PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED CREDIT
IN THE AMOUNT OF SDR 14.1 MILLION
(US$19 MILLION EQUIVALENT)
AND GRANT
IN THE AMOUNT OF SDR 15.5 MILLION
(US$21 MILLION EQUIVALENT)
TO THE
REPUBLIC OF ZAMBIA
FOR THE
COPPERBELT ENVIRONMENT PROJECT

February 14, 2003

Environment and Social Development Unit
Country Department 3
Africa Region
CURRENCY EQUIVALENTS
(Exchange Rate Effective February 2003)

Currency Unit = ZMK
ZMK 1 = US$0.00022
US$1 = ZMK 4604.5

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AAC Anglo American Company
AHC-MMS Assets Holding Company-Mines Municipal Services
APL Adaptable Program Lending
ARD Acid Rock Drainage
BAT Best Available Technology
CAP Pollution Control Act
CAS Country Assistance Strategy
CBA Cost-Benefit Analysis
CBE Citizens for a Better Environment
CDC Commonwealth Development Corporation
CEMP Consolidated Environmental Management Plan
CEP Copperbelt Environment Project
CIDA Canadian International Development Agency
CP Cleaner Production
CPAR Country Procurement Assessment Review
CQ Consultant’s Qualifications
DAA Delegated Authorizing Agency
DFID Department for International Development
DO Development Objective
DPP Detailed Procurement Plan
DSMA Disodium Methane Arsonate
EA Environmental Assessment
ECZ Environmental Council of Zambia
EIA Environmental Impact Assessment
EIAR Environmental Impact Assessment Regulations
EIS Environmental Impact Statement
EMF Environmental Management Fund
EMF-SC Environmental Management Fund-Steering Committee
EMMS Environmental Management in Mining Sector Project
EMP Environmental Management Plan
EPA Environmental Protection Agency
EPPCA Environmental Protection and Pollution Control Act
ERIP Economic Recovery and Investment Promotion
ERIPTA Economic Recovery and Investment Promotion Reform Program
ESP Environment Support Program
FMR Financial Monitoring Report
FMS Financial Management System
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>FPM</td>
<td>Financial Procedures Manual</td>
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<tr>
<td>GPN</td>
<td>General Procurement Notice</td>
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<td>GRZ</td>
<td>Government of the Republic of Zambia</td>
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<td>HRS</td>
<td>Hazard Ranking System</td>
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<td>IBRD</td>
<td>International Bank for Reconstruction and Development</td>
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<td>ICB</td>
<td>International Competitive Bidding</td>
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<td>IDA</td>
<td>International Development Agency</td>
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<td>IEMP</td>
<td>Interim Environmental Management Plan</td>
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<td>IFAC</td>
<td>International Federation of Accountants</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>IP</td>
<td>Implementation Progress</td>
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<td>IPPP</td>
<td>Industrial Pollution Prevention Programme</td>
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<td>IRC</td>
<td>Interagency Regulatory Committee</td>
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<tr>
<td>KAPS</td>
<td>Knowledge, Attitude, Practice Surveys</td>
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<tr>
<td>KCM</td>
<td>Konkola Copper Mines</td>
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<td>KDMP</td>
<td>Konkola Deep Mining Project</td>
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<td>LCS</td>
<td>Least-Cost Selection</td>
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<td>LRP</td>
<td>Labor Reduction Program</td>
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<tr>
<td>MAA</td>
<td>Multiple Account Analyses</td>
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<td>MCE</td>
<td>Maximum Credible Earthquake</td>
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<tr>
<td>MCM</td>
<td>Mopani Copper Mines</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<td>MENR</td>
<td>Ministry of Environment and National Resources</td>
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<td>MLA</td>
<td>Mining License Areas</td>
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<td>MMA</td>
<td>Mines and Minerals Act</td>
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<td>MMMD</td>
<td>Ministry of Mines and Minerals Development</td>
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<td>MoFNP</td>
<td>Ministry of Finance and National Planning</td>
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<tr>
<td>MOU</td>
<td>Memorandum Of Understanding</td>
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<td>MPAP</td>
<td>Mining Pollution Affected Persons</td>
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<td>MSD</td>
<td>Mines Safety Department</td>
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<td>MTENR</td>
<td>Ministry of Tourism, Environment and Natural Resources</td>
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<td>MUZ</td>
<td>Mineworkers Union of Zambia</td>
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<tr>
<td>NBF</td>
<td>Not Bank-Financed</td>
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<tr>
<td>NCB</td>
<td>National Competitive Bidding</td>
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<td>NCS</td>
<td>National Conservation Strategy</td>
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<td>NEAP</td>
<td>National Environmental Action Plan</td>
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<td>NFT</td>
<td>Norwegian Pollution Control Authority</td>
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<td>NOP</td>
<td>Nchanga Open Pit</td>
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<td>NORAD</td>
<td>Norwegian Agency for Development Cooperation</td>
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<td>NPV</td>
<td>Net Present Value</td>
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<tr>
<td>OP</td>
<td>Operational Policy</td>
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<td>OPP</td>
<td>Overall Procurement Plan</td>
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<tr>
<td>PAD</td>
<td>Project Appraisal Document</td>
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<tr>
<td>PCB</td>
<td>Polychlorinated biphenyls</td>
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<tr>
<td>PCD</td>
<td>Project Concept Document</td>
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<tr>
<td>PCD</td>
<td>Pollution Control Dam</td>
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<td>PHRDF</td>
<td>Policy and Human Resources Development Fund</td>
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<td>PIM</td>
<td>Project Implementation Plan</td>
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<tr>
<td>PPF</td>
<td>Project Preparation Facility</td>
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<tr>
<td>PMF</td>
<td>Probable Maximum Flood</td>
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PMU Project Management Unit  
POP Persistent Organic Pollutants  
PPM Procurement Procedures Manual  
PSC Project Steering Committee  
PSCAP Public Service Capacity Building Project  
PSREP Public Sector Reform and Export Promotion  
QBS Quality-Based Selection  
QCBS Quality and Cost based Selection  
RAP Resettlement Action Plan  
RBA Risk-Based Alternatives Evaluation  
RDV Rural Development  
RFP Request For Proposal  
RSA Resettlement Action Plan  
SBCQ Selection Based on Consultant's Qualifications  
SDB Standard Bidding Document  
SFB Selection under a Fixed Budget  
SIL Specific Investment Loan  
SI28 Statutory Instrument 28  
SOE Statements of Expenditures  
SRK Steffen, Robertson and Kirsten  
SS Single Source  
TBA Tender Board Act  
TD Tailings Dam  
TDS Total Dissolved Solids  
TLP Tailings Leach Plant  
TOR Terms of Reference  
TPM Total Particular Matter  
TR Tender Regulations  
TSS Total Soluble Solids  
UNDB UN Development Business  
USEPA United States Environmental Protection Agency  
WHO World Health Organization  
WRAP Water Resources Action Plan  
ZACCI Zambia Association of Chambers of Commerce and Industry  
ZamSIF Zambia Social Investment Fund  
ZCCM Zambia Consolidated Copper Mines Limited  
ZCCM-IH ZCCM - Investments Holdings Plc  
ZECU ZCCM-IH Environmental Coordination Unit  
ZK Zambian Kwacha  
ZNTB Zambia National Tender Board  

