS

Page

LIST OF FIGURES

4.0 CORPORATE LEVEL SHE MANAGEMENT PLAN

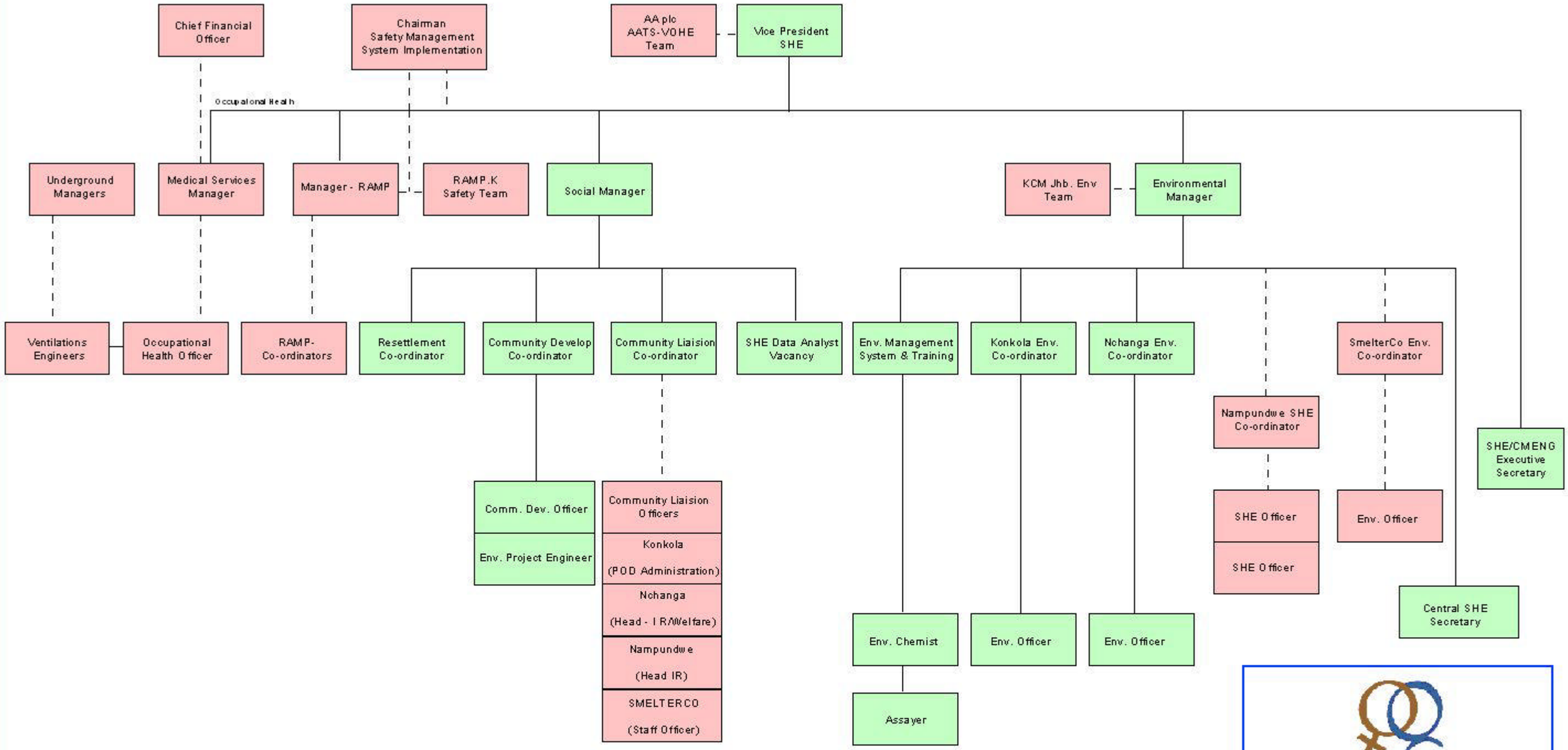
4.1 Resources and Structure

Figure 4.1 presents the overall management structure for KCM's SHE Department. The Department comprises a core team supported by resources within other departments. KCM are in the process of implementing a safety management system known as "Risk Awareness Management Program" (RAMP). In the case of safety management, dedicated RAMP Co-ordinators ("Safety Officers") are located within each operational area and are not centralised within the SHE Department. The SHE Department reports to the Vice President – Safety Health and Environment, who is a member of the company's Executive Committee.

The SHE Department comprises the following key personnel:

SHE		Vice President – SHE SHE Data Analyst
Occupational safety		Safety Manager *RAMP Co-ordinators*
Occupational health services		*Medical Services Manager* *Occupational Medical Practitioner*
Occupational hygiene		Occupational Hygiene Engineer *Ventilation Engineers*
Environment	Technical/ bio-physical	Environmental Manager Environmental Co-ordinators Environmental Officers EMS Co-ordinator
	Social	Social Manager Community Development Co-ordinator Community Development Officers Community Liaison Co-ordinator *Community Liaison Officers* Resettlement Co-ordinator

Italics = On another Department's strength



Konkola Copper Mines plc

ENVIRONMENTAL ASSESSMENT

Safety, Health and Environment Resource Structure

Figure 4.1

File Name: Vol1_fig4_1.pdf

Date: March 2001

4.2 Risk Management

4.2.1 Background

Business in Southern Africa is being transformed by many factors, including compliance to more stringent local legislative requirements and exposure to international standards. Measurements are needed that will enable managers to identify specific deficiencies that can be *corrected or controlled before accidents* and other losses occur. Much insight in this regard comes from current research.

Risk Management requires formal strategies that provide clear direction and control. In addition, *corporate governance*, initially a buzzword in Industry, is fast becoming a driving force in ensuring that business comply with a code of ethics, which should include:

- ensuring that behaviour of the corporation complies to the highest standards;
- being developed such that management and stakeholders are involved;
- receiving total commitment from the Board and CEO of the corporation; and
- being detailed enough so that it provides guidance for all employees.

Organisations should identify the relevant areas of risk, quantify those risks, prioritise them, determine those, which are deemed excessive, apply suitable treatment and controls, review the resultant risk profile and repeat the process.

The success of such an approach is dependent on the application of these principles. The techniques used are important, but ensuring that the process is followed to completion is the key to success. This can be demonstrated as shown on Figure 4.2.

The framework that organisations implement and the ongoing measurement of the continued application thereof should thus minimise business interruption, provide factual quantified information which can be used for decisions regarding risk management, contribute to risk reduction and provide opportunities for cost savings.

The three categories of risk assessment are:

Baseline Risk Assessment. This is an assessment of the entire organisation, all work, equipment, tools, materials, etc. are covered. The Baseline Risk Assessment is generally reviewed every 18 months to two years and the outcome is a “profile” of risks specific to the organisation (risk profile).

Issue Based or Pre-emptive Risk Assessments. In this instance the organisation assesses specialised or independent scenarios. Quite often these scenarios are identified through the Baseline Risk Assessment. They are simply called Issue Based / Pre-emptive because single issues / scenarios are assessed independently of one another. Issue based / pre-emptive assessments are also normally conducted prior to any change (method, equipment, supplier, material, etc.)

Continuous Risk Assessment. All personnel do these risk assessments daily. This category of risk assessment is used to ensure that risk control measures are properly communicated and

implemented. The techniques grouped under this category are not "sophisticated / complex" but rather tools that are easily used on a daily basis.

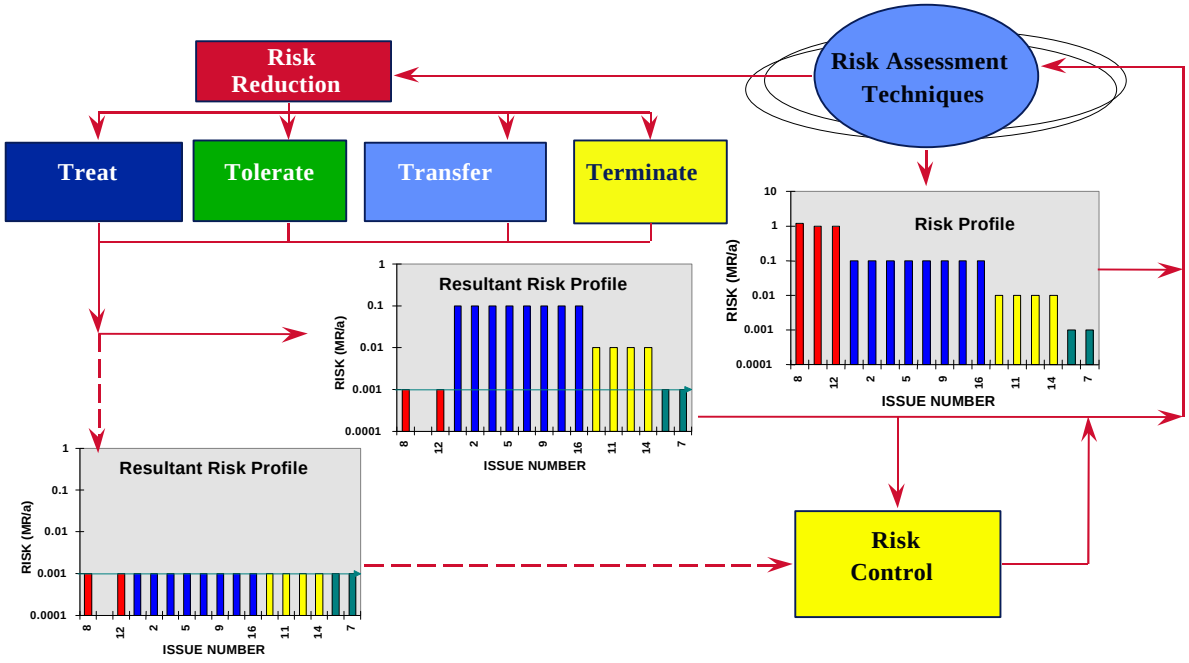


Figure 4.2 - The Risk Management Process

As previously mentioned (see Section 2.1) KCM is required to follow the requirements of the Turnbull Report which states:

> *"A company's system of internal control has a key role in the management of risks that are significant to the fulfilment of its business objectives. A sound system of internal control contributes to safeguarding the shareholders' investment and the company's assets".*

This has been one of the motivators in KCM's strategy to adopt a realistic approach in reducing its risks. This ensures a systematic approach where exposures are addressed according to their criticality in terms of risk. This process can be demonstrated by Figure 4.3.

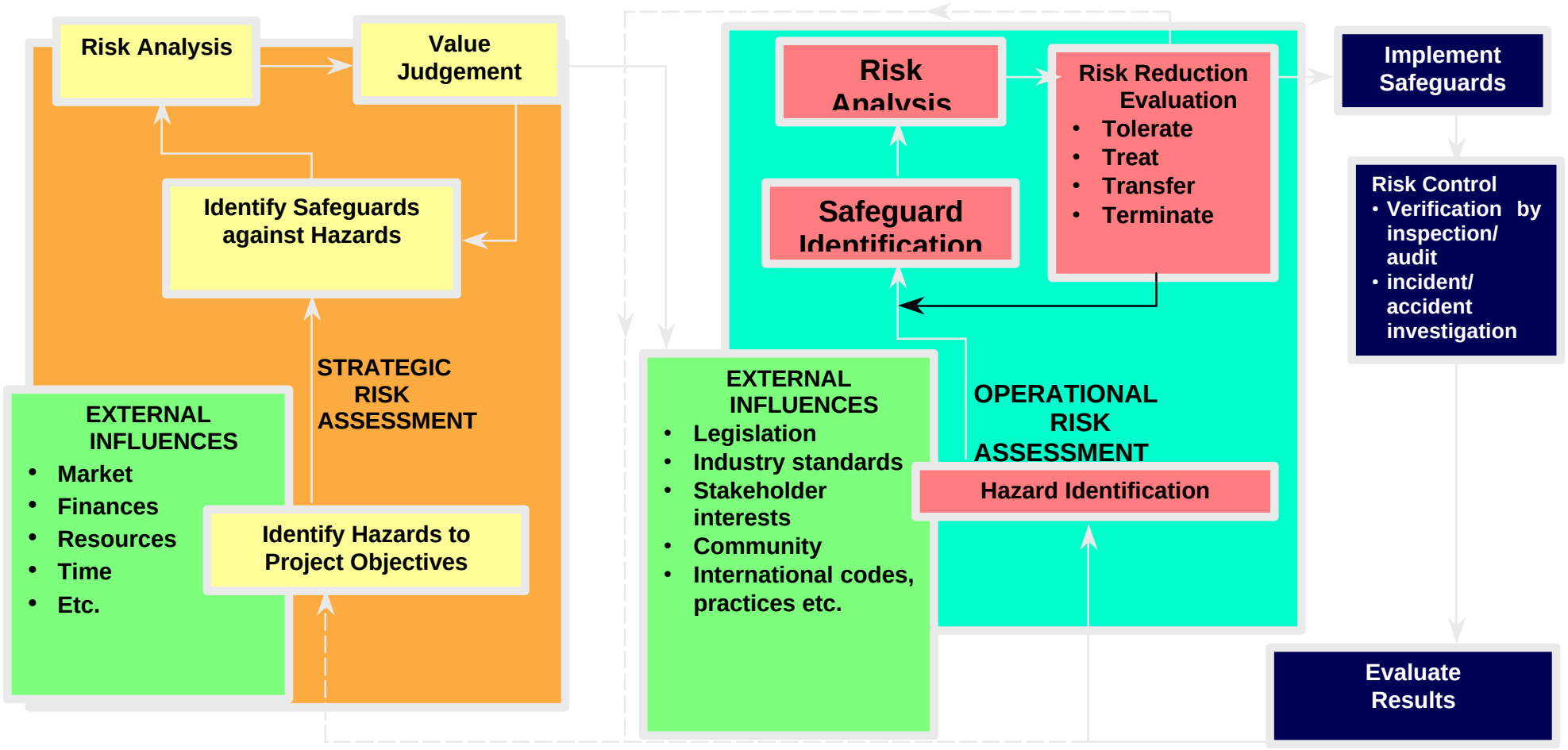


Figure 4.3 - Risk Assessment in Project Lifecycle

4.2.2 External Consultants

KCM approached a number of international consultants, to assist in the design, implementation and maintenance of the Risk Management System. After a thorough assessment KCM decided that International Risk Control Africa (IRCA) would best suit their needs.

IRCA's international risk assessment and auditing services provide organisations with the practical solutions that enable them to identify and manage risk exposure. They utilise and implement international methods and systems in partnership with their clients to ensure fully integrated systems and operational standards demanded by stakeholders.

4.3 Risk Awareness and Management Programme for KCM (RAMP.K)

KCM has embarked on a risk based approach to health and safety through a programme known as the Risk Awareness and Management Programme for KCM, in short, the RAMP.K. The programme is focused on two main areas:

1. To raise the awareness in all persons undertaking work for KCM of the risks that they may be exposed to in the course of doing their work and how best to manage those risks so as not to cause injury to themselves and those people that they may be in contact with; and

2. To equip people with skills for hazard identification and hazard management in all the work places at KCM.

The programme commenced in July 2000 with the training of a selected number of KCM trainers by experts contracted from IRCA. After the trainers were trained, they were deployed to various training centres in KCM where they in turn continued to conduct two day courses for all KCM employees including personnel employed by contractors. By March 2001, 18 000 persons had undergone safety awareness training which represents over 100% of the total number employed at KCM Mines and SmelterCo Plants.

The second critical part of the programme involved the training of a selected number of front line officials drawn from all KCM operations in the Baseline Risk Assessment Course (BRAC) The course was aimed at equipping employees with the skills to identify and document all hazards in their respective working areas and to make recommendations on what was required to be done in order to eliminate or minimise the risk that the hazard may pose.

The process of collecting and compiling data on hazards was completed during September 2000.

4.3.1 Core Systems

Once the Baseline Risk Assessments were completed for all the various sites, this information was analysed and the critical areas were identified. These critical areas were then related back to management systems to ensure the risk-based approach remained true. This will ultimately lead to a holistic, integrated management system which will take KCM to full certification in the future. This value chain is depicted on Figure 4.4.

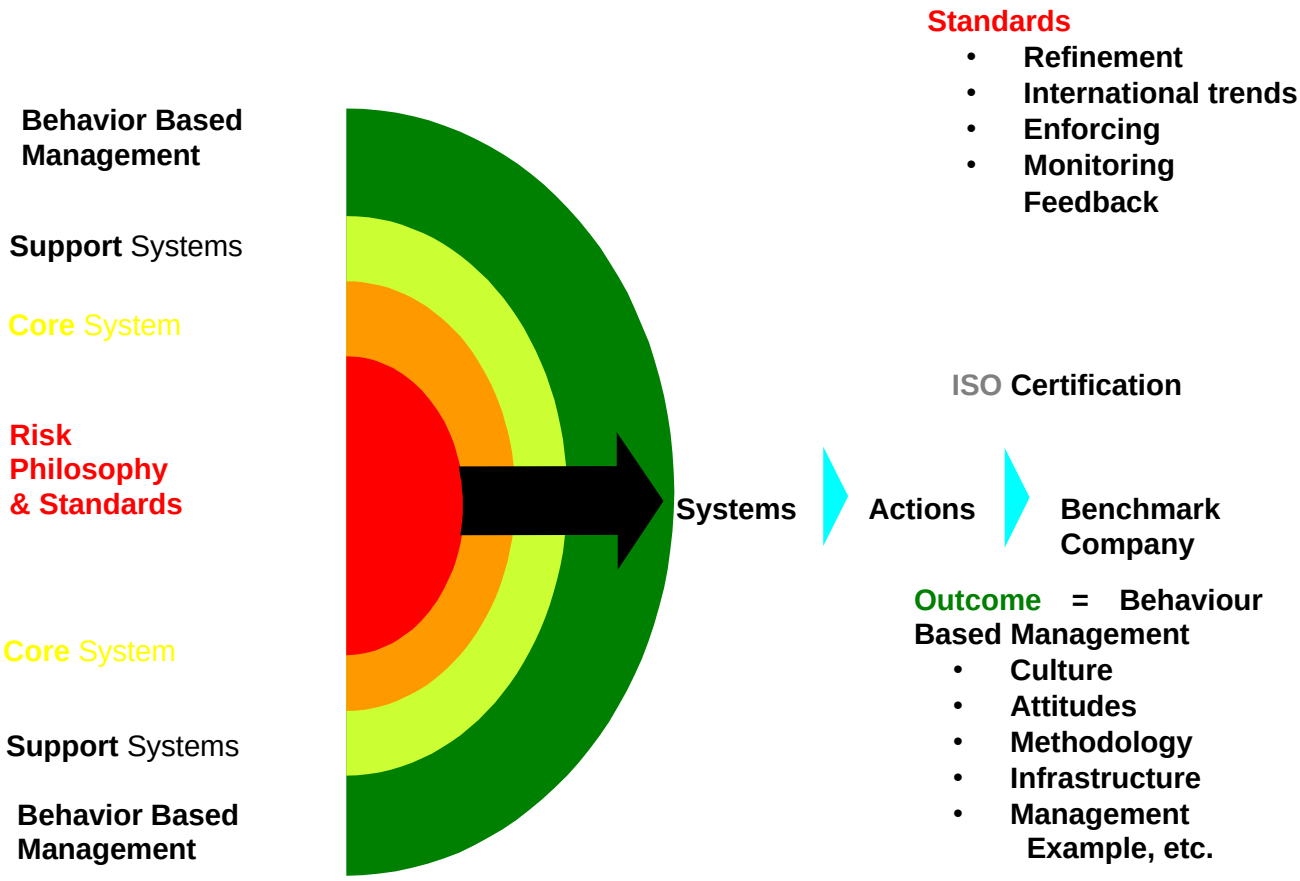


Figure 4.4 - KCM Value Chain

There were 5 critical systems identified from the Baseline Risk Assessments. However KCM had to ensure that it would ultimately have a complete management system and therefore based their approach on an internationally recognised process called the Common Audit Process (CAP™). This tool provides for a fully integrated Safety, Health, Environmental and Quality Management System.

Organisations using the CAP™ approach to audit their S-H-E-Q systems find they obtain significant reductions in the number and severity of incidents. Other benefits of using CAP™ are:

i. Identifies work needed to improve the site's SHEQ management systems.

ii. Measures work being done to improve the site's SHEQ management systems.

iii. Objectively quantifies work being done to prevent incidents and accidents from occurring.

iv. Identifies the vast majority of management system deficiencies, which could lead to incidents and accidents.

v. Finally and very importantly, CAP™ assists the site in developing systems to meet the requirements of external management system standards such as ISO 14001, ISP 9000, the Mine Health and Safety Act and others.

The elements of CAP™ can be summed up as follows:

1. Planning and Leadership
2. Training and Communications
3. Job And Operation Analysis and Controls
4. Change Management
5. Purchasing Systems
6. Work Rules and Operating Permits
7. Inspections
8. Occupational Health and Hygiene Systems
9. Personal Protective Equipment
10. Incident Investigation and Analysis
11. Emergency Preparedness
12. Audits and Reviews
13. Corrective and Preventive Action Systems
14. Environmental Management Systems
15. Quality Management Systems

4.3.2 Committees

Once KCM had identified the critical systems, focused committees were established that report on progress to the RAMP.K steering committee on a monthly basis. The 5 committees are:

Inspections Committee

This committee has defined an inspection hierarchy within KCM. This starts with senior management and goes down to the level of crew bosses.

The required intervals for conducting formal inspections were established as well as formats to record the findings. A route-map was laid down for these inspection forms to follow that ensures that full value is gained. Ultimately this system will provide an ongoing source of information to management to ensure that KCM can respond in a pro-active manner when exposures exist.

The committee has also identified critical inspections and are currently developing detailed checklists and procedures to ensure that these are addressed as a matter of urgency.

Work Rules and Operating Permits Committee

This committee has identified high risk work from the Baseline Risk Assessments and has started developing operating permits to ensure improved control. These high risk work areas include:

- Electrical lock-out
- Mobile Equipment Lock-outs
- Work over elevated places
- Hot work

The team is also in the process of identifying all external permits required. These include all legal requirements, exemptions and permissions granted, and any group standards that are applicable at this stage. Consideration will also be given to international standards and best practices.

Good Housekeeping Committee

This committee started off by identifying a list of critical areas that needed to be addressed. These are:

- Areas of responsibility
- Appointment letters
- Symbolic signs and colour coding
- Safety/fire notice board
- Refuse removal sites
- Mine specific safety statistics board
- Sanitation and plant hygiene amenities
- Lighting
- Buildings and floors
- Aisles and storage demarcation
- Stacking and storage
- Pollution control
- Waste and scrap handling

The guidelines for colour coding and symbolic signs have been completed and will shortly lead to a uniform approach within KCM. Several of the other critical areas guidelines are nearing completion for circulation and review.

Group Meetings Committee

This committee has developed a detailed procedure setting out the criteria for effective communication throughout KCM. This will ensure consistent communication lines for both top-down and bottom-up communication. Information communicated on a monthly basis will include:

- Safety and Production statistics;
- Safety Talk Topics;
- progress on systems development;
- “Hot Spots” identified during the month; and
- off-the-job safety issues.

- General

This process will ensure all employees are informed regarding safety issues and that they will be more focused to ensure continual improvement.

Accident/Incident Investigation Committee

This committee has developed a new incident investigation form that will ensure that all the required information is recorded when conducting an investigation. The focus will be on preventing a re-occurrence of a similar incident and this will be achieved through a systematic process to identify Root Causes. A procedure has also been developed to ensure a consistent approach is followed and that the investigation form will follow the correct route. A major loss announcement form has been developed to provide for the proper communication of such incidents.

This process will ensure that a pro-active culture is established in preventing re-occurrence of accidents and incidents.

4.3.3 Training

Several training courses have been completed and further courses have been scheduled. These courses are:-

Safety Awareness

The programme commenced in July 2000 with the training of a selected number of KCM trainers by experts contracted from International Risk Control Africa (IRCA). As at 13 January 2001, 18 375 persons had undergone safety awareness training which represents approximately 99% of the total number of employees at KCM Mines and SmelterCo Plants.

Baseline Risk Assessment Course (BRAC)

The second critical part of the programme involved the training of a selected number of front line officials drawn from all KCM operations in the Baseline Risk Assessment Course (BRAC). The course was aimed at equipping employees with the skills to identify and document all hazards in their respective working areas and to make recommendations on what was required to be done in order to eliminate or minimise the risk that the hazard may pose. The total employees trained amount to 182.

Root Cause Analysis Training (RCAT)

This specialist training is aimed at equipping key personnel with a technical tool that identifies root causes when conducting investigations that produced a major loss or with the potential of a major loss.

1st Course 12 – 14 December 2000
2nd Course 23 – 24 January 2001
3rd Course 30 January – 01 February 2001
4th Course 06 – 08 February 2001

Modern SHEQ Risk Management (MSRM)

This course provides practical techniques for planning, implementing and monitoring effective risk control management systems:

- how to identify and assess risks on a day-to-day basis;
- how to identify system activities that are effective for;
- managing risk and controlling risk, and which provide a basis for continuous improvement;
- how to apply professional management principles and techniques to design, develop and implement comprehensive risk control systems; and
- how to monitor and manage change within the organisation's risk control culture.

Course date 12 – 16 February 2001

Accredited CAP™ Auditors (ACA)

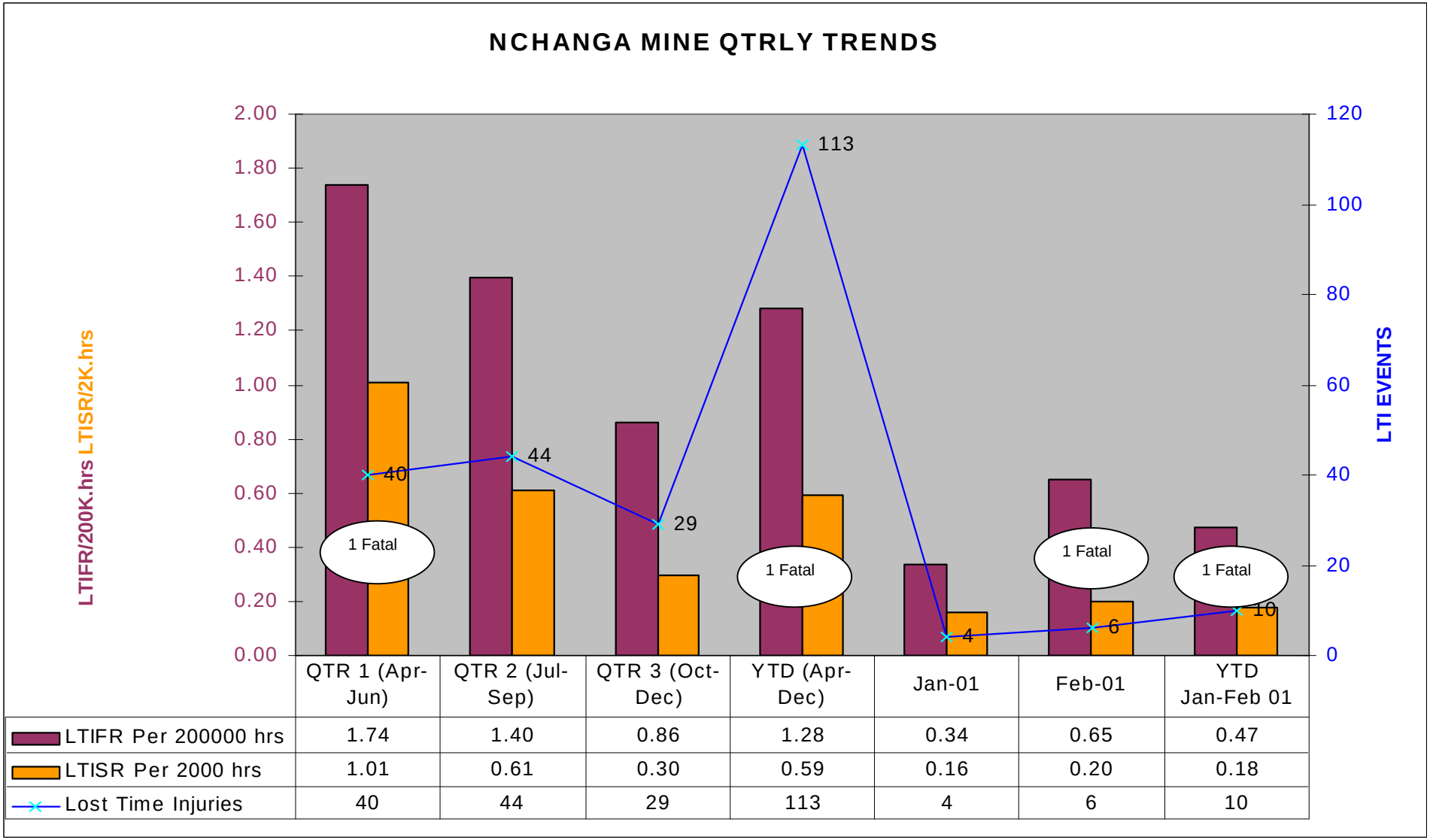
This training is aimed at providing selected employees with the knowledge, skill and understanding to conduct internal audits within KCM using CAP™.

Course date 19 – 23 February 2001

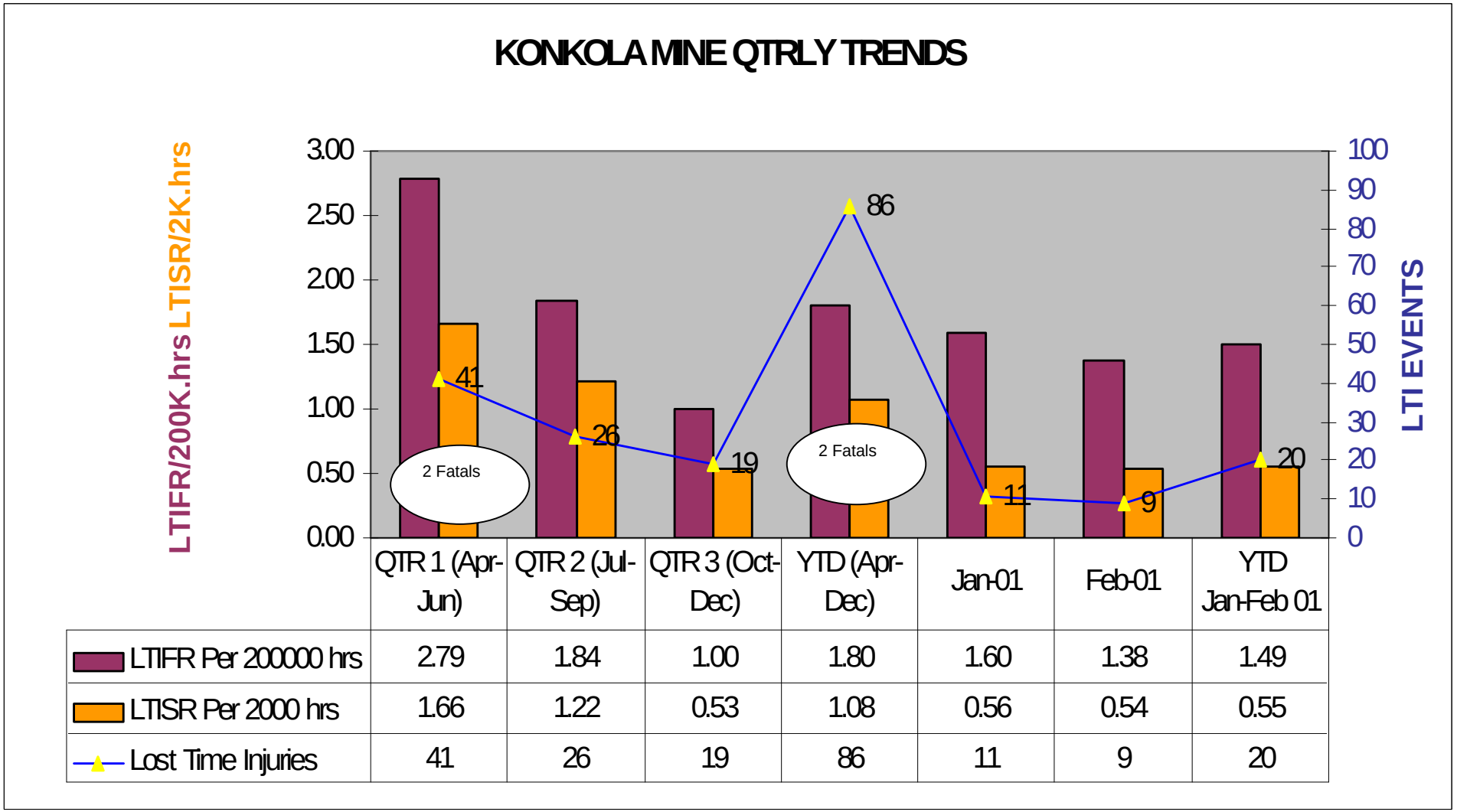
4.3.4 Safety Statistics

The graphs shown below indicate the safety statistics for the individual operations and the overall KCM results.

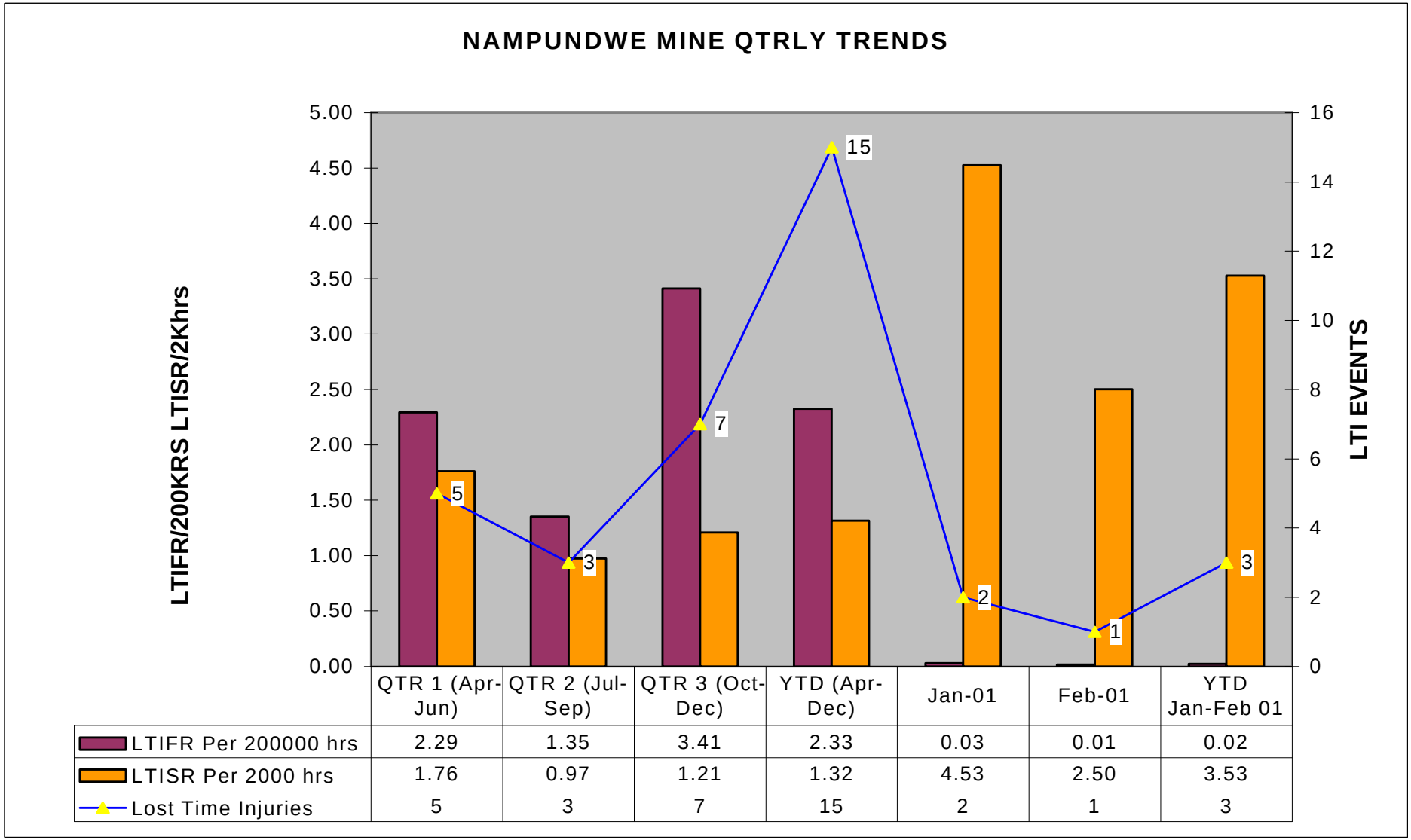
NCHANGA MINE QTRLY TRENDS



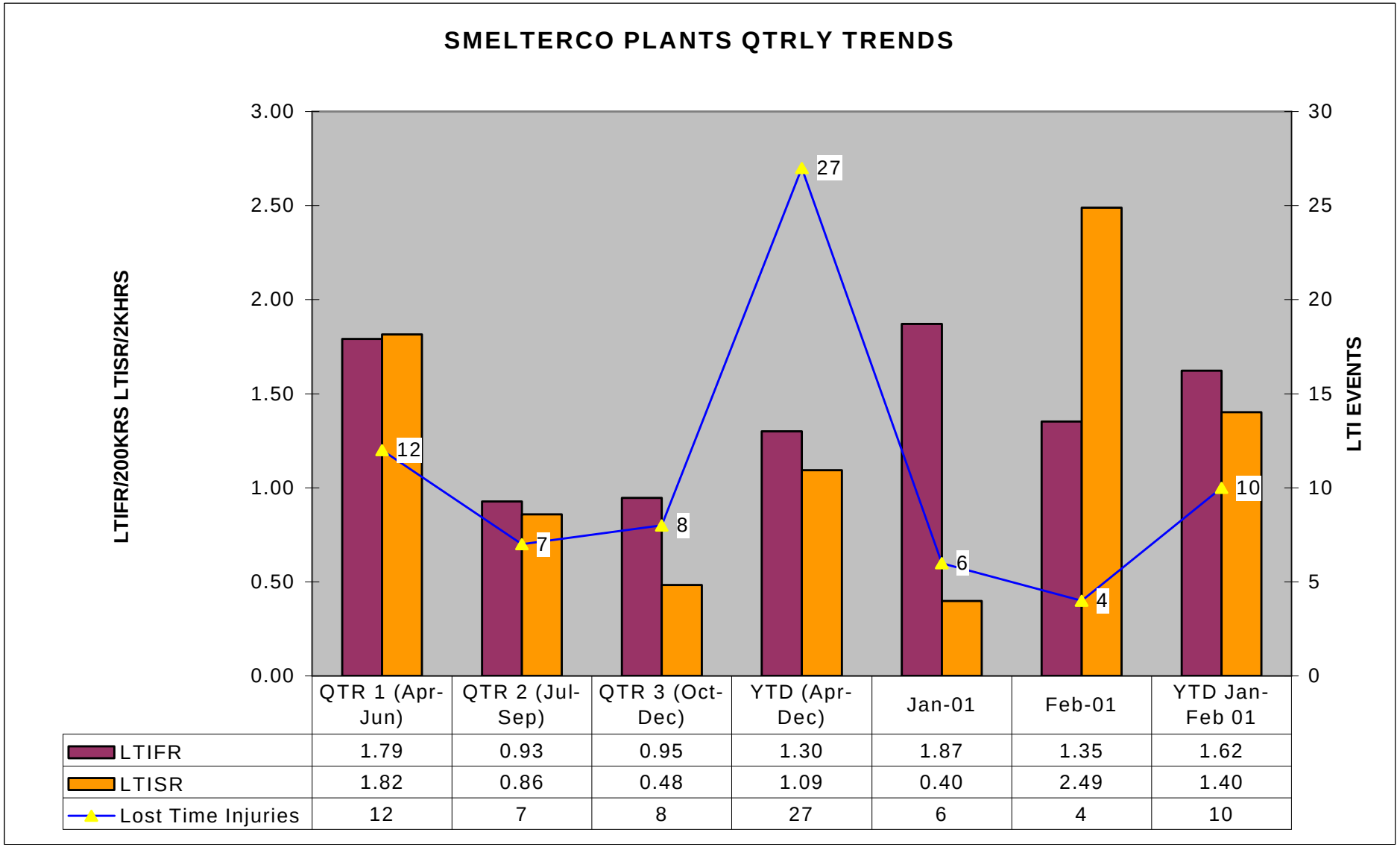
	QTR 1 (Apr-Jun)	QTR 2 (Jul-Sep)	QTR 3 (Oct-Dec)	YTD (Apr-Dec)	Jan-01	Feb-01	YTD Jan-Feb 01
LTIFR Per 200000 hrs	1.74	1.40	0.86	1.28	0.34	0.65	0.47
LTISR Per 2000 hrs	1.01	0.61	0.30	0.59	0.16	0.20	0.18
Lost Time Injuries	40	44	29	113	4	6	10



	QTR 1 (Apr-Jun)	QTR 2 (Jul-Sep)	QTR 3 (Oct-Dec)	YTD (Apr-Dec)	Jan-01	Feb-01	YTD Jan-Feb 01
LTIFR Per 200000 hrs	2.79	1.84	1.00	1.80	1.60	1.38	1.49
LTISR Per 2000 hrs	1.66	1.22	0.53	1.08	0.56	0.54	0.55
Lost Time Injuries	41	26	19	86	11	9	20



	QTR 1 (Apr-Jun)	QTR 2 (Jul-Sep)	QTR 3 (Oct-Dec)	YTD (Apr-Dec)	Jan-01	Feb-01	YTD Jan-Feb 01
LTIFR Per 200000 hrs	2.29	1.35	3.41	2.33	0.03	0.01	0.02
LTISR Per 2000 hrs	1.76	0.97	1.21	1.32	4.53	2.50	3.53
Lost Time Injuries	5	3	7	15	2	1	3



	QTR 1 (Apr-Jun)	QTR 2 (Jul-Sep)	QTR 3 (Oct-Dec)	YTD (Apr-Dec)	Jan-01	Feb-01	YTD Jan-Feb 01
LTIFR	1.79	0.93	0.95	1.30	1.87	1.35	1.62
LTISR	1.82	0.86	0.48	1.09	0.40	2.49	1.40
Lost Time Injuries	12	7	8	27	6	4	10

4.3.5 Continual Improvement

The process of development, implementation and review will continue for the remainder of the management systems in exactly the same manner outlined above. This process will become a routine cycle, which will lead to continual improvement as shown below:

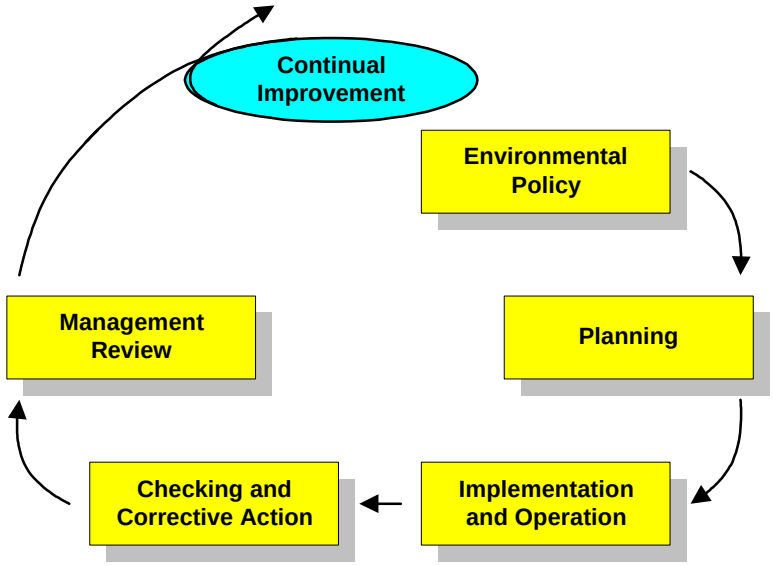


Figure 4.5 - The Continual Improvement Cycle

4.3.6 Electronic Business Management System (EBMS)

Ultimately, the management system will be accessible and maintained through the Electronic Business Management System (EBMS). This is a mechanism by which company policies and procedures or processes are documented and provided on-line to the users of these policies and procedures in the organisation.

The first step is to define a high-level Enterprise Process Model for the organisation/company. This is based on the current operation of the organisation/company and includes the strategic management processes and operational as well as support processes.

From this the lower level processes are then defined and mapped in detail, with clear responsibilities and decision authority identified in each process step. Process mapping is done together with those employees in the Department actually executing the work, ensuring buy-in. The Figure 4.6 below shows the different levels at which processes can be defined.

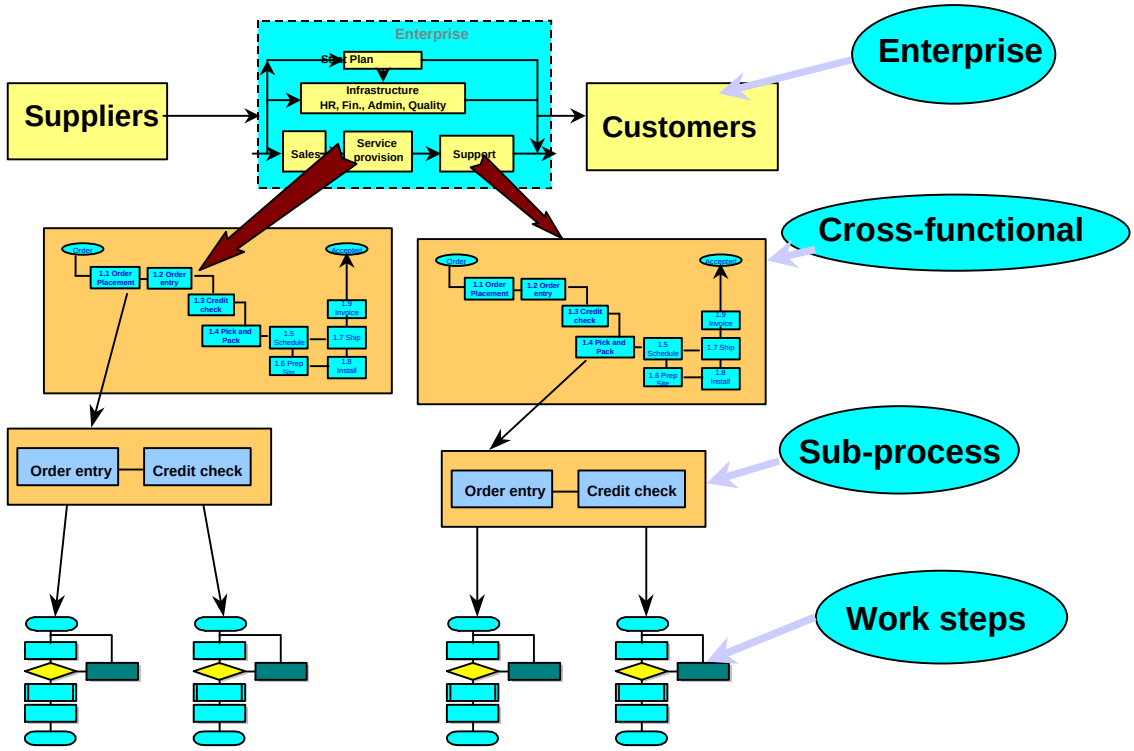


Figure 4.6 - Process Mapping: Definition of Process Levels

4.3.7 External Audits

The Turnbull report requires organisations, in terms of corporate governance, to do the following: "The directors should, at least annually, conduct a review of the effectiveness of the group's system of internal control and should report to the shareholders that they have done so. The review should cover all controls, including financial, operational and compliance controls and risk management."

KCM will have external audits conducted by recognised specialist to identify areas of improvement. These will be addressed through a process of management review to ensure continual improvement.

4.4 Occupational Health Management

In terms of the Development Agreement (Part C, Section 12, Environmental Issues) between the Government of the Republic of Zambia and Konkola Copper Mines plc a listing of safety and health legal non-compliance issues was to be registered with the GRZ within one month following closure of the development agreement. It followed that a Health and Safety Implementation Programme, to address the issues identified in the Legal Compliance Audit, should also be compiled and submitted to the GRZ within six months of vesting. These obligations were completed on schedule and the implementation of the programme was initiated ahead of schedule.

During the above exercise a number of potential occupational hygiene risks were identified, including:

- Dust
- Noise
- Heat stress
- Gases and fumes
- Radiation
- Hazardous substances/materials
- Asbestos
- Others, (including EMF, vibration, ergonomics)

It was found that the Zambian mining regulations do not adequately describe requirements in respect of occupational hygiene risks. Consequently, incidences were identified where, historically, the mines may comply with the letter of the law in respect of the control of occupational hygiene exposures, but were not in line with current-day international convention or the KCM policy on occupational health.