<table>
<thead>
<tr>
<th>Vice President:</th>
<th>Callisto E. Madavo</th>
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<tbody>
<tr>
<td>Acting Country Director:</td>
<td>Christiaan J. Poortman</td>
</tr>
<tr>
<td>Sector Manager:</td>
<td>Richard G. Scobey</td>
</tr>
<tr>
<td>Task Team Leader:</td>
<td>Yves A. Prévost</td>
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ZAMBIA
Copperbelt Environment Project

Project Appraisal Document
Africa Regional Office
AFTES

Date: February 14, 2003
Team Leader: Yves Andre Prevost

Sector Manager: Richard G. Scobey
Sector(s): Mining and other extractive (100%)

Country Director: Christiaan J. Poortman
Theme(s): Environmental policies and institutions (P), Pollution management and environmental health (P)

Project ID: P070962
Ending Instrument: Specific Investment Loan (SIL)

Project Financing Data:

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Proposed Terms (IDA): Standard Credit and Grant

Borrower/Recipient: GOVERNMENT REPUBLIC OF ZAMBIA

Responsible agency: MINISTRY OF FINANCE AND NATIONAL PLANNING

Address:
P.O. Box 50062 Ridgeway
15101 Chimanga Road
Lusaka, Zambia
Contact Person: Secretary Treasury
Fax: 260-1-250544
Email: 260-1-251078