Therefore, it was concluded that the occupational health management programme should be reviewed to extend beyond strict legal requirements and to include appropriate international convention in respect of conserving worker well being at the respective KCM operations.

4.4.1 Objectives

To effect to good occupational health practice in the interest of workers through:

- promotive and preventative strategies;
- medical surveillance;
- provision of curative and rehabilitative services; and
- ongoing assessment of health hazards in the workplace.

These objectives must be achieved in compliance with relevant Zambian and international legislation.

KCM, therefore, needs to establish the necessary infrastructure, competence and co-ordination between relevant disciplines in order to achieve these goals.

The policy on occupational health has been incorporated into the KCM Policy on Safety, Health and the Environment (see Section 2.2.2) and the infrastructure also need to be in line with this Policy.

4.4.2 Occupational Health Management

Occupational health is the discipline that deals with the prevention, treatment and rehabilitation of work related injury and illness through processes such as medical surveillance, workplace audit and advocacy on health related issues in the workplace. Disability which arises in the course of an employee's work is assessed, documented and submitted for compensation.

Occupational Health incorporates several disciplines in respect of a holistic approach to preserving the well being of workers at the KCM operations. This concept is presented schematically in Figure 4.7 below.

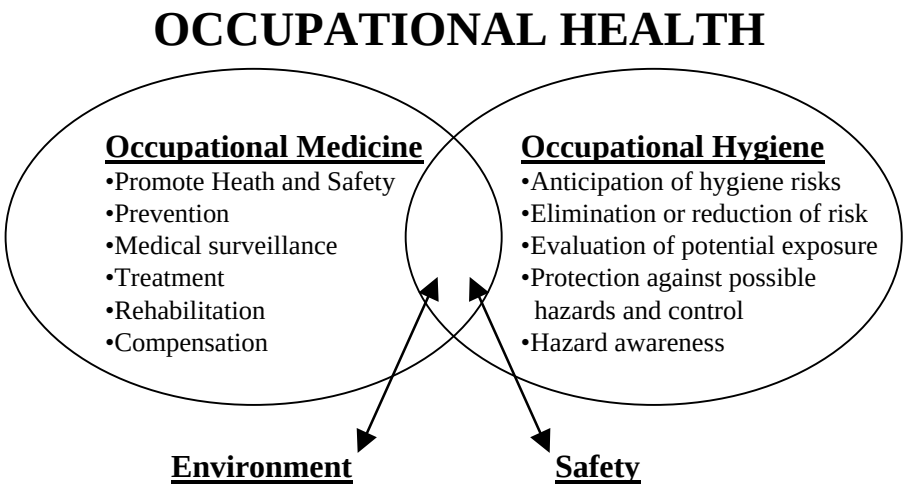


Figure 4.7 - Interdisciplinary Nature of Occupational Health Management

Occupational Health comprises mainly the medical and hygiene disciplines, but it must be viewed as an integral part of a holistic approach to Safety, Health and the Environment.

The Occupational Health structure established at KCM is presented schematically in Figure 4.8.

Occupational Hygiene:

An Occupational Hygiene Engineer, located within the SHE department, has been appointed to co-ordinate the implementation of the occupational hygiene programme at the KCM operations.

Medical Services:

The occupational health resources within KCM's Medical Services Department consists of:

- an occupational medical practitioner;
- an audiologist/speech therapist;
- three Audiometrists;

- six professional nurses; and
- administrative support staff.

The occupational medical practitioner has a direct line reporting relationship to the Manager Medical Services who in turn has a staff reporting relationship to the Vice President, Safety, Health and the Environment.

Close links exist between the occupational health services and the curative health services of KCM who undertake the clinical management of occupational injuries and illnesses at the two KCM hospitals in Chingola and Chililabombwe. A curative service is provided on contract in Lusaka for employees at Nampundwe.

Physiotherapy services at both hospitals provide a rehabilitation service for workplace injuries.

At present KCM does not have an occupational therapist or psychologist on its staff complement.

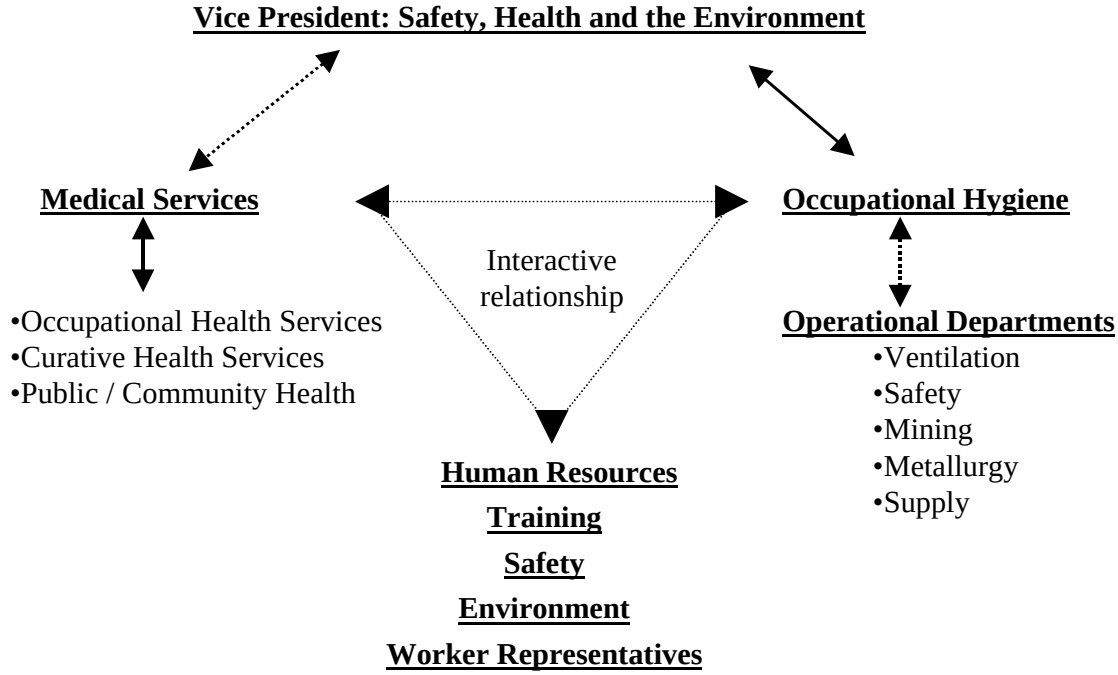


Figure 4.8 - Occupational Health Structure Established by KCM

4.4.3 Strategy on Occupational Health Risk Management

A summary of the occupational health strategy is given below. The purpose of this summary is to provide a perspective on the overall heath and safety programme.

In principle, the strategy makes provision for

- the establishment of a health and safety policy;
- a system for consultation with employee representatives on health and safety matters;
- structures for the operational implementation and review of the policy; and

- the development of a system for the assessment and management of occupational hazards.

The system requires interaction between a number of departments and committees, including Safety, Medical, Hygiene Environmental, Mining, Human Resources, Training, Procurement, etc.

It should be noted that the **elimination / control / protection** process represents the basic logical sequence of dealing with hazards from an occupational point of view.

It is accepted that the success of the management and control of health and safety hinges on the ability to establish and to maintain effective information management systems.

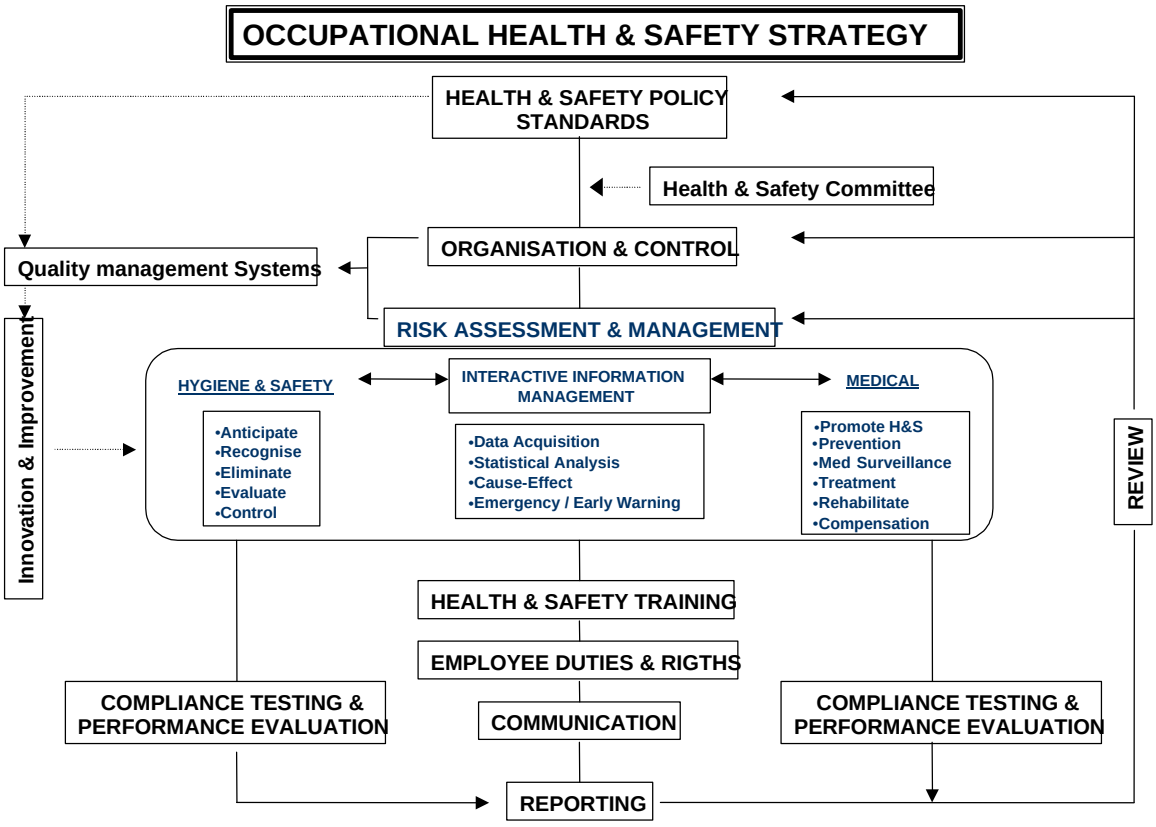


Figure 4.9 - Overview of the KCM strategy on occupational risk management

4.4.4 Standard of Risk Management

One of the specific aims of the KCM Policy on Safety, Health and the Environment is to benchmark the operations against international standards. It was mentioned in section 2.1 that the OHSAS 18001 standard was adopted for the overall management of health and safety at the KCM operations. In respect of benchmarking and in compliance with the requirements of the OSHAS standard, further standards specific to the management and evaluation of occupational hygiene risks have been adopted:

1. The use of the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) as reference. These TLVs represent the level of hazard exposure where most workers could be exposed day after day (8 hour work day, 40 hours work week) without adverse health effect. It is a term defined by the ACGIH to provide guidance for occupational hygienists to develop protection strategies against hazard exposures. The limits on exposure have been developed over many years and are widely accepted internationally.

2. The use of appropriate technology and procedures for the assessment and evaluation of potential exposures. The standards of assessment of health risks at KCM should be traceable to international standards. For that purpose assessment procedures described by the ACGIH and the National Institute for Occupational Safety and Health (NIOSH) have been adopted.

3. The implementation of a quality management system for the maintenance of instrumentation and records, including the linking of occupational hygiene exposure information with that of medical surveillance in line with the requirements of the OHSAS standard.

4.4.5 Occupational Health Services Implementation Programme

Functions

a) Prevention

Medical examinations:

The department performs pre-employment medical screening on all job applicants to ensure that they are mentally and physically capable of performing the occupation to which they will be appointed.

In selected cases, it may also be appropriate to perform psychometric testing.

Routine annual testing of employees is conducted in specific occupations such as winding engine drivers, vehicle drivers, machine operators, food handlers etc., to ensure that they can function safely and effectively at all times.

Exit medical testing is performed on all employees to establish baseline parameters for reference purposes in the event of future claims for occupationally related conditions.

b) Health Education:

Health education is provided to workers on safe workplace practices and the use of personal protective equipment in additional to more general health information on topics such as nutrition, smoking, alcohol abuse, sexually transmitted infections and exercise.

Medical Surveillance

Medical surveillance is a core function of this department and is performed in the following areas:

a) Pneumoconiosis / TB

All workers who in terms of the Zambian Mines Act work in “scheduled areas” are routed through the Pneumoconiosis Medical and Research Bureau in Kitwe on an annual basis for “Certificates of fitness”. Where abnormalities are detected clinically or radiologically, employees are referred back to KCM physicians for full evaluation and reporting.

In cases of advanced pneumoconiosis or other regulated medical conditions, certification is withdrawn and a process of compensation or review is initiated.

It is envisaged that in future the KCM occupational health service will perform these annual examinations in-house as an accredited sub-bureau of the Pneumoconiosis Medical and Research Bureau and subject to their audit.

b) Hearing conservation

Noise induced hearing loss is recognised as a significant workplace hazard within KCM and a hearing conservation programme has been developed which strives to identify, control or eliminate noise sources in the workplace while also educating workers in respect of the use of personal protective devices where unacceptably high levels of noise cannot be controlled. A critical element of this programme is the audiometric assessment of all workers who work in high noise areas.

Annual screening audiometry is initially performed and where baseline shifts are detected, diagnostic audiometry is done.

c) Lead

Certain metallurgical processes expose employees to inorganic lead fumes and as a consequence, a procedure has been put in place to ensure that regular clinical assessment and biological monitoring of lead workers is performed. Deficiencies with regard to extraction ventilation, housekeeping, personal protective equipment and the need to provide clean overalls and washing facilities in the workplace are being addressed.

d) Dental Erosions

Acid fumes in plant areas cause dental erosions when workers are exposed to them over extended periods of time.

These workers are identified and monitored by KCM dentists and protective therapy is offered. Extraction ventilation and good housekeeping is monitored while the use of personal protective equipment is statutory.

e) Occupational Tuberculosis (TB)

TB prevalence and incidence rates are monitored. Cases of active TB are managed in line with the National TB protocol.

Where applicable, workers are re-deployed from risk areas and compensation may be applicable.

Occupational Health Data

Occupational health statistics are collected and reported on a monthly basis in a number of areas. These include:

- medical absenteeism and lost shifts;
- minor accidents;
- lost time accidents;
- work related fatalities;
- deaths in service;
- occupational diseases;
- communicable diseases;
- biological monitoring;
- sexually transmitted diseases;
- medical examinations;
- disability assessments;
- compensation cases; and
- first Aid training.

Reporting

Occupational health reports are generated for:

- health service operational documents;
- SHE documents;
- AA plc returns;
- statutory returns;
- KCM Management; and
- Workman's Compensation Commissioner.

Community Health

a) Malaria Control

Malaria is a major cause of disease and death on the Copperbelt. The overall incidence during 2000 was estimated at 350 cases per thousand population. In children, this rate rose to approximately 520 cases per thousand during the same period. The incidence of malaria in Chililabombwe during 2000 was 160 cases per thousand population and has been steadily increasing over the last 20 years. In the 1970's effective vector control programmes reduced malaria to below 20 cases per thousand population per year and it was then an official notifiable disease.

The KCM malaria control programme was officially launched by the Zambian Minister of Health at a function held in Chingola on 4 October 2000.

A technical committee made up of representatives from KCM, local Councils and District Health Boards was established to oversee the programme and to report back to their principals.
Residual spraying of all houses in Chingola , Chililabombwe and Nampundwe commenced on 1 November 2000 and was completed by the end of 2000.A total number of 31 460 houses were sprayed during the campaign. Training for part-time sprayers, recruited from local communities,

was provided in October. Larvicidal spraying of open water bodies and dambo clearing in KCM mining areas has already commenced.

Training of KCM laboratory staff was undertaken with the aim of enhancing their diagnostic skills.

A malaria parasite prevalence study at selected sites in the two districts has been completed and involved the taking of blood specimens from 1200 volunteers. The purpose of the study is to establish a baseline prevalence against which the success of the vector control programme can be objectively measured.

KCM clinicians are actively participating in an initiative by the National malaria control programme to develop effective therapeutic protocols which will address the problem of increasing parasite resistance to the drugs commonly used in the treatment of malaria.

KCM has also embarked on collaborative research projects to identify local mosquito species and to determine patterns of mosquito resistance to insecticides used in vector control.

The specific objectives of the KCM malaria control programme are:

- to reduce the incidence of malaria below 20 cases per thousand of the population per year;
- to reduce the parasite prevalence rates to below 5%; and
- to halve the deaths caused by malaria by 2010, in line with the WHO “Roll Back Malaria” initiative.

b) HIV/AIDS

In a sentinel surveillance study performed by the Zambian HIV/AIDS Council in 1998, it was estimated that the prevalence of HIV in the general population for the age group 15 to 49yrs in Chingola and Chililabombwe was 28%.

The prevalence rate of HIV for the KCM workforce is not known.

A study protocol has been submitted to, and approved by, the Zambian University Teaching Hospital (UTH) Ethics committee to perform a baseline HIV prevalence of the KCM workforce. This study commenced in February 2001 and preliminary results will be published in March 2001.

Testing will be anonymous and unlinked and will be performed on saliva specimens. Participation in the study will be voluntary.

Study data will be stratified by age group, gender and job level.

Based on the outcome of the prevalence study, specific interventions for HIV/AIDS prevention and care will be developed and existing interventions strengthened.

Prevalence studies will be repeated every 2 to 3 years to monitor HIV trends, predict future trends, to facilitate health service planning and to measure the impact of target interventions.

Some of the existing medical strategies within KCM for HIV/AIDS care and prevention are:

- a TB control programme;
- voluntary testing and counselling services;
- sexually transmitted disease clinics;
- condom promotion; and
- health education.

The management response to date in terms of minimising the impact of AIDS on the future viability of KCM has been as follows:

- formulation of a policy on medical incapacitation and sick leave;
- formulation of a policy on the provision of healthcare;
- implementation of a performance management system;
- manpower planning and projections;
- training and recruitment initiatives;
- formulating new conditions of employment;
- assessing benefit schemes;
- improvement of environmental factors (e.g., housing, water, sanitation and nutrition); and
- liaison with organised labour

Critical next steps are:

- the formulation of a KCM policy on AIDS;
- implementation of the performance management system;
- performing an actuarial impact study;
- strengthening strategic partnerships with Government, NGO's and local structures to implement joint interventions; and
- wellness programmes.

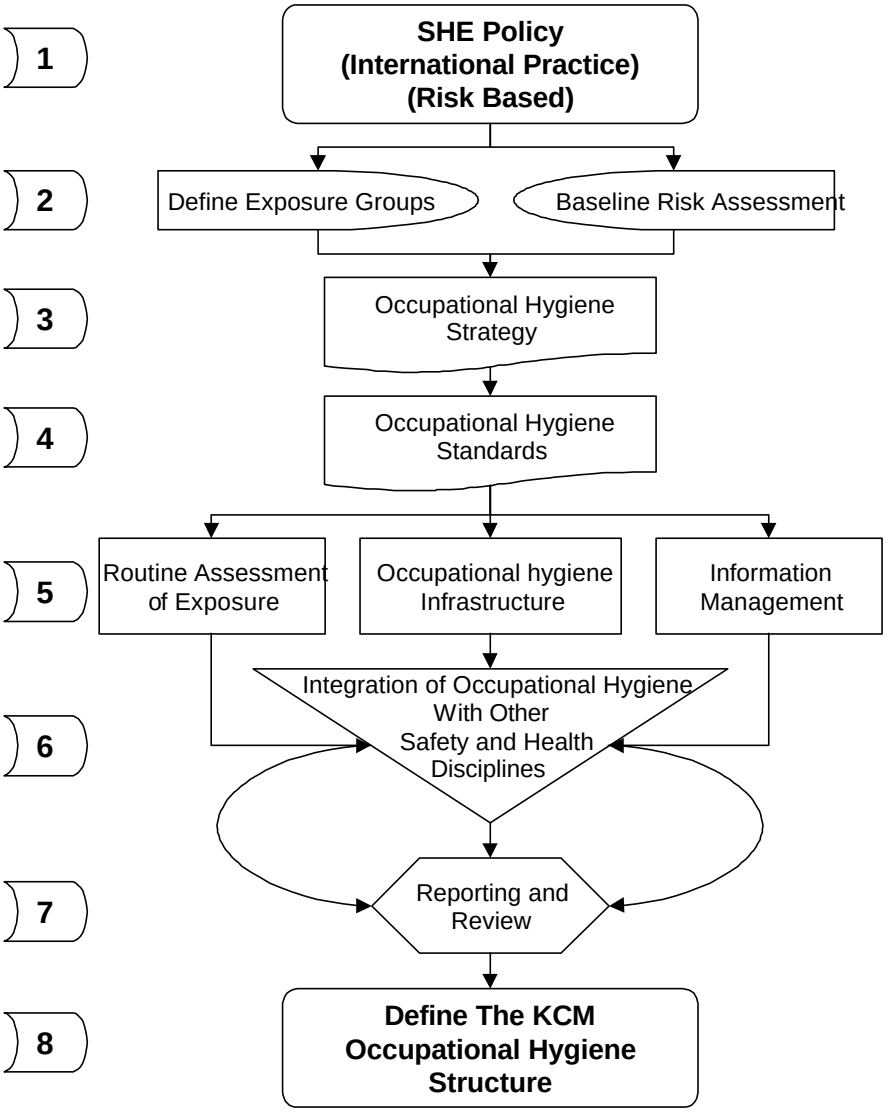
An AIDS Steering committee is in place and co-ordinates the above activities.

4.4.6 Occupational Hygiene Implementation Programme

Preliminary risk profiles for all the potential occupational hygiene risks have been established based on historic ZCCM data and KCM data gathered during 2000. An occupational hygiene management programme, in line with international convention, has been defined on the basis of these risk profiles. This programme will be adapted as new quality information becomes available which indicates the need for a review of the risk levels that workers are exposed to. The programme includes:

- the maintenance and preparation of hazard monitoring equipment;
- the routine monitoring of potential exposures by the Ventilation and Safety Departments;
- the co-ordination of engineering hazard control measures;
- liaison with relevant departments; and
- reporting and review.

The programme for the implementation of occupational hygiene management established at KCM consists of the following actions:



The schedule follows a logical chain of events to be reviewed from time to time as new information become available through the implementation of the programme and from international development.

To date, items 1 to 5 have been fully implemented and items 6 to 8 have been partially implemented. The latter form part of the principle of continual improvement and development of the system in line with improvements in the understanding of risk exposures at the KCM operations.

Interim Risk Management and Protection

The various working locations and activities on the three KCM mines, Konkola, Nchanga and Nampundwe, were classified into the relevant risk groups mentioned earlier by use of historic measurement data and measurements conducted during 2000. For example;

Category A - those areas where hazard exposures could exceed limit values and where intervention and protection of workers are required,

Category B - areas where hazard levels do not exceed the limit, but which require specific control measures to maintain those conditions, and
Category C - areas where no control of potential hazard exposures are required.

The outcome and consequent action of this baseline risk assessment can be summarised as follows:

Routine assessment of exposures, using new personal dosimetry techniques in line with the NIOSH standard, was initiated in January 2001, together with the compilation of learning material for personnel required to carry personal dosimeters. The first six monthly review of hygiene information will, therefore be conducted during July 2001.

a) Dust

Dust causes pneumoconiosis and other obstructive lung diseases. Not only the dust level, but also the individual constituents of dust, all contribute to the toxicity of the dust. The composition of the dust is determined by the source/s and processes involved such as mining of a particular ore body or the various benefication processes.

Dust can cause health effects only if it is inspired. In that respect, it should be noted that dust particles larger than 7 micron in diameter are not respirable. Therefore, in order to assess the risk of lung disease, the respirable fraction of airborne dust must be monitored. For that purpose, two techniques could be used, namely:

- Konimeter sampling where a spot sample of the respirable dust fraction in the working environment is collected on a glass slide and counted by use of an optical microscope (the technique traditionally used by the KCM mines);

- Gravimetric sampling where the respirable dust is sampled continuously on to a filter medium by use of a sampler that is fitted to selected workers. This technique is used by most mines internationally since it offers many advantages, such as accuracy, interpretation of exposure levels, analysis of samples, etc. KCM have initiated the implementation of this technique during January 2001.

A large number of konimeter samples are routinely taken at the KCM mines. The number of measurements used for risk assessment and classification are given below.

Mine	1999	January to June 2000
Konkola	7983	3192
Nampundwe	490	186
Nchanga	8390	4504

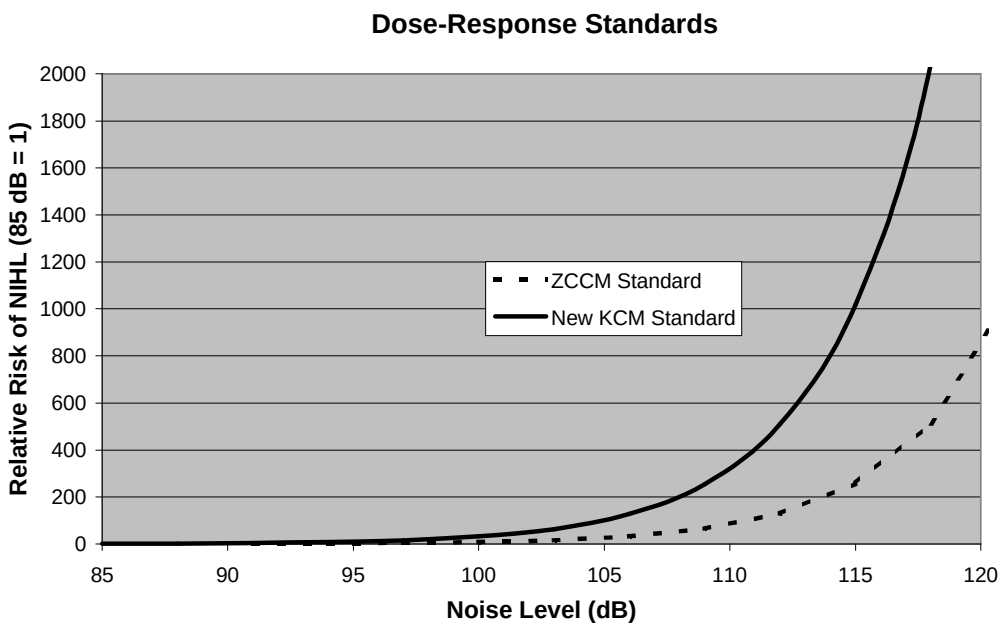
The risk of health effects from chronic exposure to respirable dust is also influenced by the content of the dust. For example, some minerals and compounds in dust, such as alpha quartz, are more toxic than others. That composition will be determined during 2001 with the implementation of the new gravimetric dust sampling techniques. However, all indications are that the ore bodies, country rock, etc. at the KCM operations contain compounds of relatively low toxicity.

Generally, dust levels in the work place are classified as category B (low risk of obstructive lung disease, but which require control). A further improvement in the control of dust in underground working areas is expected when the programme for the upgrading of ventilation is completed.

b) Noise

The noise standard implemented by most countries is 85 dB(A)[1]. It means there is an acceptable level of risk of Noise Induced Hearing Loss (NIHL) if a person is exposed to sound levels of up to 85 dB during a full eight hour shift. The standard implemented historically by the ZCCM is 90dB(A).

The risk of NIHL is determined by both the sound level and the duration of exposure. That risk doubles for every 3 dB(A)[2] above 85 dB. For instance, the unit risk of NIHL at 88 dB(A) is two times higher than that at 85 dB(A), four times higher at 91 dB(A), and so forth. Consequently the permissible period of exposure is halved for every 3 dB(A) above 85 dB(A). The difference between the old standard implemented by ZCCM and the new standard adopted by KCM is depicted below. Note that the risk of NIHL becomes particularly significant above 100 to 105 dB. Most general purpose hearing protection devices such as ear plugs, muffs, etc. are effective below 100 dB. However, specialised and dual hearing protection is often needed in areas where the noise exceeds 105 dB.



The above standard formed the basis for the assessment of the risk of noise induced hearing loss at KCM. The areas where noise levels may exceed 85 dB and 100 dB and the relevant workers have been identified and a hearing conservation programme has been established.

[1] **dB** is the notation for decibel. **(A)** is the notation for sound pressure measured on the so-called "A" scale which allows for weighting of the different sound frequencies in respect of the potential to cause damage to the ear.
[2] The ACGIH uses the so-called "**3 dB exchange rate**" (risk of NIHL doubles for every 3 dB. In some countries a 5 dB exchange rate is used).

The programme includes; the assessment of baseline and repeat audiogrammes, the monitoring of noise levels in the workplace, engineering control of noise levels (at the design stage and reduction and isolation of noise), training and the use of personal protective equipment. The monitoring of noise exposures is aimed at identifying not only the loudness, but also the type of noise (continuous or impact noise), the noise profile during a full shift and the overall shift noise dose.

It is estimated at this stage that about 2500 persons work in noise zones of which about half are exposed to noise levels in excess of 100 dB.

c) Heat Stress

The potential for heat stress underground must be considered when temperatures in excess of 27.5 ^{o}C wet bulb occur in the workplace. The KCM mines are not generally associated with heat stress due to a low virgin rock temperature and adequate ventilation. However, incidences where the temperature marginally exceeded 27.5^{o}C were recorded in areas where diesel equipment is used. These exposures are of short duration and are not considered a safety risk. Historically, no incidences of heat stress such as heat cramp, heat exhaustion or heat stroke have been recorded. Therefore, apart from normal routine control of heat in respect of design parameters, no heat stress management programme is required.

d) Gases and Fumes

There are a number of sources of hazardous gases at the KCM mines such as underground blasting fumes and diesel exhausts and, on the surface, from acid storage, reagent mixing, water treatment and various other engineering operations such as welding, etc.

Gas levels are managed underground by re-entry times after blasting and the balancing of the use of diesel power with ventilation for dilution and heat dispersion. Historic data show instances where blasting fumes and diesel emissions exceeded the ACGIH TLV levels. However, the recent upgrades of the ventilation system were intended not only to replace old ventilation equipment, but also to manage gas levels underground. Note that this ventilation equipment was also delivered on specifications regarding noise levels.

e) Ionizing radiation

No evidence of ionising radiation levels that are significantly above natural background levels could be found. In a mining scenario, occupational radiation exposure could be incurred mainly from external gamma radiation and by the inhalation of alpha radiation associated with dust particles.

External gamma radiation measurements showed no increase above natural background levels and are in the order of 0.1 to 0.2 micro Sievert/hr (µSv/hr). These values equate to a potential annual dose of 0.2 to 0.4 milli Sievert per annum (mSv/a). Radon gas (its progeny are short-lived alpha emitters and are attached to respirable dust particules) was monitored during 1997 in underground workings by the ZCCM Technical Services. Values in the order of 40 to 75 Bq/m^{3} were found. These values equate to a potential annual dose from radon progeny of 0.25 to 0.5 mSv/a. The combined potential annual radiation dose incurred by personnel is therefore estimated at between 0.6 to 0.9 mSv/a.

The International Commission on Radiation Protection has recommended annual occupational radiation dose limits (averaged over 5 yrs) of 20 mSv/a. They have also recommended that efforts to implement radiation control at annual dose levels of less than 1 mSv/a are not justified.

f) Other Hygiene Risks

Data on other hygiene risks such as hazardous substances, asbestos, vibration and ergonomics are not readily available at this stage. Some risk is, however, indicated in respect of gases and fumes present at the reagent mixing bays and analytical services sections.

Another area of concern is the occupation of “Lead Burning” where workers maintain acid tanks, etc. The monitoring of lead fumes in that scenario is technically difficult and, thus, biological screening of these workers for lead absorption is conducted. In this respect action levels were adopted that will allow removal and decontamination of workers prior to the onset of clinical symptoms.

4.4.7 Auditing and Benchmarking

A system for regular reporting (monthly) and review (six monthly) has been instituted. The occupational health programme will also be audited regularly by internal mechanisms and also by external agencies.

The review and reporting system is compatible with that of associated companies such as AMBASE and Anglo American Plc. A direct comparison of the health and safety standard achieved at the KCM operations with those companies is, therefore, envisaged via the annual reporting structures. Annual reports will also be benchmarked against the achievements published by other local and international companies.

While reporting to the GRZ on health and safety issues is a legal requirement, it also serves as indicators of the legal compliance.

SECTION 5

Corporate Level Social Management Plan

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

5.0 CORPORATE LEVEL SOCIAL MANAGEMENT PLAN

5.1 Process of Developing Social Management Plans

Social management is concerned with the development of relations with local communities and society in general in order to promote sustainable development in a way that benefits both society and the company. Social management is forced to consider all aspects of KCM which impact on internal (employees) and external stakeholders (households, communities, institutions and organisations) outside of the work place. For example, providing training for retrenched workers is about promoting sustainable livelihoods beyond employment with KCM.

The Social Management Plans have been developed for KCM's Safety, Health and Environment Department although the nature of social management demands that responsibilities are also held by other KCM Departments. SHE Social Management refers to those aspects of KCM activities which impact on the *external social environment,* whereas the Human Resources (HR) Department manages the aspects that relate to the *internal social environment*. However in the KCM management system the HR Department is also responsible for facilities such as schools, clubs, recreation centres and retrenched worker training. It is also important to highlight that social management does not refer to public relations (PR), which is concerned with developing a particular image of the company and to impact on public perceptions. An aim of the social plan is to co-ordinate strategies to ensure that PR strengthens social management principles and corporate citizenship values.

5.1.1 Corporate Citizenship and Sustainable Livelihoods

KCM has a policy to ensure that it is a good corporate citizen in all business undertakings, so that while adding value to the business KCM is also adding value to society. This policy is exemplified in the following quote, extracted from the KCM SHE Vision Statement:

"We will uphold the values of good corporate citizenship and seek to contribute to the wider economic, social and environmental well being of Zambia"

Corporate Citizenship can be defined as "the value system that brings together the self-interest of business and its stakeholders with the interest of society" (CSI Handbook, 2000).

The reality of the society in which KCM operates is one of high levels of poverty. In this context KCM aims to be a good corporate citizen through the promotion of *sustainable livelihoods* in their business environment and sphere of influence. This is in line with the overall Safety, Health and Environment mission of sustainable development although it also ensures that other agencies participate in the endeavour. The Corporate Citizenship strategy of KCM will be realised through the implementation of the Social Actions Plans at the corporate level as well as at each mine site.

The shift away from the mining companies providing services to local communities ensures that KCM is now one of many stakeholders in the local town and the district. This is a significant change from the mining company being *the* stakeholder that dominates the development agenda in the town and the district. KCM is not in a position to dominate the development agenda and is required to align all social management strategies with the district, provincial and

national development strategies. The Social Management Plan development process has positioned KCM as being one stakeholder that has a powerful role to play in the environment.

The Social Management Plans were developed by the integration of concepts and methodologies of two approaches. One of the approaches is the Corporate Citizenship approach to business and society and the other approach is the Sustainable Livelihoods approach to promoting poverty alleviation and sustainable development.

Sustainable livelihoods comprise assets such as human, physical, financial, social and natural assets that all societies require for development and, in the case of Copperbelt communities, for poverty alleviation. KCM operations have some positive and some negative impacts on livelihoods. It is the intention of the Social Management Plan to mitigate the negative impacts and optimise the positive impacts. KCM is the primary industry in Chingola (Nchanga Mine) and Chililabombwe (Konkola Mine) Districts and plays an important economic role in Kitwe (SmelterCo) and Mumbwa (Nampundwe Mine) Districts. KCM's role in society extends beyond that of an employer. It has a direct sphere of influence over the mine surface rights area and people either living within or using resources within the surface rights area of each mine or facility as is the case with SmelterCo. KCM resources such as Mine Trust Schools, KCM medical facilities, services and primary health care support to the Government, and the provision of social amenities such as sports clubs and recreational services are aspects which are managed through this Social Management Plan.

The philosophy of promoting sustainable livelihoods through corporate citizenship is based on the following principles:

- KCM undertakes its core business in a way that is socially responsible. This means that many KCM line functions have a role to play in promoting social responsibility. For example, this extends to Human Resources (i.e., labour policies, training and development, labour relations, schools and social services), supplies (i.e., contracts and local procurement), Safety Health and Environment (i.e., mitigating negative social impacts such as resettlement and optimising positive social impacts, mitigating environmental impacts, improving the state of the environment), and Medical Services (i.e., hospitals, clinics and health services).

- KCM provides support to aspects of society which are not directly related to core business but which impact on sustainable livelihoods. For example, the promotion of economic diversification and development of alternative economies. These actions are of benefit to KCM as it promotes a healthier society in which it operates.

- KCM can at its own discretion provide support to organisations and institutions in terms of social investment such as provision of equipment to schools. This support is based on the generation of profit in the company and will be considered in more concrete terms once profit is secured. At that point it will be undertaken in a professional way, possibly managed through a Corporate Foundation.

5.1.2 Historical Context

"The Copperbelt of Zambia and the Democratic Republic of Congo contain some of the world's highest-grade copper and cobalt deposits…" and the Copperbelt contains just over 10% of the world's copper reserves (Mining Mirror, 1998). Peak production of 720 000 tpa of copper occurred in 1969 (one year prior to nationalisation of the mining industry, which was followed in

1981 by the formation of Zambian Consolidated Copper Mines) and by 1996 this had declined to 340 000 tpa. Nevertheless, copper production still accounted for 10% of the country's GDP and copper exports accounted for 80% of Zambia's export earnings. The copper industry also accounted for 20% of the country's employment (Institutional Investor, 1995). In 1995 ZCCM had a high level of debt (approximately US$800 million) and was facing bankruptcy. This situation led to the initiation of a privatisation programme that began in 1995 (*ibid*, 1998).

From the 1920s onwards, the development of mining activity on the Zambian Copperbelt has had a fundamental impact on patterns of human settlement (Richards 1939; Gluckman 1950 Epstein 1980, for example). The economic opportunities represented by mining activity on the Copperbelt led to many thousands of Zambians migrating to the region. In some cases, this migration was oscillatory and people maintained strong ties with their rural bases. In other cases, it was characterised by a more permanent process of urbanisation, with people losing touch with their rural roots and becoming fully integrated into the urban environment, mostly as landless mine workers. With independence from colonial rule mining activity was consolidated under the centralised management of ZCCM, which took on a strong service-providing role in non-mine and mine settlements on the Copperbelt. Privatisation has resulted in mining companies reducing the role they play in the provision of social services. This is placing greater pressure on the local authorities and has demanded that national infrastructure support programmes as well as World Bank and donor funded support programmes are in place to build capacity for effective delivery.

5.1.3 The Global and Local Context of Social Management

The international, national, provincial, district and local contexts influence KCM Social Management Plans. Policies and programmes for social management at site level are influenced by international organisations such as the IFC, national governments and corporate bodies such as Anglo American plc. The KCM SMP has considered the issues and concerns from the international through to the local level. The discussion below provides an outline of these contexts.

5.1.3.1 International Context

KCM is part and parcel of an international move towards Corporate Social Responsibility (CSR). Globalised operations, and the role of watchdog organisations in the NGO world, ensure that no operation can be separated from a company's global reputation. What happens in Zambia will have bearing on a company's operations in other parts of Africa and the rest of the world.

The privatisation of the Copperbelt mines has attracted foreign investment from all over the world. The new companies comprise various international shareholders as well as Zambian shareholders. Different financing arrangements and conditions of financing have dictated the parameters for developing social management plans. KCM is influenced by the conditions set out by the IFC and the World Bank as well as Anglo American plc global policies for social responsibility.

5.1.3.2 National and Provincial Context

National government has moved away from central planning approaches and is promoting decentralisation and devolution of power to the local level. The national government has embarked upon privatisation of state assets and liberalisation of the economy with World Bank

financial support through loans. The central and provincial governments are co-ordinating various development strategies such as urban renewal and road rehabilitation. Of particular importance is the development of the National Poverty Reduction Action plan for the period 1999 – 2004. This has been followed by the *interim* Poverty Reduction Strategy Paper (PRSP) produced in July 2000. The process to develop a full PRSP, which should be complete by September 2001, has already started. There is some pressure on this programme, as Zambia will not get full debt relief until it has completed a year of running the PRSP. The PRSP provides an opportunity for a national poverty-focused plan, and the KCM Social Management Plan reflects many of the critical issues such as the promotion of jobs and income, human development and sustainable livelihoods

There have been a series of programmes promoting public service reform, starting with the Public Sector Reform Programme (PSRP) from 1993, and more recently the linked Public Sector Capacity-building Programme. The objective is to reduce the size of the public service to create an affordable, well-paid and more professional civil service, as well as to build its capacity, while providing opportunities for increased participation by the private sector and community-based organisations. The Social Management Plans have considered the impact of this process on KCM and include mechanisms whereby KCM recognises its corporate social responsibility.

5.1.3.3 District and Local Context

The district and local environment is undoubtedly the most important consideration for the development of the Social Management Plans. As described above, there is increased pressure on district governments and local authorities to manage and provide services to the population. There have been a variety of policies in Zambia aimed at improving service delivery. During the 1980's there were programmes with individual ministries, but also a significant move towards decentralisation, with the Local Administration Act of 1980. During the 1990's, the emphasis shifted to sectoral investment programmes with the support of various donor agencies.

The immediate challenge for local authorities is to absorb the responsibilities previously held by ZCCM. KCM also faces this challenge, not to do the work of the council but to ensure that the local environment is conducive to the successful operation of the mines. In the immediate term KCM recognises that it has a social responsibility to provide assistance to the local authorities to ensure mutual benefit from effective service delivery. This assistance, such as emergency repairs, is aimed at ensuring that services are rendered to the largely mine employee population (See table 5.1 below). The challenge for KCM is to be socially responsible at the same time as not creating a dependency on the mine either through taking over essential services or through the perception that KCM is a service provider. In the current local context of social and institutional poverty this challenge is immense.

Table 5.1 - Mine Population (Employees & Dependants) in Relation to Broader Population

Mine	Approx. Mine Population[☒]	District Population[☒]	Mine Population as a % of Total Population
Konkola	40 000	107 000	37%
Nchanga	68 000	161 000	42%
Nampundwe	4 800	8 600[☒☒]	56%[☒☒]
TOTAL	**112 800**	**276 600**	**45%**

☒ Taken from SRK (1996) - estimates based on rough calculations from 1990 census data and are subject to correction when more data become available.

☒☒ In this case district activities are not centred on mining, thus this figure does not refer to the *district* total but rather to the population in the immediate vicinity of the mine.

5.1.4 Approach and Methodology

The methodology adopted to develop the Social Management Plans is in line with the principles of the Sustainable Livelihoods and Corporate Citizenship approaches. The Sustainable Livelihoods Approach includes the following principles:

1. Participatory research.

2. Adopting a holistic approach to development that considers all stakeholder roles and responsibilities (note: this is a shift from the notion that the mining company is responsible for development as was the case with ZCCM).

3. Sharing of information to empower people to raise issues.

4. Respect for people (i.e., their opinions and values).

5. The need to understand people's strengths and vulnerabilities.

6. The importance of village-district-province-national linkages.

7. Understanding the role of policies and institutions in promoting livelihoods.

Principles of Corporate Citizenship as adapted from a model developed by the Prince of Wales Business Leaders Forum include:

1. That KCM must maximise its profitable performance. In order to do this the SMP considers the future development of resources, the KCM reputation and the social risk to KCM.

2. That KCM energises future business development for itself as well as other multiplier industries. The SMP has considered, as part of the KCM economic diversification initiative, potential products and services, partners and places for local economic development.

3. That KCM optimises business multipliers. Also through the economic diversification, issues considered are promoting investment and income generation, job creation, human resource development, the provision of goods and services to the mine, the development of local business systems, sharing of international standards, transferring technology and establishing institutional and physical infrastructure.

4. That KCM will professionalise social investment and corporate sponsorship. The SMP has considered how innovative funding mechanisms can be strengthened as part of KCM policy of not providing cash donations. Further consideration has been given to moving from ad hoc approaches to providing support to mobilising core competencies in society, creating partnerships rather than giving gifts as part of public relations and to shift from charity to community capacity building.

5. That KCM will promote policy dialogue on sustainable development. To do this the SMP has considered the promotion of ethical business practice, the facilitation of an enabling environment for private enterprise and investment, support for good governance and KCM contribution to economic, social and environmental policies.

Review of Relevant Literature

A thorough review of available literature was conducted. This was drawn from the following:

- recent site reports: Including Environmental Impact Statements conducted in 1996 (SRK 1996) and a Social Impact Assessment for the Konkola Deep Mining Project (INR 1997);
- current publications on the Zambian Copperbelt and its Privatisation;
- recent KCM Project information;
- international guidelines for social management; and
- appropriate theoretical models for effective social management including the Sustainable Livelihoods Approach (SLA) and Corporate Citizenship.

Fieldwork, Workshops and Consultative Forums

The methodology for developing the SMP is designed to achieve two main aims:

- First, to develop a document that contains the research findings, the management measures and the implementation plan.

- Second, to implement a process which provides the opportunity for stakeholders to engage with the development of the plan and that can be on-going beyond the life of this project.

The process included the involvement of the KCM Community Liaison Co-ordinator. Active involvement in the research was coupled with training and capacity building. Part-time Community Liaison Officers also participated in the development of the social management plans.

The data collection and participatory process was undertaken to ensure that all stakeholders validated the research findings. To achieve this research and consultation was conducted with the following groups:

- communities within the mine surface rights area and areas immediately adjacent to the mine;
- immediate service providers for the communities (such as teachers);
- district service providers and the District Development Co-ordinating Committee;
- KCM management (various departments which impact on the external environment);
- provincial government departments and service providers (NGO's); and
- national level Government Ministries and Departments and service providers (NGO's, donors, ZAMSIF).

The development of the Land Use and Settlement Management Plans adopted a variety of methodologies. The findings of the participatory mapping research in communities provided the basis for creating social maps of the mine licence area. Social information was superimposed on to aerial photographs and satellite images to create land use and settlement maps that depict social dynamics.

The details of each engagement are provided below.

Community:

Community engagement was a first step in understanding the nature of the issues for social management.

Konkola	-	research in six communities (both MLA and council areas)
Nchanga	-	research in seven communities (both MLA and council areas)
Nampundwe	-	research in two communities (former MLA and site and service)
SmelterCo	-	research in adjacent community and specific community groups

The engagement with the above communities was undertaken using the following methodologies:

- participatory methods (i.e., PRA, group work, transect walks and resource mapping);
- individual interviews and key stakeholder interviews; and
- mapping of resource areas for the generation of Land Use and Settlement Maps.

Immediate Service Providers

Arising from the engagement with communities and analysis of secondary information, immediate service providers were interviewed. This provided data about the level of service provision, quality of services, and ability and willingness for communities to pay for services. The meetings also raised issues about the challenges immediate services providers are faced with as a result of privatisation and decentralisation of authority to the local level. The following types of meetings took place:

- key stakeholder interviews with local authorities such as the District Agriculture Officer, NGOs and community based organisations;
- site visits with local authorities, NGOs, community organisations; and
- workshops with stakeholders.

District Services

The District Authorities provided valuable information about the co-ordination of development within the district as a whole and how KCM fits into the district as one of the stakeholders. The acquisition of this information was achieved through the following means:

- workshops with District level service providers; and
- interviews with District Departments.

District Development Co-ordinating Committee Workshop

- Raising issues from the research.

- Validation of results from the research.

- Group work, feedback on issues raised.

Provincial and National

- National stakeholders (e.g., Physical Planning; Local Government and Housing- Valuation; Cabinet Office; Ministry of Mines; Finance; World Bank; and ZAMSIF).

- Provincial stakeholder interviews, policy documents.

KCM

- Meetings and interviews with key departments impacting on social management.

- Workshops with KCM S.H.E. Management.

- Site visits with KCM Departments.

- Reviews and discussion with KCM SHE Vice President.

Consultative Forums

Consultative Forums were held in the districts of all mine sites. Selected stakeholders were invited based on the research undertaken prior to the Consultative Forum. The reports from each Forum are provided in Appendix A. The Consultative Forums held were the following:

1. Konkola: 11 December 2000 no of participants: 52
2. Nchanga: 12 December 2000 no of participants: 47
3. SmelterCo: 13 December 2000 no of participants: 19
4. Nampundwe: 30 January 2001 no of participants: 30

The specific objectives of the Consultative Forum were the following:

- to communicate the objectives of the Social Management Plan;
- to have initial research findings validated by stakeholders;
- to identify stakeholder roles in the process; and
- to identify how mutual benefits can be gained for KCM, communities and institutions.

The Consultative Forums were not an opportunity for stakeholders to present their needs to KCM. The Forums managed to highlight that KCM is one stakeholder and is not the government. In all districts the Forums and the general research process has raised critical issues facing the district and provided the opportunity for district stakeholders to debate the critical issues without turning to KCM to solve the issues. The Consultation and Disclosure Plan has provided for this process to continue as KCM recognises that as a powerful stakeholder it has the ability to provide a platform to facilitate understanding of mining and sustainable development.

5.1.5 Corporate Level Social Management Plans

Corporate level Social Management Plans encompass the following components:

1. The principles for managing social issues at all sites.

2. The corporate level management of social issues including human resources, organisation development and reporting systems.

3. The corporate level auditing and reporting system.

5.1.5.1 Social Management Principles

The KCM Project Social Management Plans have been designed to avoid or limit negative KCM project impacts and to increase the potential for the social environment to benefit from the KCM Project. The plans go further to position KCM as a *stakeholder organisation* whereby interests, concerns, perceptions and knowledge from stakeholders are integrated into the organisation throughout the life cycle of the operations. The plans put in place the development of KCM as a *learning organisation* whereby KCM as an organisation, in terms of both senior management and staff, are committed to the concept that sustainable shareholder value can really only come through the creation of societal value as an integral part of the same process.

KCM will implement the Social Management Plan according to the following objectives:

1. To minimise negative consequences and optimise opportunities from mining operations.

2. To increase local capacity.

3. To promote co-operation between the company and stakeholders.

4. To develop ownership of the plans by the KCM implementing agents and the beneficiaries of the plans.

5. To ensure that KCM implementing agents benefit from the plans and improve their capacity to integrate the company into society.

The following principles underlie the implementation of the Social Management Plans over the life of each mine (construction through to closure).

1. The implementation is a two-way process between the company and society – both parties should benefit from the plan and that communities' dependence on the mining company, as experienced during the ZCCM period of operation, will be reduced.

2. Respect for local cultures and communities and plans will be implemented with people and not only for people.

3. The SMP must build on positives – a respectful approach to people (particularly the poor) and the district as people and institutions with strengths and opportunities and not just needs. The vast differences within communities in the districts have been recognised and the plans should be implemented accordingly.

4. Social responsibility is both within and external to the company and in this regard corporate citizenship values and responsibilities will be integrated into each department.

5. The KCM operations will be in accordance with the World Bank OD 4.30 and IFC guidelines for social management. Resettlement will be avoided wherever possible. Where resettlement is unavoidable it will be carried out in accordance with World Bank OD 4.30 directives and internationally accepted practices, ensuring the dignity of affected communities as well as the long-term sustainability of their lifestyles.

6. The Project will recognise the social environment as continually changing. Thus, plans will be flexible and tailored to specific KCM operational environments over the life of the KCM operations. The SMP recognises the importance of institutional structures and processes which determine access to assets. Implementation needs to emphasis the need for bottom-up participatory work as well as top-down strategic work.

7. The SMP recognises people are central to development and so uses approaches that are people-focused and are participatory. These approaches should recognise the holistic nature of people's lives and their use of multiple livelihood strategies.

8. Negative social impacts will be prevented rather than merely implementing reactive mitigation and interventions will be focused on increased opportunities for sustainability beyond the life of the mine. This is of particular significance in regards to social responsibility programmes that will be developed in partnership with communities and local authorities and institutions. Social responsibility is more than mitigating direct impacts but also about making a contribution to society.

9. The open and participatory sharing of information regarding the KCM operations will take place where appropriate. The SMP recognises the complex and dynamic nature of the social environment and so emphasises the need for constant dialogue with stakeholders so as to learn about their short versus long-term objectives, (e.g., on the environment), where people may sacrifice long-term sustainability for short-term gain.

10. The interdependence of biophysical and social components of the environment and the consideration of the impact that changes to one component will have on the other will be recognised. The SMP must recognise the important role played by women in society and encourage their empowerment and recognises that people are an integral part of the environment and so mainstreams environmental issues especially those resulting from mining.

11. Corporate social responsibility is an asset to the company and can improve benefits to shareholders. The SMP encourages partnership approaches between and among stakeholders (i.e., government, community, NGOs/donors and the private sector) and KCM – with the role of KCM as more a facilitator and animator, than a provider.

5.1.5.2 Social Action Plans

Social Action Plans have been developed for each site. The action plans for sites are characterised as the following:

- Nchanga Mine plans focus on operations but has a strong emphasis on closure planning as an immediate concern. The current plans are to reach closure of the main mining and concentrator operations by 2012 and all activities in the plans are designed for closure in a way that promotes sustainable development beyond the life of the mine.

- Konkola Mine plans are designed with a minimum 31-year time frame. Although all plans are designed to promote sustainable development beyond the life of the operations, specific closure plans are developed for implementation from approximately 10 years prior to closure.

- SmelterCo and Nampundwe Mine have the same life as Konkola. The planning for these operations follows the same time frame as Konkola. If plans for the continued operation of these sites alter due to technological changes or others then closure planning will start accordingly.

Employment and Retrenchment Plan

The current and future employment projections over the life of KCM as a corporate entity (all mine sites) for the next 31 years signal a significant reduction in employment. Although KDMP will operate for 31 years (current KCM business plan) there will be a reduction in employment in the next ten years of operation of approximately 6000 workers, the majority of which will be at the Nchanga Mine.

To manage this issue KCM will implement the following plans:

1. KCM will design and implement a multi-skilling capacity building plan for all workers. This will be in two parts: (a) a voluntary after-hours training programme for all workers which is linked to the phased retrenchment plan; and (b) a voluntary at work training programme just before retrenchment. At Nchanga this training will be more pressing than at Konkola and the other sites. The plan will be designed at corporate level based on a survey of training needs and will be linked to the economic diversification programme to increase opportunities for sustaining economic livelihoods. The training programme will provide the opportunity for the worker to nominate a family member to be trained in place of the worker. This ensures that the *family* rather than the *individual* is provided for. KCM will also investigate the feasibility of implementing a training programme for post-retrenchment.

2. Throughout the life of the mining operation KCM will develop the quality of labour and encourage contractors to do the same. This is a human resource function of KCM that will promote the re-skilling of workers to suit new working conditions; compliance with all legal conditions and agreements with the Mineworkers Union of Zambia; and the implementation of conditions of service for contractors to ensure suitable training and development of workers, health care (including a HIV/AIDS programme) and retrenchment policies.

3. KCM will brief all relevant stakeholders on retrenchment plans at an appropriate time.

Local Economic Development Plan

The Chingola, Chililabombwe and Kitwe local economy is weak. The partial closure of Nchanga Mine will have serious consequences for the local economy unless alternative economic activity is established. KCM believes that unemployment and poverty will have a negative influence on their business in the long run.

KCM recognises that improving the local economy has to start with the mining sector, as there is lead-time for diversification into alternative economies such as agriculture and manufacturing. The dependence on the mining sector has delayed the development of other economic sectors. As a result of retrenchments from the mining sector there is already an increase in agriculture activity on the Copperbelt and a pressure on available land. A general consensus amongst KCM, the government and international donor agencies is that the agriculture sector should be strengthened in order to support the economy and sustain development outside of mining.

To manage this issue KCM will implement the following plans:

1. KCM will implement a procurement strategy that supports local economic development. This will be the responsibility of the Manager Supplies and will encourage Zambian suppliers. This initiative will be accompanied by the development of businesses through capacity building, facilitation of joint ventures and accreditation procedures.

2. KCM, together with other stakeholders, will implement a programme to support economic diversification in the Chingola, Chililabombwe and Kitwe Districts. The KCM economic diversification strategy will aim to first reduce poverty amongst retrenched workers and their families.

3. KCM will establish an Employment Centre to facilitate the recruitment of employees and the establishment of local business. This will be part of the economic diversification strategy. The centre will focus on employment and training, how to do business with KCM, the KCM accreditation system (quality, cost and other criteria such as environmental protection and conditions of labour), joint venture support, and supply opportunities for contractors.

Land Use and Settlement Plan

The KCM mine surface rights area at Nchanga, Konkola and Chililabombwe have natural resources which people access and people are living within the boundaries of the surface rights. The relationship between the people and the land on the mine surface rights is complex and has set the scene for KCM management strategies. The complexity is created due to a number of factors, some of which are the following:

- The people living on the land are deemed illegal even though they have been tolerated over many years by ZCCM.

- There are natural resources such as *dambos* (wetland) which support thousands of people and sustain livelihoods.

- The council does not provide services to the settlements as they are not legal.

- At Nchanga there is a settlement with an approximate population of 240 people which has been established since the 1970s and has grown with retrenchments.

- In some areas where social activity takes place there are ore mineral resources which could be suitable for future development.

- As part of the vesting agreement ZCCM is responsible for certain social issues on the mine surface rights area which includes settlements.
- There are hazardous areas within the mine surface rights, which are deemed by law to be uninhabitable and access restricted.

The land use management plans are specific for each site, however the KCM principles of land management for all sites as follows:

1. KCM will not resettle people who were living on land within the mine surface rights at the time of vesting unless it is required for development. KCM will retain the status quo for current settlements. If resettlement cannot be avoided then KCM will follow World Bank OD 4.30 guidelines. KCM will restrict access to land for new settlements. KCM will demarcate the areas of settlements and restrict further growth of the settlements beyond the agreed boundaries.

2. KCM will not restrict access to natural resources unless they are within hazardous areas or other mine facilities or the land is not suitable for agriculture and reduces sustainable land use. If land is required for economic development KCM will follow World Bank guidelines for economic displacement.

3. KCM will restrict access to hazardous areas in line with government regulations and agreements. This will be coupled with extensive community awareness programmes. This will be undertaken in conjunction with the SHE and security departments.

4. KCM will develop a register of all households in settlements in the mine surface rights area. In some cases this will be an update of the ZCCM register compiled before vesting. The register will be developed as a form of control to ensure that settlements do not increase in size. The SHE Department will be responsible for this in conjunction with the Administration department. The SHE Department will be responsible for understanding the demographics of the settlements and the on-going changes that take place with regards to family, kinship and marriage.

5. KCM Board of Directors will take decisions on ceding to the council land which has settlements or social infrastructure if the land is not to be used for economic development by KCM.

6. KCM will ensure participation of all stakeholders (e.g., traditional leaders, civic leaders) in the implementation of land use management decisions.

Education and Training Plan

KCM currently operates Trust Schools in Chingola and Chililabombwe. These schools provide high quality education mainly to mine employee children. It is critical that the schools continue to provide high quality education in the district after the closure of the mining operations. To ensure this happens, the sooner the schools can operate independently of the mine the greater

the chances of achieving sustainability. KCM undertakes to facilitate the establishment of conditions for the handover of the school for their continued operations.

Developing human capacity through training is a vital component of development. The majority of skills in the district have been developed in the mining sector, subsistence agriculture and the civil service. In order for diversification of the economy to succeed an effective training initiative is required. In addition KCM requires a well skilled labour force and will begin to compete with other mining companies for graduates.

To manage this issue KCM will implement the following plans:

1. Before closure KCM will investigate the economic viability of creating an independent Trust School. The feasibility study will include the identification of partners and potential trustees, the development of a business plan and identification of organisations that could manage the school.

2. The Trust School will provide support to Government schools in the form of information sharing, curriculum development and exchange of ideas on teaching methodologies.

3. KCM will provide bursaries to the Schools of Mining and Engineering in the short term and will consider extending this to other departments in the medium term (after two years). This will be managed through the Human Resources Department.

4. KCM will provide the opportunity for university students from a range of disciples to work during the university vacations.

5. KCM will continue to provide support to government primary and secondary schools.

6. KCM will develop an environmental awareness programme. This will take the form of a SHE centre initially in Chingola and then also in Chililabombwe where the public can have access to SHE documentation and environmental education material. KCM will establish an environmental programme for schools and investigate the possibility of using the Konkola golf course as a centre for environmental training and walking tours. KCM will investigate the possibility of publishing a guide to birds and flora on the Copperbelt as well as lower cost environmental awareness material such as booklets and media supplements. KCM will also investigate the possibility of establishing an annual environmental project competition for schools. In all initiatives the focus will be on promoting an awareness of the environmental challenges KCM is faced within their operations.

Health and Welfare Plan

The districts in which KCM operate do not have adequate health care facilities. The long-term sustainability of the KCM hospitals in the Chingola and Chililabombwe districts is a paramount importance to provide health security. KCM has adopted a health system from ZCCM which provides significant support to the district health care services. Health is a critical aspect of sustainable livelihoods and KCM will ensure that its policy on health care provision supports the wider community at the same time as maintaining the economic viability of the health care system.

KCM has taken over certain sports and recreation facilities. Some of the facilities continue to play an important role in society whilst others are not able to secure a membership base and

rely on the bar to secure finances. KCM believes that the sports and recreational clubs should operate on a sustainable basis beyond the life of the mines.

In order to manage these issues KCM will implement the following plans:

1. Mine hospitals will continue to operate according to current policies and will continue to provide support to government health care facilities. On closure the mine hospitals will become independent trust hospitals unless evaluated otherwise. On closure all community clinics will be handed over to the government.

2. KCM Medical Services will continue to work with government primary health care issues such as the malaria roll back programme, rabies control, child immunisation and health inspections until closure of operations.

3. KCM will implement an HIV/AIDS programme at all operations and will start with a prevalence survey. KCM will implement an HIV/AIDS awareness programme adopting various methodologies and tools for communication including industrial theatre, pamphlets and radio. KCM will ensure that all contractors have an effective HIV/AIDS programme in their companies or to arrange that all contractors participate in KCM HIV/AIDS programmes.

4. KCM will, in the next 12 months, investigate management options for all clubs and recreational facilities at all mine sites. KCM believes that all clubs and recreational facilities should operate on a self-sustainable basis, however KCM recognises that some clubs and recreational facilities have significant social value and will continue to support these according to agreed management objectives. Current operational procedures for the clubs will continue until new plans are developed. Clubs, which continue to receive support, will enter into a management contract with KCM and will be evaluated on a six-monthly basis.

Physical Infrastructure Plan

The towns in which KCM operates have services provided by the Asset Holding Company and a utility company Mulonga Water and Sanitation Company. In the case of Nampundwe the Nampundwe Mine services the settlements with water, electricity and refuse removal. Nampundwe has acquired a water licence from the government to supply water to the settlements. The major challenge for the service providers is to ensure cost recovery in order to sustain the delivery of the service. The service providers currently do not have sufficient capacity to ensure sustainability although there are plans in place for its improvement. KCM's major risk is the ability of Asset Holding Company to sustain services to the former mine township. These former mine townships have mainly KCM employees as residents. The significant constraint to the sustainability of these service providers is the reduced amount of income in society. As KCM increases the retrenchment programme fewer people will be able to pay for services. In Konkola the potential influx of people to find work will place more pressure on the service providers.

An aspect of physical infrastructure is the potential use of mine facilities after closure. In order to ensure maximum benefit for society from the mine infrastructure KCM will implement the following plan:

As facilities are decommissioned over the life of the mine KCM will investigate the options for handover of assets. It would be highly beneficial if the facilities could be used to support the economic diversification initiative. In order to ensure sustainable use of the facilities KCM will

insist on the development of business plans for the facilities. Tenders will be called for and awarded on agreed criteria developed through the economic diversification initiative.

Community Management Support Plan

KCM is committed to sustainable development and recognises that the well being of neighbouring communities is in their business interests. KCM cannot play the role of the government in ensuring sustainable livelihoods in communities but as KCM is one stakeholder in the districts it has a certain responsibility.

For KCM to ensure that there is sustainable land use management (based on the land use and settlement management plan) within their mine surface rights KCM will facilitate the establishment of community based land use management systems. This will involve the establishment of committees in communities, terms of reference for committees, and community based monitoring and evaluation of sustainable land use practices within the mine licence area. This will also provide the opportunity for recognised community structures and KCM to consult with each other on environmental and safety issues.

Disclosure and Consultation Plan

The development of the SMP demonstrated that stakeholders are very keen to engage in consultation and planning around KCM. Consultation with the public about KCM and societal issues and disclosure to the public about KCM activities are the activities which improve relationships between the company and society.

A consultation programme will provide the opportunity to implement a short-term strategy in order to plan medium term outputs. The aim of the consultation programme is to ensure that KCM engages with stakeholders in society. Establishing trust between KCM and society is extremely important and a serious risk emerges when stakeholders do not understand the reasons for decisions being taken by KCM. Improving the linkages between the mine and stakeholders will provide the opportunity for KCM to understand different stakeholders issues, concerns and recommendations. Through the consultation programme KCM will ensure that it is adequately positioned in society to maximise benefits to both shareholders and society.

To manage these issues KCM will implement the following plans:

1. KCM will implement a series of Consultative Forums. The Consultative Forums will take place every six months. There are three aims of the Consultative Forums:

    - First, communicate KCM policy around social and environmental management.

    - Second, engage with stakeholders about district issues and provide a platform for stakeholders to articulate role and responsibilities for managing the issues.

    - Third, to record concerns about KCM management of the social issues.

2. KCM will develop and manage a stakeholder database.

    - The database will be a strategic management tool to:
        - manage stakeholder interactions with KCM;
        - manage and evaluate conditions of relations between KCM and society; and
        - monitor and evaluate changes in society and the district.

- The database will be based on the following requirements:
  - a Windows based programme such as Access (the database will be designed by the SHE Department in order to ensure that it is connected to the broader SHE database requirements);
  - inclusion of the following parameters in the database:
    - personal particulars (i.e., name, title, organisation, full contact details);
    - date of engagement with KCM;
    - issues and concerns raised by the stakeholder and how they have been processed by KCM;
    - links to other organisations;
    - details (including full references) of media articles that have information for the database; (All articles about KCM will be collected from the national media as well as certain international media. The SHE Department or the Corporate Affairs Department can undertake this.)
    - a quarterly analysis of the media will be undertaken and a report produced;
    - the complaints and comments from the public (see activity 4); and
    - all environmental queries, complaints and issues will be recorded and dealt with as indicated in the Environmental Management Plan.

- The stakeholder database will be available for public scrutiny and comment. The database is intended to ensure that KCM is a 'stakeholder organisation' which is able to integrate the issues, concerns and comments of stakeholders into the organisation, process them; and through this increase the levels of trust with KCM stakeholders (local, national and international).

- The database will be analysed every month and a report provided to KCM Executive Committee.

3. KCM will implement a complaints and comments process for the public which will include a postal box, telephone (with an answering machine), fax and e-mail. All queries will be dealt with and responded to as soon as practically possible. All queries will be signed off by the SHE Social or Environmental Manager and recorded in the stakeholder database. A monthly report will be compiled for the Executive Committee.

4. KCM will establish an Environmental Information Centre to allow community access to SHE information material.

5. KCM will implement an environmental awareness programme that indicates environmental risks to the public. This programme will include information from an emergency preparedness strategy which will be developed and implemented by the SHE Department, the Environmental Management Programme which indicates the procedures for emergencies, and the Environmental Awareness Programme which will form part of the education and training plan.

6. KCM will use various communication channels to support consultation and disclosure and to raise awareness about KCM activities (such as operations, closure and retrenchments). A planned communication strategy will be designed at the start of each year and monitored on a monthly basis. These include:

   - print media: national and local newspapers;
   - digital media: national television and radio, local radio, internet (KCM website); and
   - KCM magazines / newsletters to serve both employees and the public.

5.1.5.3 Human Resources and Reporting Structure

The responsibility for the implementation of the Social Management Plan lies with the SHE Department. The SHE Department has a Vice-President, a Social Manager (note: the title for this manager is discussed in the job description) and an Environmental Manager. The Social Manager will lead a team comprising a community development co-ordinator and community liaison co-ordinator. Both co-ordinators will have support from a community development officer and site level community liaison officers and a database and media / communication materials co-ordinator. All the community liaison officers will be temporary positions as they are part of the HRE Department. It will be the responsibility of the SHE and HR Department to ensure that they have dedicated time to undertake the community liaison functions. The required outputs will be linked to the overall performance of the community liaison officer.

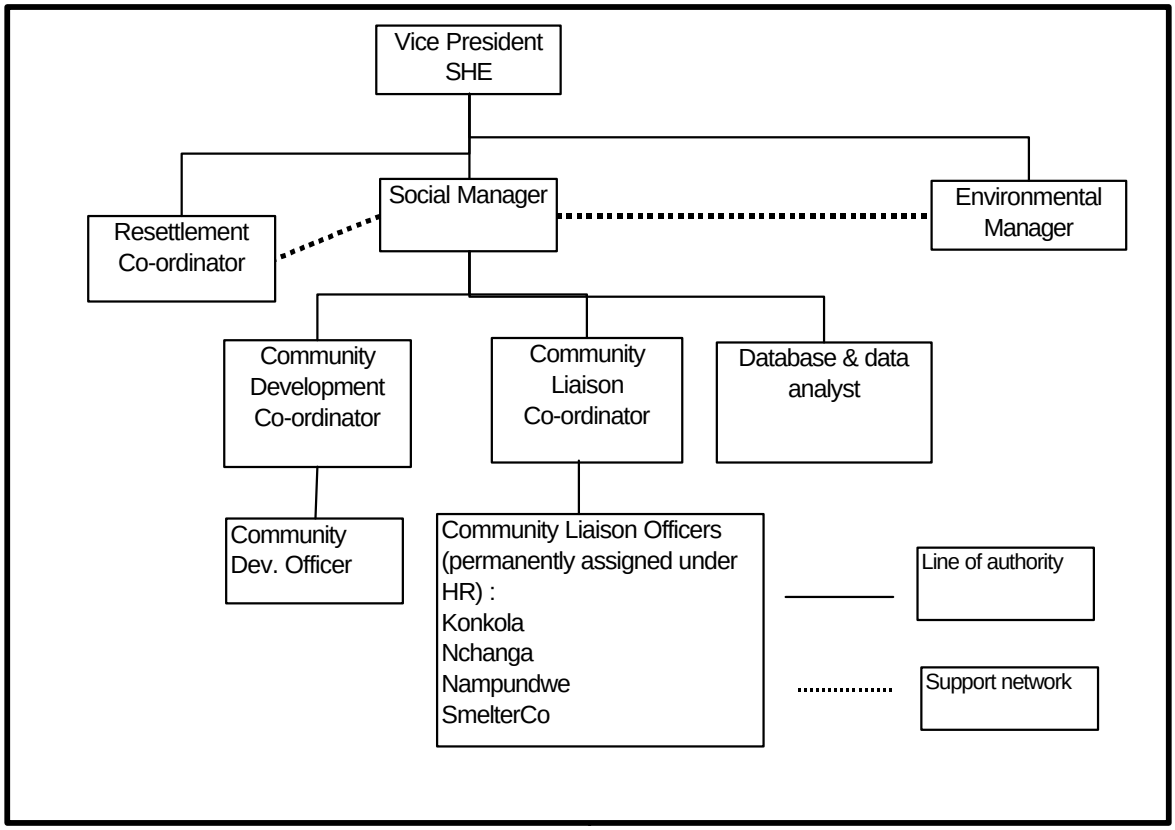


Figure 5.1 - SHE Department Structure for Social Management

The organisation of social management will be through 23 separate structures managed by the SHE Social Manager. These are:

- the SHE Department; and
- the Corporate Citizenship Unit (this is co-ordinating function).

When the KCM Executive Committee approves the establishment of a Corporate Foundation then the Social Manager will be responsible for its establishment and management. The

Corporate Foundation could then absorb the Economic Diversification Fund and the Corporate Citizenship Unit as a responsibility.

Job Descriptions

1. **Social Manager**

Overall Responsibility: To ensure that all Social Action Plans and Management Implementation Plans are carried out by the SHE Department and all other responsible Departments. The table below indicates the activities.

Table 5.2 - Activities to be undertaken by the Social Manager

Social Action Plan	Activities for the Social Manager
Employment and Retrenchment Plan	• To monitor the first retrenchment that will take place in March 2001 and ensure that retrenchment training is carried out effectively. • To work with the HR Department to design and implement retrenchment training plans for all workers. • To work with the HR Department to brief stakeholders on retrenchment plans as they are developed.
Local Economic Development Plan	• To work with the Supplies Department to design and implement a procurement strategy that supports local economic development. • To establish an Employment Centre to facilitate the establishment of local business.
Land Use and Settlement Plan	• To co-ordinate Land Use and Settlement Management Plans at each site together with relevant departments. • To undertake consultation with stakeholders on the implementation of the plans. • To monitor land use and settlement activities at each site. • To ensure participation of all stakeholders (e.g., traditional leaders, civic leaders) in the implementation of land use management decisions.
Education and Training Plan	• To undertake a feasibility study before closure of creating an independent Trust School. • To monitor the provision of support to Government schools as per the Social Action Plan. • To co-ordinate the provision of bursaries to the Schools of Mining and Engineering. • To facilitate the provision of support to Government institutions when feasible. • To develop and implement an environmental awareness programme.
Health and Welfare Plan	• To monitor and evaluate KCM medical services' collaboration with the government. • To assist with the implementation of an HIV/AIDS programme at all operations especially the awareness component. • To investigate within 12 months management options for all clubs and recreational facilities at all mine sites.
Physical Infrastructure Plan	• To investigate options and conduct feasibility studies for facilities, which are decommissioned over the life of the mine, KCM will investigate the options for handover of assets.
Community Management Support Plan	• To facilitate the establishment of community based land use management systems.
Disclosure and Consultation Plan	• To ensure that all legal requirements for disclosure are carried out at all sites from construction to post-closure. • To design and implement a communication strategy using a variety of communication channels.

Social Action Plan	Activities for the Social Manager
	• To manage the implementation of a series of Consultative Forums at all sites. The Consultative Forums meet every six months. • To design and manage a stakeholder database. • To design and implement a complaints and comments process for the public. • To co-ordinate an emergency procedure strategy with the Manager Environmental and stakeholders. • To implement an environmental awareness programme that indicates environmental risks to the public. • To design and implement a communication strategy. • To engage with stakeholders and undertake research on an on-going basis to understand the development agenda in the district and the province.
Training and Capacity Building Plan	• To ensure that key personnel understand the rationale of social management as part of corporate strategy into which individual tasks and responsibilities are tied. • To design, implement or outsource training packages for key personnel.
Co-ordination of Social Responsibility: Corporate Citizenship Unit	• To prepare final operational procedures for the Corporate Citizenship unit as a 5-year plan. • To co-ordinate all relevant departments activities into the Unit. • To implement auditing procedures in each department to monitor social investment expenditure. • To prepare monthly reports for the Executive Committee.
KCM Corporate Foundation	• To evaluate options for the establishment of a Corporate Foundation taking into account international best practice. • To design and establish a Corporate Foundation when the Executive Committee decides it is feasible.
Monitoring and Evaluation of Social Management	• To undertake an internal evaluation at the end of the second quarter. • To co-ordinate an annual evaluation. • To co-ordinate a benchmarking exercise for KCM in 2002. • To evaluate current plans and adjust future plans if necessary.

2. Community Liaison Co-ordinator

Overall Responsibility: To co-ordinate all liaison activities with stakeholders and implement Social Action Plan activities.

Table 5.3 - Activities for the Community Liaison Co-ordinator

Social Action Plan	Activities for the Community Liaison Co-ordinator
Employment and Retrenchment Plan	• To work with the HR Department to brief stakeholders on retrenchment plans as they are developed.
Local Economic Development Plan	• To work with the Supplies Department to design information packs about doing business with KCM.
Land Use and Settlement Plan	• To co-ordinate Land Use and Settlement Management Plans at each site together with relevant departments. • To undertake consultation with stakeholders on the implementation of the plans. • To monitor land use and settlement activities at each site. • To manage participation of all stakeholders (e.g., traditional leaders, civic leaders) in the implementation of land use management decisions.

Social Action Plan	Activities for the Community Liaison Co-ordinator
Education and Training Plan	• To develop and implement an environmental awareness programme.
Health and Welfare Plan	• To assist with the implementation of an HIV/AIDS programme at all operations especially the awareness component.
Community Management Support Plan	• To facilitate the establishment of community based land use management systems.
Disclosure and Consultation Plan	• To ensure that all legal requirements for disclosure are carried out at all sites from construction to post-closure. • To design and implement a communication strategy using a variety of communication channels. • To manage the implementation of a series of Consultative Forums at all sites. The Consultative Forums meet every six months. • To manage a stakeholder database. • To manage a queries and complaints system at each site and gather information continuously as per the Action Plan. To co-ordinate an emergency procedure strategy with Manager Environmental and stakeholders. • To implement an environmental awareness programme that indicates environmental risks to the public. • To engage with stakeholders and undertake research on an on-going basis to understand the development agenda in the district and the province. • To design and implement a communication strategy.
Training and Capacity Building Plan	• To facilitate training courses and programmes for internal and external stakeholders if feasible.

Training and Capacity Building Plan

Training and capacity building is an integral component of ensuring that the Social Management Plans are implemented successfully. The beneficiaries of the training and capacity building are not only members of the SHE Department but key personnel throughout the organisation.

The aim of training and capacity building is two-fold:

1. To ensure that key personnel understand the rationale of social management as part of corporate strategy into which individual tasks and responsibilities are tied.

2. To ensure that key personnel have the required skills to implement the tasks.

KCM will implement a series of workshops to mobilise the implementation of the Social Management Plan. As social management in KCM is based on the activities of various departments it is necessary to ensure that all departments understand the objectives of the plans and manage social issues from the same principles. In some cases different departments are required to work on the same projects or activities and this will require co-operation.

It is envisaged that the total period for the workshops will be 15 days for all sites.

The overall aim: Building KCM leadership within all departments to promote Corporate Citizenship.

Except for Nampundwe, all sites will attend the workshops at the same time:

1. Workshop 1: Introduction to Social Management Plan for all Departments (5 hours)

    - Opening from the CEO
    - Background to Social Management Plans
    - Introduction to Corporate Citizenship / sustainable development / human rights and business with an emphasis on perceptions and understandings of KCM individuals.
    - Results of social accounting audit
    - Highlight areas of social responsibility within each Department
    - Each department should form a mission statement around CSR
    - Corporate Citizenship Unit
    - Discuss the programme forward

2. Workshop 2: Theme: Employment and Retrenchment & Local Economic Development

    - Participating departments: HR, SHE, BPD project team, procurement, and corporate affairs
    - Procurement policies, local economic development

3. Workshop 3: Theme: Land Use and Settlement (6 hours)

    - Participating departments: SHE, HR, Security, Medical Services, Property management (administration)
    - Development of strategies for land use and settlement

4. Workshop 4: Theme: Education & Training, health & welfare (3 hours)

    - Participating departments: SHE, HR, medical services
    - Education: Schools, environmental training, technical college
    - Health: Hospital and health services
    - Welfare: Recreation and sports facilities

5. Workshop 5: Theme: Physical Infrastructure (3 hours)

    - Participating departments: Engineering services, administration, SHE
    - Provision of support to AHC and Mulonga

6. Workshop 6: Theme: Consultation and disclosure (5 hours)

    - Participating departments: SHE, HR, Corporate Affairs & Transition
    - Database management
    - Consultative and Planning Forums
    - Communication strategy

7. Workshop 7: Corporate Citizenship Unit (CCU)

    - Presentation of social management plans for each relevant department
    - CCU policy and mission statement
    - Terms of Reference

- Roles and Responsibilities
- Database Management
- Social Management Fund: Policies and procedures
- Establishment of a Steering Committee

Training and Capacity Building Requirements for Social Manager and Community Liaison Co-ordinator.

At a corporate level it is necessary to secure the following capacity building:

1. Social auditing.

2. Desktop publishing and database development and management.

3. Monitoring and evaluation of community development projects.

4. Attendance at relevant conferences on corporate social responsibility and corporate citizenship.

5. Corporate benchmarking procedures.

6. Study tour of other mines to establish best practice.

7. Understanding business principles in order to maximise shareholder value and societal value.

5.1.5.4 Corporate Citizenship Unit

The Corporate Citizenship Unit is an inter-departmental body. The main aims of the CCU are to:

- professionalise social responsibility and investment;
- provide a structure in which all KCM departments can implement social responsibility / investment activities which contribute to the success of the departments as well as adding value to society;
- ensure that money spent on social management activities is properly accounted for;
- ensure that all activities are recorded and reported in an annual social report;
- ensure that all activities mobilise core competencies within KCM and society;
- ensure that all activities promote partnerships in society and not dependency;
- ensure that all activities promote community and institutional capacity building; and
- ensure that social management activities are undertaken within an agreed framework of objectives and principles.

The KCM departments who will participate in the Corporate Citizenship Unit are the listed below.

Table 5.4 - KCM Departmental Participation in the Corporate Citizenship Unit

KCM Department	Area of Participation
Safety, Health and Environment	Overall management Environmental Awareness Programme All Action Plans
Human Resources	Employment and Retrenchment Education and Training Welfare
Corporate Affairs and Transition	Consultation and Disclosure Education and Training
Medical Services	Health
Engineering Services	Physical Infrastructure
Supplies and Contracts	Local Economic Development Health
Security	Land Use and Settlement
Administration	Land Use and Settlement Physical Infrastructure

Structure and Responsibility of CCU

The CCU will comprise a steering committee, the social manager, community liaison co-ordinator and site co-ordinators. The responsibilities of each group / member are the following:

Table 5.5 - Structure and responsibility of CCU participants

CCU Participant	Responsibility
Steering committee Vice President - SHE Vice President - HR Vice President - Corporate Affairs Vice President – Finance Social Manager	To assess social management funding requirements for participating departments. To conceptualise and champion Corporate Citizenship activities and programmes in KCM. To monitor and evaluate SMP activities. To manage the fund for SMP activities.
Social Manager	To develop assessment criteria for funding proposals. To implement monitoring and evaluation. To provide support to the steering committee. To provide ongoing training and awareness amongst KCM management on Corporate Citizenship. To compile the CCU social report at the end of each financial year.
Community liaison co-ordinator	To provide support to departments which engage communities in their activities. To implement monitoring and evaluation. To provide support to the social manager.
Site specific community liaison co-ordinators	To provide support to community based activities on each site.

Auditing Social Responsibility

KCM undertakes social investment activities throughout the company, some of which are part of the business, such as the KCM hospital, and others not part of business, such as providing assistance to the Asset Holding Company.

The Social Manager will undertake an audit of input costs to social responsibility and community involvement. The table below, adapted from the London Benchmarking Group (2000) provides a template for undertaking the audit. A financial cost will be established for each activity based on the cost type. For example if a KCM department provides assistance to society without a cash transaction then the costs of time must be established.

Each participating KCM department in the Corporate Citizenship Unit will use the template below to establish social responsibility costs. The Social Manager will design a form for recording the activities and costs and send through to the Social Manager for processing into the database.

Table 5.6 - Input Costs for Social Responsibility*

Type of Social Responsibility	Specific Activities	Cost Type
Activities Related to Core Business: These are to ensure that core business can continue and to reduce major societal risks associated with core business.		
Employment and Retrenchment	1. Retrenchment packages 2. Retrenchment training 3. Voluntary training 4. Re-training for continued employment	Cash + use KCM facilities
Health Services	1. Collaboration with government in delivery of health care services (e.g. malaria spraying campaign, rabies control, immunisation). 2. Management of hospitals and community clinics.	Cash, time.
Land Use and Settlement	1. Management of settlements in mine surface rights area.	Time
Education and Training	1. Provision of scholarships for mining and engineering students. 2. Provision of opportunities for students to work during university vacations.	Cash + on-site training
Disclosure and Consultation	3. Consultative Forums and Planning Forums, which include a broader district planning agenda.	Cash, time
Community Investment: Long-term strategic involvement in community partnerships to address a limited range of social issues chosen by the company to protect its long-term corporate interests and enhance its reputation.		
Education and Training	1. Management of schools and provision of education allowances. 2. Environmental awareness programmes in the form of lectures, publication of environmental education material and school environmental competitions.	Cash, time
Health Services	1. Provision of support to government hospitals and clinics. 2. Provision in all supply contracts that an HIV/AIDS programme is in place. Monitoring required.	Cash, time, in-kind
Physical Infrastructure	1. Provision of support to Asset Holding Company and Mulonga Water and Sanitation. 2. Repair of roads around mine and between Chingola and Chililabombwe. 3. Management of water, supply and energy at	Cash, time

Type of Social Responsibility	Specific Activities	Cost Type
	Nampundwe. 4. Hand over of mine facilities to economic opportunities.	
Local Economic Development	1. Establishment and management of Economic Diversification Initiative. 2. Establishment of Business Development Centre and development of material to build capacity. 3. Securing local suppliers through the Supplies Department.	Cash, time
Charitable gifts: Intermittent support to a wide range of good causes in response to the needs and appeals of charitable and community organisations, increasingly through partnerships between the company, its employees, customers and suppliers.		
Education and Training	1. Provision of used equipment such as computers. 2. Scholarships to universities. 3. Use of company premises.	In-kind, cash
Other forms of social responsibility	1. Donations to local, national and international appeals. 2. Sponsorship of causes or events with name recognition but not part of a marketing strategy. 3. Company matching of employee giving or fundraising. 4. Costs of supporting or promoting employee involvement in social causes. 5. Costs of facilitating giving by suppliers. 6. Costs of employee volunteering in company time. 7. Costs of secondments (short term or long term). 8. Written-down products or equipment	Cash, time

* Note: All costs that are reimbursed either by the beneficiary or through a debt-swop must be a separate entry.

KCM Corporate Foundation

International best practice for Social Management amongst mining companies is to establish a Corporate Foundation to manage and implement Corporate Social Responsibility activities.

The Corporate Foundation can take various forms. A thorough evaluation will be undertaken to develop the operational principles. Some options could include the following:

- A Foundation that is controlled by a department in KCM, such as the SHE Department. This Foundation will be funded through the Department operating expenses.

- A Foundation that is independent of KCM, which operates on separate principles to that of the core business. This Foundation will have a Board of Trustees with representation from KCM as well as other stakeholders. This Foundation will be funded by KCM as post-profits as a percentage of profits. This Foundation will be able to secure funds from other organisations in order to implement projects.

The evaluation of the Foundation will comprise of the following:

- The development of a mission statement. This will dictate the type of Foundation that KCM would like to have based on KCM corporate culture and management principles.

- Development of a financial model for the Foundation.

- Development of operational procedures. This will include integrating the Corporate Citizenship unit and the Economic Diversification Fund into the Foundation (if appropriate), criteria for providing assistance, integration of sustainable development objectives into all projects and programmes and the monitoring and evaluation of projects, programmes and beneficiaries.

5.1.5.5 Monitoring and Evaluation of Social Management

Monitoring and Evaluation is an integral component of Social Management. The first two years in particular are important, as this is an intense period of setting up systems and changing mindsets in the company about the role of KCM as a Corporate Citizen.

Monitoring of social management is undertaken in the following manner.

1. Undertaking an audit of procedures. The audit uses stakeholder interviews, reports, and database analysis.

2. Undertaking an audit of perceptions and views of KCM. This is done through stakeholder interviews, media analysis and database analysis.

3. Each aspect of KCM activities is evaluated using a social performance indicator. These are developed for each site. The performance indicators for the corporate level are a combination of the social responsibility audit process and the benchmarking process. It will be necessary in 12 months time to evaluate the Social Management Plan and critically re-assess the level of contribution KCM can make to society and build this into the following year's plan.

Schedule for Monitoring

Monitoring and evaluation will take place at the Corporate Level and will interface with site level monitoring and evaluation. The schedule for monitoring is the following:

1. The Social Manager will provide a monthly report to the Executive Committee. This will be a report of corporate responsibilities and milestones at each site.

2. KCM corporate level will undertake internal monitoring every six months. The Social Manager will be responsible for undertaking the evaluation. This will summarise the site level evaluation.

3. At the end of each financial year KCM will produce a social management evaluation report of all sites. This report is not a Public Relations exercise but a critical account of KCM Social Performance.

5.1.5.6 Benchmarking KCM Social Management

Aside from undertaking an ongoing audit of what KCM spends on Corporate Social Responsibility initiatives it is important to assess how KCM is operating according to best practice. In this regard a benchmarking exercise would be an appropriate tool to measure KCM impact on society.

Benchmarking answers three questions:

1. Where are we now?

2. Where do we want to go?

3. How do we get there?

The goal of benchmarking is to build on the success of others rather than re-inventing the wheel. By benchmarking on an ongoing basis KCM will always address current best practice, not outdated ideas.

The model in which KCM could work with, and which has been used to develop the Social Management Plans is that of Corporate Citizenship. As discussed in Section 1.3.1 it is about the values that KCM has in undertaking core business and making a contribution to society.

The main elements of this reflected in the Table below are adapted from the Prince of Wales Business Leaders Forum (1998), which will be used by KCM to establish social performance. It is important to view all elements as adding value to both shareholders and society – mutually beneficial. International best practice values both sides of the equation as part of corporate citizenship.

Table 5.7 - Benchmarking KCM Corporate Citizenship

Components of Corporate Citizenship	Current KCM Situation.	Strategic Options for the Future.	Implementation of Strategies
1. Maximising Profitable Performance: • Resources are used efficiently & enhanced for maximum performance. • Responsiveness to customer needs & opportunities is ensured. • Reputation is managed on an on-going basis and in an ethical way. • Risk is managed on an on-going basis and in an ethical way.			
2. Maximising Profitable Performance: • Resources are used efficiently & enhanced for maximum performance. • Responsiveness to customer needs & opportunities is ensured. • Reputation is managed on an on-going basis and in an ethical way. • Risk is managed on an on-going basis and in an ethical way.			

Components of Corporate Citizenship	Current KCM Situation.	Strategic Options for the Future.	Implementation of Strategies
3. Energising Future Business: • Ensuring the company has the right people and the most effective human resource development programme. • Processes are effective and environmentally sound. • Partners are committed to sustainable business practices.			
4. Optimising Business Multipliers: • Generating investment & income in the local, provincial and national contexts. • Creating jobs. • Developing human resources. • Providing goods and services. • Building local business systems. • Sharing international standards • Transferring technology • Establishing institutional and physical infrastructure			
5. Professionalising Social Investment and Philanthropy: • Money: From cash donations to innovative funding mechanisms which promote sustainable development. • In-kind support: From ad hoc approaches to mobilising core competencies in the community and the government. • From philanthropy and public relations to partnerships with community based organisations and government. • From charity to community capacity building and contributing to sustainable livelihoods.			
6. Legitimise Policy Dialogue: • Promoting ethical business practices amongst suppliers. • Creating an enabling environment for private enterprise and investment. • Supporting good governance • Contributing to economic, social and environmental policies in the districts and the province.			

The benchmarking exercise will be undertaken after 12 months of implementing the social management plans. It will be undertaken by an independent organisation which focuses on all stakeholders in the benchmarking process and adopts a range of tools to identify and analyse the main issues and components of corporate citizenship.

REFERENCES

AAC (Anglo American Corporation of South Africa Limited), 1997a. Report on Legal Requirements for Environmental Management for Konkola Mine and Mufulira Smelter; Mining Law and Property Section, Unpublished Report.

AAC (Anglo American Corporation of South Africa Limited), 1997b. Report on a Specialist Assessment of Occupational Health and Safety at Konkola Mine and Mufulira Smelter in Zambia; Environmental Engineering Department, Unpublished Report.

AAC (Anglo American Corporation of South Africa Limited), 2001. Konkola Deep Mining Project. Feasibility Study.

AATS (Anglo Technical Services), 1999a. Zambia Copper Investment Limited, KNNN Project – Environmental Issues for Active and Inactive Dumps and Open Pits on Nkana, Nchanga and Nampundwe Mines. July 1999.

AATS (Anglo Technical Services), 1999b. Anglo Base, KCM – Nchanga Mine – Proposed Erosion Control Measures for the Nchanga and Block A Open Pit Overburden Dumps. December 1999.

ACES (Anglo Coal Environmental Services), 2000a. Konkola Copper Mines Water Management, Konkola, Nchanga, SmelterCo and Nampundwe Operations. Submitted to KCM October 2000.

ACES (Anglo Coal Environmental Services), 2000b. Konkola Copper Mines – Land Rehabilitation, Mine Closure and General Environmental Issues. Submitted to KCM October 2000.

AMC (African Mining Consultants), 1998. Konkola Mine – LML3 – Environmental Audit. Prepared for ZCCM, October 1998.

AMC, 2001a. Konkola Copper Mines, Soil Contamination and Land Capability Evaluation – Nchanga, Konkola & Nampundwe Mine Sites. Draft February 2001.

AMC, 2001b. Konkola Copper Mines, Soil Contamination Evaluation – SmelterCo. Draft February 2001.

Burger, L.W. 1997. ZCCM Environmental Management Plan: Dispersion modelling of Nkana Smelter, Kitwe, Zambia. February. Report for a project done on behalf of Steffen Robertson and Kirsten Inc.

Burger, L.W., 1999. Assessment of the current air quality near the Nkana Smelter, Kitwe (Zambia). April. (Report on a project done on behalf of Envirolink a Division of the Anglo American Corporation of SA Ltd).

Chidumayo, E.N., Mbata, K., Chabwela, H., Munyandorero, J. & Cernak, J., 1997. A Specialist Environmental Assessment of the Ecology at the Konkola Mining Licence Area in Zambia; Unpublished Report.

Chishala, B.H., Mbewe, D.N., Msoni, R. & Kabwe, H.C., 1997. A Specialist Environmental Assessment of Soil Pollution in the vicinity of the Mufulira Smelter and a Soil Survey at the Konkola Deep Mining Project Licence Area in Zambia, Unpublished Report.

E. Martinelli & Associates, 1997. The Environmental Assessment of Groundwater in the vicinity of the Konkola Mine Lease Area and Mufulira Smelter in Zambia; Report No. 736, Unpublished Report.

EMS (Environmental Management Services), 1997. Proposed Konkola Deep Mine and Upgrading of Mufulira Smelter – Zambia: Impact Assessment Report: Air Pollution; Report No. EMS/97/ANG-01, Unpub Report.

Envirolink, 1999a. KCM Project, Environmental Audit, Part A: Volume 1 Konkola Environmental Assessment. Prepared by Envirolink on behalf of Zambia Copper Investment Limited, November 1999.

Envirolink, 1999b. KCM Project, Environmental Audit, Part A: Volume 2 Description of Current Operations and Environmental Baseline, Nchanga and Nampundwe Mines. Prepared by Envirolink on behalf of Zambia Copper Investment Limited, November 1999.

Envirolink, 1999c. KCM Project, Environmental Audit, Part A: Volume 3, Health and Safety Audit. Prepared by Envirolink on behalf of Zambia Copper Investment Limited, November 1999.

Envirolink, 1999d. KCM Project, Environmental Audit, Part B: Volume 1, Interim Environmental Management Plan (IEMP). Prepared by Envirolink on behalf of Zambia Copper Investment Limited, November 1999.

Envirolink, 1999e. KCM Project, Environmental Audit, Part B: Volume 2, Interim social Management Plan (ISMP). Prepared by Envirolink on behalf of Zambia Copper Investment Limited, November 1999.

Envirolink, 2000. KCM & Nkana SmelterCo – Public Consultation and Disclosure of the Environmental Audit, Volume I, Report and Volume II, Appendices. Prepared for KCM, February 2000.

Fractal Forest Africa/ForestWood, 2001. Sustainable Timber Utilisation - Konkola Copper Mines. Submitted to KCM March 2001

Government of Zambia, 1972. Mining (Dumps) Regulations, 1972.

Government of Zambia, 1995. Mines and Minerals Act (Act No. 31 of 1995).

Government of Zambia, 1997. Mines and Minerals (Environmental) Regulations, 1997.

GRZ/ZCCM Privatisation Negotiating Team, 1999. KNNN Co Package – Final Draft of ZCCM's Environmental Remedial Work Agreed upon by ZCI-lead Consortium and ZCCM Limited. August 1999.

Guerreiro, C. and Sivertsen, B., 1998. Passive sampling of SO_2 and NO_2 ambient air concentrations in Zambia. Norsk institutt for luftforskning, Norway.

INR (Institute for Natural Resources), 1997a. Social Impact Assessment. Privatisation of Zambian Consolidated Copper Mines Limited. Konkola/Chililabombwe and Mufulira, Investigational Report No.161, Unpublished Report.

Institutional Investor, 1995. Zambia: A peaceful revolution. Vol.20, No. 9, September, pp.3-24.

ISO (International Standards Organisation), 1996. Environmental Management Systems – General guidelines on principles, systems and supporting techniques; ISO, Geneva.

Knight Piesold, 1997. Konkola and Mufulira Divisions, Zambia. Specialist Environmental Assessment; Report No. 2200/10/01, Unpublished Report.

Knight Piésold, 2001a. Lubengele Tailings Disposal Facility - Environmental Management Plan, Konkola Division – Konkola Mining Licence Area. Submitted to KCM January 2001.

Knight Piésold, 2001b. Nampundwe Tailings Disposal Facility - Environmental Management Plan, Nampundwe Mining Licence Area. Submitted to KCM January 2001.

Knight Piésold, 2001c. Nchanga Tailings Disposal Facility - Environmental Management Plan, Nchanga Division – Nchanga Mining Licence Area. Submitted to KCM January 2001.

KCM (Konkola Copper Mines plc), 2000a. Corporate Information Brochure.

KCM, 2000b. Interim Training and Development Plan.

KCM, 2001. Hydro Versus Pyro Process Trade-off Study on Environmental Aspects. Final Draft Report.

Lees, H.M.N., 1962. Working plan for the forests supplying the Copperbelt, Western Province; Government Printer; Lusaka, Zambia.

LVA (Loxton, Venn & Associates), 1997. Konkola Deep Mining Project – Zambia. Assessment of Commercial Plantations and Indigenous Timber use at Mufulira and Konkola, Unpubl. Report.

Mining Mirror, 1998. Zambian Copperbelt and Democratic Republic of Congo – Minerals Overview. April, 48-49.

MRC (Medical Research Council), 1997. Specialist environmental Assessment of Community Health in the Vicinity of the Konkola Mining Licence Area and Mufulira Smelter in Zambia; Unpub. Report.

Musonda, M.V. and Simashikwe, N.M., 1997. Aquatic Resources; ZCCM Konkola Division Environmental Impact Statement, Appendix B; Unpub Report.

Nelson J., 1998. Building competitiveness and communities. *How world class companies are creating shareholder value and societal value.* The Prince of Wales Business Leaders Forum in collaboration with The World Bank and The United Nations Development Programme, London, United Kingdom.

RauEcon, 2001. Environmental Risk Assessment: Consumption of fish from the Lubengele and Muntimpa Tailings Dams, Copperbelt, Zambia. Prepared for KCM, Draft Report dated February 2001.

Ross, R.D., 1972. Air Pollution and Industry; Van Nostrand Publishers. New York.

Schoeman, N., 1997. Konkola Element Balance; KDMP personal communication; Unpublished Report.

Sibanyama Mudenda, 2000. Archaeological Investigations at Konkola and their Regional Implications on the Copperbelt, Zambia. Prepared by the Lusaka National Museum for KCM, November 2000.

SRK (Steffen, Robertson and Kirsten), 1993. Initial Environmental Examination for the Konkola Mining Division; SRK Report No. Z103101, Unpublished Report.

SRK, 1996a. Konkola Division Mining Licence Area ML7 Environmental Management Plan (Volume 2); SRK Report 229803/ML7, Unpublished Report.

SRK 1996b. ZCCM – Nampundwe Mining Licence Area ML2: Environmental Management Plan. (Volume 2 of Environmental Impact Statement).

SRK 1996c. ZCCM Nchanga Division – Nchanga Mining Licence Area – ML10: Environmental Management Plan. Report No 229803/ML3. September. (Volume 2 of Environmental Impact Statement).

SRK 1996d. ZCCM Nkana Division – Nkana Mining Licence Area - ML3: Environmental Management Plan. Report No 229803/ML3. September. (Volume 2 of Environmental Impact Statement).

SRK, 1996e. Environmental Impact Statement: Appendix C – Socio-Economic Issues, Unpublished Report.

SRK, 1997a. ZCCM Konkola Division – Konkola Mining Licence Area – ML7: Environmental Impact Statement. Volume 1: Executive Summary. Volume 3 Environmental Impact Statement. Volume 4 Appendices. March 1997.

SRK, 1997b. ZCCM Nampundwe Division – Nampundwe Mining Licence Area – ML2: Environmental Impact Statement. Volume 1: Executive Summary. Volume 3 Environmental Impact Statement. Volume 4 Appendices. March 1997.

SRK, 1997c. ZCCM Nchanga Division – Nchanga Mining Licence Area – ML10: Environmental Impact Statement. Volume 1: Executive Summary. Volume 3 Environmental Impact Statement. Volume 4 Appendices. March 1997.

SRK, 1997d. ZCCM Nkana Division – Nkana Mining Licence Area – ML3: Environmental Impact Statement. Volume 1: Executive Summary. Volume 3 Environmental Impact Statement. Volume 4 Appendices. March 1997.

SRK, Knight Piésold and African Mining Consultants. 1997. ZCCM Nampundwe Division ML2 - Environmental Impact Statement. “Rehabilitation and Decommissioning Plan and Environmental Cost Protection” Prepared for ZCCM Ltd.

SRK, 1998. Zambian Consolidated Copper Mines. External Environmental Audit of the Nampundwe Mining Licence Area.

Techpro, 1994. Konkola Deep Mining Project: Volume 11 – Environmental Impact Assessment; Unpub. Report.

WHO (World Heath Organisation), 1979. Environmental Health Criteria 8, Sulphur Oxides and Suspended Particulate Matter, UNEP and WHO, Geneva.

WHO, 2000. Guidelines for Air Quality, report published by the World Health Organisation in May 2000.

Wild, A., 1993. Soils and the Environment – An Introduction; Cambridge University Press.

WMC (Water Management Consultants Ltd.), 2001a. Konkola Mine, Groundwater Impact Assessment, Konkola, Zambia.

WMC, 2001b. Nchanga Mine, Groundwater Impact Assessment, Chingola, Zambia.

WMC, 2001c. Nampundwe Mine, Groundwater Impact Assessment, Nampundwe, Zambia.

WMC, 2001d. SmelterCo Smelter, Groundwater Impact Assessment, Kitwe, Zambia.

Yager, T.U., Lee C.A. and Prefect, G.A., 1968. M F Makulu Research Station Soil Survey Report No 2. A detailed soil survey of Copperbelt Regional Research Stations.

ZCCM (Zambia Consolidated Copper Mines), 1995. Konkola Deep Mining Project; Project Manual Summary, Volume I; Unpub. Report.

ZCCM, 1996. Konkola Division: Summary Report on the Socio-economic Assets; Human Resources Department, Unpub. Report.

APPENDIX A

Regulations and Guidelines

TABLE OF CONTENTS

Page

LIST OF TABLES

TABLE OF CONTENTS

Page

1.0 LEGAL FRAME

Zambian legal requirements, contractual agreements governing the privatisation process and IFC/ World Bank policies and guidelines have had important bearing on the contents of the various documents submitted to date and, in particular, on the management actions outlined in the IEMPs and ISMPs and, subsequently, in the Final Environmental and Social Management Plans.

A survey of Zambian legislation and the IFC/ World Bank policies and guidelines was undertaken as part of the EA process for the original KDMP to identify the requirements for environmental protection. The following Acts were surveyed:

- Actions for Smoke Damage (Prohibition) Act Cap.327 of the Laws of Zambia
- The Bancroft Mine Township By-Laws
- Electricity Act No. 15 of 1995
- Energy Regulation Act No.16 of 1995
- The Environmental Protection and Pollution Control Act No.12 of 1990 and its Regulations, including:
  - The Environmental Protection and Pollution Control (Environmental Impact Assessment Regulations, 1997)
  - The Air Pollution Control (Licensing and Emission Standards) Regulations, SI No. 141 of 1996
  - The Water Pollution Control (Effluent and Waste Water) Regulations SI No.72 of 1993
  - The Pesticides and Toxic Substances Regulations SI No. 20 of 1994
  - The Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations 1993
- Explosives Act Cap.102 of the Laws of Zambia
- Forests Act Cap. 311 of the Laws of Zambia
- The Ionising Radiation Act Cap.552 and its Regulations
- The Ionising Radiation Protection Regulations SI. No. 171 of 1992
- The Investment Act No.39 of 1993
- The Land Act No.29 of 1995
- The Local Administration Act No. 15 of 1980 and its Mining Regulations
  - The Local Administration (Trade Effluent) Regulations SI No. 161 of 1985
- The Local Government Act No.22 of 1991
- The Mines and Mineral Act No.31 of 1995 and its Regulations
  - The Mines and Minerals (Environmental) Regulations SI. No.29 of 1997
  - The Mining (Mineral Resources Extraction) Regulations SI No.119 of 1994
- The Mufulira Mine Township By-Laws
- The National Heritage Conservation Commission Act No.23 of 1989
- The National Parks and Wildlife Act No.10 of 1991
- Pneumoconiosis Act Cap.326 of the Law of Zambia
- Public Health Act Cap.535 of the Laws of Zambia
- Town and Country Planning Act Cap. 475
- Water Act Cap. 312 of the Laws of Zambia

The Mining and Minerals (Environmental) Regulations SSI N0. 29 of 1997 outline the process to be followed in producing an EIS for project approval by the Zambian authorities. The Mines Safety Department administers these regulations. In the case of mining projects the

requirements of the Mining Environmental Regulations have precedence over the Environmental Protection and Pollution Control Regulations. The latter regulations outline the EIA process to be followed for non-mining projects.

The following World Bank/ IFC polices and guidelines were considered:

- Procedure for the Environmental and Social Review of Projects, December 1998
- Pollution Prevention and Abatement Handbook, 1998
  - Base Metal and Iron Ore Mining
  - Copper Smelting;
- Operational Procedures/ Directives/ Policy Notes:
  - Natural Habitats (OP 4.04), November 1998
  - Involuntary Resettlement (OP 4.30), June 1990
  - Safety of Dams (OP 4.37), May 1999
  - Managing Cultural Property (OP 11.03), September, 1998
- Environmental, Health and Safety Guidelines:
  - Forestry Operations: Logging
  - General Health and Safety
  - Guidelines for Hospitals
  - Polychlorinated Biphenyls (PCBs)

Other national and international standards were consulted for comparison or where no Zambian or World Bank/ IFC standards were available.

A comprehensive register of the Zambian environmental legislation and World Bank/ IFC guidelines has been produced (AAC, 1997a). The legal and other environmental performance requirements, which have the greatest bearing on this assessment, are summarised below. Procedural requirements for the submission of information to the authorities, application for permission and licensing have not been included in the summary.

2.0 ASPECTS

Environmental guidelines and standards often aim to prevent environmental impacts by placing restrictions on the characteristics of the environmental aspects that can cause the impacts. This document does not go into the details of an Environmental Impact Assessment (EIA) process and instead relies on impact assessments conducted as part of previous studies.

2.1 Definition of Aspects

Simplistically an EIA aims to identify the impacts that may result from the activities associated with a project. However, for management to be focused it is essential that the mechanisms causing the impact are understood. This concept is promoted by the International Standards Organisation (ISO) Environmental Management System (EMS) standards, where the mechanisms that can cause environmental impacts are termed environmental aspects and defined as follows:

Environmental aspects refer to an element of an organisation's activity product or service which can have a beneficial or adverse impact on the environment. For example, it could involve a discharge, an emission, consumption or reuse of a material, or noise (ISO 14004, 1996).

The following four steps are proposed by the ISO standards:

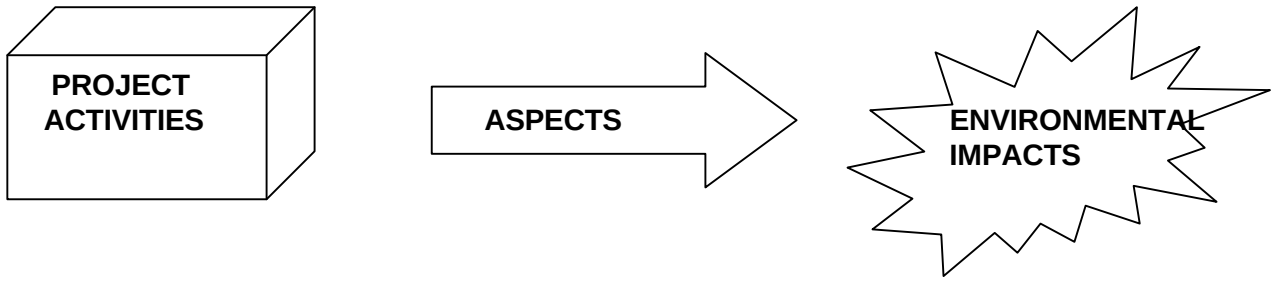
- Step 1 - Select an activity
- Step 2 - Identify environmental aspects of the activity
- Step 3 - Identify environmental impacts
- Step 4 - Evaluate significance of impacts.

The relationship between environmental aspects and environmental impacts is one of cause and effect.

For example:

Activity	**Aspect**	**Impact**
Waste disposal	Contaminated seepage	Groundwater contamination
Handling of hazardous materials	Accidental spillage	Soil contamination

This can be illustrated as follows:



The aspects are the "mechanisms" associated with the project activities, which have the potential to cause environmental impacts.

The categories of aspects that were identified and considered are listed in Table 2.1.

Table 2.1 - Categories of Environmental Aspects

Categories	Sub-categories
Raw Material and Energy Consumption	• Consumption of primary resources • Electricity or fuel consumption • Resource wastage
Water Abstraction/Consumption	• River water • Underground water
Releases to Water	• Diffuse sources (seepage/ run-off) • Point sources
Releases to Air	• Diffuse sources (fugitive dust etc.) • Point sources
Invisible Releases	• Elevated noise • Vibrations • Health risks
Land Transformation	• Land occupation • Structures and excavations (physical hazards) • Under-mining • Other modifications
External Incidents	• Release of hazardous substances • Structural failure
Workplace Aspects	• Noise • Illumination • Radiation • Dust • Heat and fumes • Fire and explosion • Asbestos dust • Hazardous material • Safety
Social Aspects	• Communication • Employment/retrenchment • Provision of services • Health care • Education and training • Housing • Population change: increase/influx/decrease • Uncontrolled settlements • Resettlement • Recreational facilities • Overall socio-economic welfare

Impacts on the environments listed in Table 2.2 were assessed.

Table 2.2 - Categorisation of the Environment

Environment		Description
Bio-physical	Soil and land capability	The inherent value (agriculture, conservation etc.) of the land.
	Topography	The shape and stability of the land surface.
	Surface water	Rivers, streams, dams, pans etc.
	Groundwater	Underground water.
	Air quality	Ambient air.
	Terrestrial ecology	Plants and animals living on dry land.
	Aquatic ecology	Plants and animals living in water.
	Archaeology	Sites of cultural or historical significance.
	Global issues	Environmental issues which may not be significant locally but are of international concern. For example: energy consumption, depletion of resources, release of green-house or ozone-depleting gasses etc.
Social/ human	Workplace	The buildings and other areas where employees work.
	Mine "high cost" housing community	Residential area for professional and technical mine staff. The suburbs are relatively affluent and houses and plots are generally large.
	Mine "low cost" housing community	Residential areas that were originally designed to accommodate lower income miners.
	Council "high cost" housing community	Relatively affluent residential areas under the control of the Municipal Councils. The houses and plots are generally large.
	Council "low cost" housing community	Residential areas under the control of the council occupied by people of limited financial means. The houses and plots are small and over-crowded.
	Kawama community	Kawama is a resettlement area at Konkola under the control of the Council.
	Unauthorised or informal settlements	Settlements without formal planning largely occupied by poor, unemployed people living without formal authorisation on mine land.

The following legislation and guidelines apply to the categories of aspects (see Table 2.1) considered in this assessment.

2.2 External Aspects

2.2.1 Raw Material and Energy Consumption

No specific limits are set for the consumption of raw materials or energy. However, energy efficiency and resource conservation are dictated by:

- International pressure;
- The necessity to minimise downstream impacts associated with resource extraction or energy generation;
- Economic considerations.

2.2.2 Water Abstraction/ Consumption

No absolute limits are set for water abstraction or consumption. Acceptable levels are determined by considering, amongst others, the availability of water, needs of others uses and the impact on the surface or groundwater environments.

2.2.3 Releases to Water

Table 2.3 compares the legislated Zambian effluent standards with World Bank guidelines and target values the current KCM operations have adopted. The Zambian legislation is generally similar to the World Bank guidelines, with the exception of total suspended solids and copper. These two parameters are typically the most problematic at the current operations.

Table 2.3 - Effluent Standards and Guidelines

Parameter	Zambian Legislation	KCM Targets	World Bank Guidelines		
			Base Metal & Iron Ore Mining	General Guidelines	Copper Smelting
PH	6.0-9.0	6.5-9.0	6-9		
BOD_5	50mg//	-	50mg//		
COD			150 mg//	250 mg//	-
Oil and greases	20mg//	-	10mg//	10 mg//	
Total suspended solids (TSS)	100mg//	100mg//	50mg//	50mg//	50mg//
Dissolved solids	3000mg//	1500mg//	-	-	-
Heavy metals – Total	-	-	10mg//	-	10 mg//
Arsenic	0.5mg//	-	0.1mg//	0.1mg//	
Cadmium	0.5mg//	-	0.1mg/l		0.1 mg//
Chrome, total	0.1mg//	-	0.1mg//	-	-
Copper, total	1.5mg//	3.0mg//	0.5mg//	0.3mg//	0.5mg//
Copper, dissolved	-	1.0mg//	-	-	-
Cobalt, total	1.0mg//	1.0mg//	-	-	-
Cobalt, dissolved	-	0.5mg//	-	-	-
Iron, total	2.0mg//	2.0mg//	3.5 mg//	2.0mg//	3.5 mg//
Iron, dissolved	-	1.5mg//			
Lead	0.5mg//	-	0.2 mg//	0.6mg/l	0.1mg//
Manganese, total	1.0mg//	0.5mg//	-	-	-
Mercury	0.002mg//	-	0.01mg//	0.002mg//	0.01 mg//
Nickel	0.5mg//	-	0.1mg//	0.5mg/l	
Selenium	0.02mg//	-	0.1mg//	-	10mg//
Zinc	10mg//	-	2.0mg//	1.0mg//	1.0mg//
Chlorine, total residual	-	-	1mg//	0.2	-
Sulphide	-	-	1mg//	0.1	-
Temperature, at point of entry	40°C	-	-	-	-
Temperature, at edge of mixing zone	-	-	3°C above ambient	5°C above ambient, 3°C if receiving water>28°C	

Zambian limits from “The Water Pollution Control (Effluent and Waste Water) Regulations 1993, third schedule”.

2.2.4 Releases to Ambient Air

The limits for the concentration of pollutants in stack emissions in given in Table 2.4. The Zambian legislation is the same as the World Bank guidelines.

Table 2.4 - Emission Standards and Guidelines (mg/Nm^3)

	Zambian Legislation[1]	World Bank Guidelines for Copper Smelting
Sulphur Dioxide	1000	1000
Arsenic	0.5	0.5
Cadmium	0.05	0.05
Copper	1.0	1.0
Lead	0.2	0.2
Mercury	0.05	0.05
Particulates- Smelter	50	20
Particulates – Other Sources		50

The Air Pollution (Licensing and Emission Standards) Regulations, 1996; Third Schedule; Long-term emission limits.

In addition to the limits provided in Table 2.4, the Mining (Mineral Resource Extraction) Regulations, 1994 impose monetary penalties for the emission of sulphur. A fee of 10 Kwacha per kg sulphur is levied for all sulphur exceeding 30% of the difference between the sulphur in the input materials and the non-gaseous waste products. A fee of 50 Kwacha is levied for every kilogram of sulphur contained in fugitive emissions.

2.2.5 Invisible Releases

2.2.5.1 Elevated Noise

Source limits are not usually set. Guidelines and standards are rather set for acceptable noise levels in the surrounding environment, usually at the plant boundary. Compliance can, therefore, be achieved either by reducing the levels at source or by increasing the distance between the noise source and the receptors.

2.2.5.2 Vibrations

No source limits are known to apply. Disturbance or damage caused to the surrounding environment are the criteria usually used for determining acceptable vibration levels. As with noise, acceptable performance can be achieved either be reducing the vibrations or ensuring adequate buffering distance.

2.2.5.3 Health Risks

The Zambian Public Health Act stipulates that:

(i) any collection of water, sewerage, rubbish, refuse, ordure or other fluid or solid substance which permits or facilitates the breeding or multiplication of animal or vegetable parasites of men or domestic animals, or of insects or of other agents, which are known to carry such parasites, or which may otherwise cause or facilitate the infection of men or domestic animals by such parasite;

(ii) any collection of water in any well, pool, gutter, channel, depression, excavation, barrel, bucket or any other article found to contain mosquito larvae; and

(iii) any cesspit, latrine, urinal, dung-pit or ash-pit found to contain mosquito larvae;

will be considered nuisances.

The occupier or owner of premises must keep such premises free from all bottles, tins, boxes, or any other articles which are likely to retain water. A fine of K10 will be imposed for anyone who fails to comply with this provision.

The Act also aims to control mosquitoes by requiring owners or occupiers of premises or land within a township to prevent:

- the area from becoming overgrown with bush or long grass which is likely to harbour mosquitoes;
- the collection of water in any well, or other vessel intended for the storage of water, unless such vessel is fitted with a sufficient cover which is kept in good repair and properly protected or screened to prevent the ingress of.

The Act prohibits anyone causing a nuisance or any other condition likely to be dangerous to health on the land that they own or occupy. Section 67 of the Act defines what is deemed to be a nuisance. These include:

- the pollution of potable water (see below);
- the discharge of noxious matter or waste water into any water course not approved for the reception of such discharge;
- the accumulation or deposit of waste which is offensive or injurious or dangerous to health;
- overcrowded premises;
- premises without sufficient lighting or ventilation;
- dangerous buildings; and
- factories giving rise to smells and effluents which are offensive or dangerous to health.

The Mining Environmental Regulations requires the quality of water provided to employees to be in line with World Health Organisation (WHO) guidelines.

Table 2.5 - WHO Guideline Values for Drinking Water Quality

Health-related		Aesthetic	
Constituent	**Guideline value (mg/l)**	**Constituent**	**Guideline value**
Arsenic	0.01	Aluminium	0.2 mg//
Cadmium	0.003	Chloride	250 mg//
Chromium	0.05	Colour	15 True Colour Units
Cyanide	0.07	Copper	1.0 mg//
Fluoride	1.5	Hardness	500 mg/l as $CaCO_3$
Lead	0.01	Hydrogen Sulphide	0.05 mg//
Mercury	0.001	Iron	0.3 mg//
Nitrate (as N)	10.00	Manganese	0.01 mg//
Selenium	0.01	PH	6.5 – 8.5
		Sodium	200 mg//
		Total Dissolved Solids	1000 mg//
		Sulphate	250 mg//
		Taste and colour	Not offensive
		Zinc	3.0 mg//

According to the South African Foodstuffs, Cosmetics, and Disinfectants Act, Act no 54 of 1972 (updated 21 June 1996) the concentration of copper in food should be below the following limits:

Table 2.6 - Recommended Maximum Concentration of Copper in Food

Food Type	Standard (mg/kg)
Meat	30
Fish	30
Shellfish	50
Fruit and vegetables	30
Cereals	30
Any other foodstuffs	30

The Air Pollution Control (Licensing and Emission Standards) Regulations prohibit the open air burning of any waste from industrial or domestic activities without the consent of the Inspectorate.

The IFC Guidelines for Hospitals require that hospitals and medical centres develop and implement a comprehensive waste management system and that the system be based on the following principles:

a) “A plan should be developed under the direction of a property trained waste management officer designated for the facility.
b) The should include the substitution of hazardous chemical agents, where practical, with less hazardous substances.
c) All pathogenic, infectious, and hazardous (sharp, radioactive, toxic, and flammable or explosive) wastes must be segregated from general wastes.
d) Appropriate handling, storage and transport methods must be established for all operations.
e) Adequate treatment and disposal methods must be used for all wastes.
f) A monitoring program must be implemented, including frequent spot surveys in problems or high-risk areas.”

More detailed guidelines are provided in regard to medical wastes handling and storage, treatment and disposal methods, hazardous material handling and storage, fire protection and life safety, hazards protection and general health and safety guidelines. Once again the need for the training of employees, record keeping and reporting is emphasised in the guidelines.

The IFC Guidelines on Polychlorinated Biphenyls (PCBs) require the replacement of PCB transformers with PCB-free transformers where routine replacement and maintenance requires this. Specific guidelines are then set out in regard to labelling, monitoring, retrofilling, transport, storage, disposal, fire, security, occupational health and safety, work in confined spaces and record keeping and reporting of sources of PCBs.

2.2.6 Land Transformation

2.2.6.1 Land Occupation

The Mines and Minerals Act imposes the following restrictions:

A mining licence holder must not exercise any of his rights under the Act or his license:

(i) without the consent of the owner or legal occupier:
- on any land which is the site of or is within 180 metres of any inhibited, occupied or temporarily uninhabited house or building;
- within 45 metres of any land which has been cleared or ploughed or otherwise prepared in good faith for growing farm crops or upon which farm crops are growing;
- on any land which is the site of or is within 90 metres of a cattle dip, tank, dam or any private water as defined in the Water Act; or
- on any land that forms part of an aerodrome.

(ii) without the written consent of the railway administration, on any land reserved for any railway track or within 100m of any railway track;

(iii) without the written consent of the appropriate authority or local authority on any land within, or within 60 metres of the boundaries of any city, municipality, township for which a council has been established under the Local Government Act;

(iv) without the written consent of the appropriate authority, on any land used as a forest nursery or plantation or as a timber depot, sawmill or other installation for working a forest;

(v) without complying with the relevant provisions of the Forests Act, on any land declared to be a national or local forest by the Act;

(vi) without the written consent of the appropriate authority or public body, on any street, road, or highway;

(vii) without complying with the National Parks and Wildlife Act, on any land comprised in a National Park;

(viii) without the necessary permission, on any land that cannot be developed without permission under the Town and Country Planning Act.

2.2.6.2 Structures and Excavations

The Mines and Minerals (Environmental) Regulations requires that:

A developer who makes, or causes any other person to make an excavation into which a person or animal may fall, must make a regular ridge around the boundary of the excavation or take other necessary safety measures.

2.2.6.3 Under-Mining

In terms of the Mines and Minerals (Environmental) Regulations:

Permission from the Director of Mine Safety is required before:

(i) mining operations can be carried out that are likely to cause a crack, subsidence or cavity on the surface within a horizontal distance of 100 metres from any building, road, railway, lake, river or any other structure or feature on the surface requiring protection; or

(ii) constructing or erecting a building, powerline, road or railway within 100 metres from the line of break of a caving area.

2.2.7 External Incidents

2.2.7.1 Release of Hazardous Substances

The Mines and Minerals (Environmental) Regulations prohibits the washing of petrol or fuel oil into any drainage system or any place where it could cause danger. Where any petrol or fuel oil is spilled it must be removed immediately. If in the process of removing the spillage, any material is contaminated, it must be placed in a suitable container and subsequently destroyed or disposed of.

The numerous requirements contained in, amongst others, the Environmental Protection and Pollution Control Act and the World Bank/IFC guidelines for the labelling, handling and storage of hazardous substances are primarily aimed at prevention of accidental release. The requirements include:

- Storage and liquid impoundment areas for fuels should be designed with secondary containment (dykes, berms) to prevent spills and the contamination of soil, groundwater and surface water.

2.2.7.2 Structural Failure

The Mining Regulations contain numerous requirements for the classification and management of dumps. A competent person must be appointed to supervise every classified dump and must submit a report containing, amongst others:

- an opinion stating whether the dump is secure;
- an opinion stating whether, so far as the person making the report can ascertain, there has been any change in the design of the dump or in the nature of material deposited, or whether there has been a departure from the original design other than that noted in any previous report and the details of such change or departure;
- an opinion stating whether, so far as can be ascertained, there has occurred or is likely to occur, any subsidence or other surface movement which may affect the security of the dump, details and the effect or probable effect of such movements on the security of the dump or mine workings, whether abandoned or not;
- an account of any survey, test borehole or ground water measurements made for the report and their results; and
- the measures which, in his opinion, are necessary during any dumping operations to ensure the security of the dump and its surroundings and the avoidance of pollution and prevention of nuisance.

The Mining Environmental Regulations prohibits the dumping of any material in solution or suspension (or which may turn into a solution or suspension) above any mine workings, or within 100m from where the line of break from the mine workings intersects the surface. In addition, the developer must ensure that a dump is properly drained and must not carry out any dumping operations that may cause accumulation of water in, under or near a dump, making the dump insecure or dangerous. The following must be ensured:

- the drainage system of a dump is maintained and is in good working condition;
- regular inspections of the dump are made
- the dump is kept secure and safe

The drainage from any dumping operation should not be allowed to enter any mine opening or subsiding ground over any mine workings, whether abandoned or not.

The World Bank Safety of Dams Guidelines [World Bank Version OP 4.37 -Approved May 1999] set out the following requirements:

“For the life of any dam, the owner has full responsibility for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails, the Bank is concerned about the safety of new dams it finances and existing dams on which a Bank-financed project is directly dependent”.

For large dams- that is, dams that are 15 metres or more in height, or are between 10 and 15 meters and present special design complexities (e.g., an unusually large flood-handling requirement, location in a zone of high seismicity, or foundations that are complex and difficult to prepare) the Bank requires;

- reviews by an independent panel of experts throughout investigation, design, and construction of the dam and the start of operations;
- preparation and implementation of detailed plans: a plan for construction supervision and quality assurance, a plan for instrumentation, an operation and maintenance plan, and an emergency preparedness plan;
- prequalification of bidders during procurement and bid tendering; and

- periodic safety inspections of the dam after completion."

According to the World Bank Guidelines for the Environmental Assessment of Mining Projects the critical issues to consider in evaluating alternative tailings disposal options include:

- the geochemical characteristics of the area to be impounded/inundated by tailings, and potential for leachate migration from tailings;
- seismicity of the area, or other natural hazards and risks that might affect the suitability of potential disposal areas or influence the engineering design;
- other siting issues including conflict with sites of ecological, cultural heritage, agricultural or other importance;
- chemical characteristics of sands, slimes and pond water, and requirements for treatment;
- the water management regime and requirements to discharge effluent (if any) and the degree of treatment required; and
- the reclamation potential of the site.

2.3 Workplace Aspects

In terms of the Mines and Minerals (Environmental) Regulations the provisions of any legislation on occupational health and safety will apply to any person employed at a mine that is at risk of contracting any occupational illness. There is currently a draft bill on Occupational Health and Safety. The Bill has not been finalised and it is not clear when it will be enacted.

2.3.1 Noise

The present ZCCM Hearing Conservation Programme (HCP) sets 90dB(A) as the maximum noise level for unprotected exposure. Internationally, 85dB(A) is typically applied.

The IFC general health and safety guidelines require that personnel use hearing protection when exposed to noise levels above 85 dBA and that controls be put in place to generally reduce the average noise levels in work areas.

2.3.2 Illumination

The Zambian Mining Regulations requires the following illumination levels:

Table 2.7 - Zambian Illumination Standards

Location	Illumination Level (Lux)
Stationary lights	50 Lux
Workshops	
Pump stations	
Shaft stations	
Machinery and trains	10 Lux at 20m distance.

The following levels are recommended:

Table 2.8 - Typical International Illumination Standards

Location	Illumination Level (Lux)
Station areas	100 Lux
Where machinery is used (pump chambers, workshops, conveyor belts, sub-stations etc).	80 Lux
At junctions and potential hazard areas (tips, winches etc.)	50 Lux
Treatment plants and equipment (night time)	50 Lux

2.3.3 Radiation

Table 2.9 compares the standards contained in the Ionising Radiation Protection Regulations with the South African Limits.

Table 2.9 - Zambian and South African Radiation Exposure Limits

Description	South African limits	Zambian Limits
Restricted area	> 20 mSv/a	> 500 mSv/a
Controlled area	5 to 20 mSv/a	< 5 000 mSv/a
Supervised area	1 to 5 mSv/a	Not specified
Uncontrolled area	< 1 mSv/a	External radiation not detectable
Occupational exposure	< 50 mSv/a and a maximum mean of 20 mSv/a over 5 years	50 mSv/a
Public exposure	< 0,25 mSv/a	Individual = 5 mSv/a Population = 1,7 mSv/a average

2.3.4 Dust

The Zambian Chief Inspector of Mines has currently set the following dust standards (measured using a konimeter):

Table 2.10 - Zambian Dust Workplace Dust Limits

Sampling Location		Limit
Intake air	Body of air upstream of the worker	200 ppcc
Face	Body of air on the worker's breathing region	350 ppcc

The konimeter is an instrument that uses a piston device to suck 5 cc (cm^3) of air from the surrounding atmosphere and deposits the dust therein on a coated glass slide. The slide is treated and then examined under a microscope. The sampling time is only a fraction of a second and is, therefore termed a "snap sample".

Internationally, konimeter sampling is being superseded by gravimetric sampling. Gravimetric sampling is undertaken using an instrument carried on the worker for a full working shift and is, therefore, far more representative of actual exposure. The following threshold limit values (TLVs) are typically set for gravimetric dust samples:

Table 2.11 - Typical TLVs for Gravimetric Dust Samples

Pollutant		TLV	Action Level
1)	Silica quartz	> 5% - 0,1 mg/m³ < 5% - 5mg/m ³	0,08 mg/m³ 3,0 mg/m ³
2)	Respirable combustible dust (RCD) (Mechanised mining)	2,0 mg/m ³	1,0 mg/m ³

The World Bank/IFC guidelines recommend the following Threshold Limit Values (TLVs) for dust and other particulates

Table 2.12 - World Bank/IFC TLVs for Dust and Particulates

Parameter	TLV
Arsenic	0.2 mg/m^3
Asbestos	0.5 $fibers/cm^3$
Copper	1 mg/m^3
Lead	0.15 mg/m^3
Particulate (Inert or Nuisance dust)	10 mg/m^3
Silica/Crystalline Quartz	0.1 mg/m^3
Sulphur Dioxide	5 mg/m^3

2.3.5 Heat and Fume

The permissible concentration of gases set by the Zambian Mining Regulations and the World Bank/ IFC guidelines are as follows:

Table 2.13 - Standards for the Concentration of Gases

Parameter	Zambian Regulations (ppm)		World Bank TLV (mg/m^3)
	General air	Diesel exhausts	
Carbon Dioxide	7500	-	-
Carbon Monoxide	100	2000	29
Hydrogen Cyanide	-	-	11
Hydrogen sulphide	20	-	14
Nitrogen Oxides (NO_x)	10	1000	-
Nitrogen Dioxide	-	-	6
Sulphur Dioxide	20	-	5
Sulphuric Acid Vapour	-	-	1

All work areas should be ventilated by a flow of air containing at least 19.5% oxygen and less than 5% carbon dioxide (World Bank/IFC).

The IFC general health and safety guidelines require periodic monitoring of workplace air quality and the proper maintenance of ventilation, protective and monitoring equipment. Guidelines are set out to ensure the safety of work in confined spaces and to ensure general standards of health and safety. The training of employees is specifically mentioned as well as monitoring and reporting.

2.4 Social Aspects

The World Bank Involuntary Resettlement Operational Directive 4.30 can be summarised as follows:

- Category A and B projects should be reviewed for potential resettlement requirements early in the project cycle.

- Involuntary resettlement should be avoided or minimised where feasible, exploring all viable alternative project designs.

- Where displacement cannot be avoided resettlement plans should be executed as development programs, providing opportunities to share in project benefits. Compensation or restitution must be arranged such that all people displaced from land on which they rely for their economic livelihood will continue to have access to means of economic livelihood and lifestyles at least on a par with those available prior to the project.

- Displaced persons must be compensated for their losses at full replacement cost prior to the actual move and be assisted with the move. After relocation they must be assisted in their efforts to improve their former living standards, income earning capacity, and

production levels, or at least to restore them. Particular attention should be paid to the needs of the poorest groups to be resettled.

- Community participation in planning and implementing resettlement should be encouraged. Consultation with future hosts of the community is also encouraged in order to integrate re-settlers socially and economically into host communities and to minimise impacts on the host communities.

- Land, housing, infrastructure and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoralists who may have usufruct or customary rights to the land or other resources taken for the project. The absence of legal title to land should not be a bar to compensation.

- Resettlement Plans should include a statement of objectives and policies, an executive summary and detailed provision for organisational responsibilities, community participation and integration with the host, a socio-economic survey, a legal framework, alternative sites and the selection, land tenure, acquisition and transfer, access to training and employment, infrastructure and social services, environmental management and protection and an implementation schedule which makes provision for monitoring and evaluation.

3.0 ENVIRONMENTS

Environmental standards and guidelines also set limits for acceptable levels of impact on the environment or contain requirements for measures to be implemented when impacts have occurred. The following legislation and guidelines apply to the environments considered in this assessment. These requirements were an important criterion in determining the significance of the impacts associated with the various activities and facilities.

3.1 Bio-Physical Environment

3.1.1 Soil and Land Capability

There are no soil pollution standards in Zambia. Maximum metal concentrations in soils permitted under European Community Regulations are as follows:

Table 3.1 - Metal Concentration in Soils Permitted Under European Community Regulations

(Wild, 1993)

Metal	Maximum Soils Concentration (mg/kg)
Cadmium	3
Copper	140
Lead	300
Zinc	300

3.1.2 Topography

The Mines and Minerals (Environmental) Regulations contains the following requirements:

A developer who makes, or causes any other person to make an excavation into which a person or animal may fall, must make a regular ridge around the boundary of the excavation or take other necessary safety measures.

Where any mining operation has caused or is likely to cause any crack, subsidence, or cavity on the surface in any area, the area must be kept fenced or bounded and will be considered a caving area. No one is allowed to enter a caving area except for the purpose of performing statutory duties. Sufficient notices prohibiting unauthorised entry must be prominently displayed at suitable places along the fence or bounds.

3.1.3 Surface Water

No receiving water quality objectives have been developed in Zambia. However, the Water Act states:

Anyone who wilfully or negligently pollutes any public water so as to render it harmful to man, beast, fish or vegetation will be guilty of a criminal offence. If a Water Officer is satisfied that a public water has been fouled or polluted, he must order the person responsible to take adequate measures to prevent such pollution within a specified period. Anyone who fails to take the steps required will in addition to any penalties to which he may be liable on conviction for the offence be liable to a further penalty not exceeding K200 per day until the matter is rectified.

The standards shown below are recommended for protecting the aquatic environment (Musonda et al, 1997)

Table 3.2 - Recommended Concentration for Natural Fisheries

Parameters	Limit (mg/l)	Parameters	Limit (mg/l)
Dissolved oxygen	> 5.5 mg/l	Turbidity	0 to 10 NTU
PH	5.6 to 8.5	Phosphate	> 0.1 mg/l
Water temperature	18 to 24	Nitrate	> 0.1 mg/l
Salinity	< 0.02 %	Chlorine	<15 mg/l
Colour	clear to green		

The water quality standards for fishery and livestock water are given in Table 2.14 (Musonda et al, 1997).

Table 3.3 - Recommended Concentrations Limits for Fishery and Livestock Water

Parameters	Limit (mg/l)	Parameters	Limit (mg/l)
Aluminium	3.0	Cobalt	1.0
Iron	1.0	Nickel	1.0
Nitrite	10	Hydrogen sulphide	< 0.2
Nitrate	100	Lead	0.1
Copper	0.5	Ammonia	1.5
Zinc	25	Chlorine	15
Sulphide	< 0.2	Chromium	1.0
Cyanide	< 0.1	Total dissolved solids	10 000
Manganese	5.0	Total suspended solids	25

3.1.4 Groundwater

The requirements of the Water Act relating to pollution and public water referred to above may also be applied to groundwater.

3.1.5 Air Quality

The following table contains a comparison of various ambient air quality guidelines/standards. The strictness of the Zambian sulphur dioxide standards is clearly observed and is comparable with the WHO goals.

Table 3.4 - Ambient Air Quality Standards (µg/m^3)

Parameter	Averaging Period	Zambian	South African	EU	US-EPA	WHO Goals	World Bank/ IFC	
		1					2	3
Sulphur dioxide	12 months	-	79	80-120	80	-	100	50
	6 month	50	-	-	-	-	-	-
	1 month	-	130	130-180	-	-	-	-
	24 hours	125	262	250-350	365	90	500	125
	1 hour	350	786	-	-	350	-	-
Lead (Pb)	12 months	1.0	-	-	-	-	-	-
	3 months	1.5	1.5	-	-	-	-	-
Particulate matter (PM_{10})[a)]	12 months	-	80	-	50	-	75	50
	24 hours	70	160	-	150	-	260	70

a) Respireable particles with diameters less than 10µ:m.

1. The Air Pollution (Licensing and Emission Standards) Regulations, 1996; First Schedule.
2. Environment, Health and Safety Guidelines: Mineral Processing – Copper and Nickel, 1995 (superseded)
3. Pollution Prevention and Abatement Handbook: General Environmental Guidelines, 1998

3.1.6 Terrestrial Ecology

In terms of the Mines and Minerals Act mining rights may not be exercised in a declared national forest, local forest or National Park without complying with the provisions of the Forests Act or the National Parks and Wildlife Act.

The Forest Act provides that the following acts can only be carried out in a National Forest or a Local Forest with a licence:

(a) fell, cut, burn, injure, take, collect or remove any forest produce;

(b) squat, camp, reside, build or excavate, or construct or use any enclosure, or construct, reopen or use any road other than a public road, or erect or operate any plant machinery or equipment

(c) fire any tree, undergrowth, grass or forest produce or assist in lighting any fire, or to allow any fire to be lit;

(d) remove or damage any boundary mark, beacon, notice, fence or gate, or remove or damage any mark placed on any tree by or on the authority of a forest office;

(e) deposit negligently or allow to fall over any rubbish or debris.

In terms of the Forest Act any kind or category of trees may be declared to be protected. The felling, cutting or removal of any protected tree without a licence (except in or from freehold or leasehold land) is prohibited.

The guideline values that are typical set for the concentration of metals in plants is given in Table 3.5.

Table 3.5 - Guideline Metal Levels in Plants (Jones, 1972; Alloway and Ayres, 1993)

Metal	Concentration in Mature Leaves (mg/kg)		
	Deficient	Sufficient (Normal range)	Excessive or Toxic
Cadmium	-	0.1 - 2.5	5 – 30
Copper	< 4	5 - 20	> 20
Lead	-	5 -10	30 – 300
Zinc	< 20	25 - 150	> 400

The IFC Guidelines for Forestry Operations: Logging, set out further requirements which are summarised below.

The IFC will not support the logging of primary tropical moist forest. Where forest operations have occurred in tropical moist forest the IFC will consider investments in upgrading the design and control of harvest operations as part of a program to transform to sustainable forestry, if certain specified conditions are met. Only sustainable and conservation-based forestry will be considered by the Bank and this may require the cyclic use of tree plantations or sustainable selective harvesting in secondary forest stands. Community interests must also be properly addressed and project sponsors will be required to develop a forest management plan. The Guidelines set out the basic principles as follows:

"Basic Principles

a) Conversion of secondary forest to plantations in the concession area should be kept to the minimum required to sustain the raw material production rate.

b) Selective tree removal and directional felling are encouraged in secondary forest areas.
c) Multi-species and multi-age stands are encouraged in plantations.

d) Maintenance of a sustainable, healthy, diverse environment within the concession must be a high priority for the company.

e) Rights and welfare of local inhabitants must be respected and enhanced where possible.

f) The design and management of conservation areas should be undertaken so as to ensure sound watershed management, reduction of soil erosion, and maintenance of biological diversity.

g) To the extent practical, conservation areas should occur in the largest possible blocks of contiguous area, maintain connecting corridors of natural habitat where they must be separate, and maintain connections with natural habitats outside of the concession area.

h) A unit shall be established in the company operations whose sole function is to monitor the environmental impact of the operation, the design and implementation of conservation management areas, and the relation of the company with local inhabitants and community programs."

The guidelines set out specific steps which should be taken to manage water resources, workplace air quality and noise, health and safety, records and reporting and in the training of employees. Guidelines on road construction and settlement incursion are also included.

It is furthermore important to note that the International Finance Corporation Operational Directive 4.04 on Natural Habitats states that the IFC supports the protection, maintenance and rehabilitation of natural habitats and their functions in its project financing and advisory activities. The IFC requires that project sponsors apply a precautionary approach to natural resource management. The IFC therefore prefers not to finance projects that would significantly degrade or convert natural habitats unless appropriate mitigation measures are implemented.

3.1.7 Archaeology

In terms of the Mines and Minerals Act

A mining licence holder must not exercise his rights on any land;
- Dedicated as a place for burial; or
- Containing any ancient monument or national monument as defined in the National Heritage Conservation Commission Act.

Without the written consent of the appropriate authority.

The National Heritage Conservation Act states:

No-one can without the written consent of the National Heritage Commission, alter, remove, destroy, damage, excavate or export any ancient heritage or relic, or any national monument.
Anyone who discovers an ancient heritage or relic must report this to the Commission within 14 days of the discovery, and must suspend all his operations in the immediate vicinity until 30 days after the delivery of his report, unless the Commission authorises him to continue; and deliver to the Commission as soon as practicable, or request the Commission to examine and remove, any object which is or appears to be a relic. If the Commission does not exercise its powers under the Act, the person my resume his operations 30 days after delivering his report.

The World Bank Operational Policy on the Safeguarding of Cultural Property is still being finalised and therefore the draft policy note dated September 1986 was referred to. The World Bank aims to assist in the preservation of "cultural" property which it defines to include inter alia sites having archaeological, paleontological, historical, religious and unique natural values. The Bank will assist in and encourage the presentation of cultural properties and may even require that the project be relocated for these reasons. If there is any possibility of there being cultural property in the area the Bank requires that a brief survey be done by a field specialist at the outset.

3.1.8 Global Issues

"Improved energy efficiency to reduce fuel usage and associated emissions" is listed as a key issue in the World Bank/IFC environmental guidelines.
Zambia is a signatory to the Montreal Protocol. In terms of the Protocol several chemicals classified as ozone depleting substances are scheduled for phasing-out. They include: chloroflurocarbons (CFCs), halons and hydrochloroflurocarbons (HCFCs)

3.2 Social Environment

3.2.1 Workplace

The World Bank/ IFC guidelines, in keeping with the international norm, require personnel to use hearing protection when exposed to noise levels above 85dB(A).

The Pneumoconiosis Act makes provisions for the assessment and payment of compensation and for the medical examination and standards of physical fitness to be required of persons exposed or likely to be exposed to the risk of pneumoconiosis. The Pneumoconiosis Bureau, in accordance with the Pneumoconiosis Act, stipulate that miners suffering from tuberculosis, including miners receiving medication for tuberculosis, are not "physically suitable for work as a miner in occupations involving exposure to harmful dust". The Act prohibits the employment of anyone as a miner and anyone from working as a miner without or in breach of a certificate of fitness issued by the Pneumoconiosis Medical and Research Bureau.

3.2.2 Neighbouring Communities

The well-being of communities in the vicinity of mining or industrial activities is safeguarded by, amongst others the following:

<u>Use of Land</u>

In terms of the Mines and Minerals Act:

- Mining rights may not be exercised on any land occupied as a village, without the written consent of the chief and the local authority of the district in which the village is situated.

- The owner or occupier of any land within a mining licence area retains the right to graze stock or to cultivate the land to the extent that this does not interfere with the mining

operations. However, buildings or structures may not be erected without the consent of the licence holder.

- If mining operations disturb the rights of the owner or occupier of land or damages crops, trees, buildings, stock or works on the land, the licence holder must pay fair and reasonable compensation.

Noise Levels

World Bank Ambient Noise Guidelines– Base Metal and Iron Ore Mining and Copper Smelting

The World Bank/ IFC guidelines recommend that noise levels, measured at receptors outside the project operations boundary, should achieve either the following levels shown in Table 3.6 or a maximum increase in background levels of 3 dB(A).

Table 3.6 - Recommended Ambient Noise Levels

Category of Noise Receptor	Limits in Decibels, dB(A)	
	Day Time 07:00-22:00	Night Time 22:00-07:00
Residential	55	45
Commercial	65	55
Industrial	70	70

According to the World Bank these emission requirements can be consistently achieved by well-designed, well-operated and well-maintained control systems.

Air Pollution

Table 3.7 - Potential Health Effects of Sulphur Dioxide and Particulates (Ross, 1972)

Exposure			Adverse Health Effect
Concentration ($\mu g/m^3$)		Period	
Sulphur Dioxide	Particulates		
-	80 -100	annual mean	Increased death rates for persons over 50 years
130	130	annual mean	Increased frequency and severity of respiratory diseases in school children.
190	177	annual mean	Increased frequency and severity of respiratory diseases in school children.
105 – 265	185	annual mean	Increased frequency of respiratory symptoms and lung diseases.
140 – 260	-	24 hour mean	Increased illness rate of older persons with severe bronchitis.
300 – 500	low	24 hour mean	Increased hospital admissions for respiratory disease and absenteeism from work of older persons.
630	300	24 hour mean	Chronic bronchitis patients suffer acute worsening symptoms.