Other Agency(ies):
CCM - Investments Holdings Plc (ZCCM-IH)
Address:
Mukuba Pension House
5309 Dedan Kimathi Road
P.O. Box 30048
Lusaka 10101, Zambia
Contact Person: Environmental Manager ZCCM-IH, Joseph Makumba
Fax: 260-2-245054
Email: makumbaj@zccm-ih.com.zm

Environmental Council of Zambia (ECZ)
Address:
Suez Road, PO Box 35131
Lusaka, Zambia
Contact Person: ECZ Director, James Phiri
Fax: 260 1 223123
Email: jsphiri@zamnet.zm
## Estimated Disbursements (Bank FY/US$m):

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<th>FY</th>
<th>2003</th>
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<th>2006</th>
<th>2007</th>
<th>2008</th>
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<td>Annual</td>
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<td>9.75</td>
<td>9.50</td>
<td>8.00</td>
<td>7.00</td>
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<td>Cumulative</td>
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<td>10.00</td>
<td>19.50</td>
<td>27.50</td>
<td>34.50</td>
<td>40.00</td>
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- **Project implementation period:** 5 years
- **Expected effectiveness date:** 06/20/2003
- **Expected closing date:** 08/01/2008
A. Project Development Objective

1. Project development objective: (see Annex 1)

The development objectives of the Copperbelt Environment Project (CEP) are to assist Zambia to: i) address environmental liabilities associated with the mining sector, following the privatization of the mining assets, and ii) improve future compliance of the mining sector with environmental and social regulations.

These objectives will be pursued by two project components: i) establishing an Environmental Management Facility (EMF) to finance the implementation of priority environmental and social measures required of ZCCM Investments Holdings Plc (ZCCM-IH) and the Government of the Republic of Zambia (GRZ) according to a Consolidated Environmental Management Plan (CEMP); and ii) strengthening the regulatory and institutional frameworks to improve compliance of the mining sector with environmental regulations and Environmental Management Plans (EMPs).

2. Key performance indicators: (see Annex 1)

**Outcome/Impact Indicators (over the 5 year period of the Project)**

- EMPs prepared by Investors and ZCCM-IH, reviewed and approved by the Environmental Council of Zambia (ECZ), and under implementation.
- Consolidated EMP completed by ZCCM-IH, approved by ECZ and adopted by the EMF Steering Committee.
- Environmental and social obligations resulting from ZCCM's historical liabilities identified and addressed on a priority basis.
- Monitoring system established to monitor implementation of EMPs and their compliance with environmental regulations.
- Pollution flows and loads resulting from mining operations are regularly monitored.

**Output Indicators (over the 5 year period of the Project)**

- Pollution flow from rehabilitated project sites into Kafue River Watershed reduced by about 70 percent.
- Zero leakage of tailings from dams rehabilitated by the project.
- Investor and Counterpart EMPs for each site completed with adequate participation of local governments and stakeholder groups (NGO's, community organizations)
- Environmental liabilities of ZCCM-IH prioritized according to a transparent and accepted ranking system.
- Performance and capacity of ECZ and Mine Safety Department (MSD) to enforce regulations improved.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)

   **Document number:** 19582
   **Date of latest CAS discussion:** 07/10/99

   The overarching theme of the CAS is support for diversified and sustainable growth. For the mining sector, the CAS goal is to remove constrains to such growth through privatization of mining assets. The privatization effort of GRZ is the linchpin of the country's economic restructuring. Privatization is supported by several World Bank Group operations, including the Mine Township Services Project and the Economic Recovery and Investment Promotion Technical Assistance (ERIPTA) Program, both funded by IDA, and the IFC (International Finance Corporation) investment in the Konkola Copper Mines Plc. The Copperbelt Environment Project was specifically programmed in the CAS to address the environmental
liabilities associated with the privatization of ZCCM assets.

2. Main sector issues and Government strategy:

_The Copper Industry in Zambia and its Privatization_

Copper mining has been a significant economic activity in Zambia since the development of the first copper mines in late 1920's. By the time Zambia gained independence in 1964, copper mining was the backbone of the country’s economy and a powerful force in shaping the Copperbelt Province where the mines are concentrated. Copper mining and processing of copper led to the establishment of urban centers that drew workers from rural areas with a promise of jobs and access to infrastructure, housing and a range of social services. Throughout the 1970’s and 1980’s, the copper industry was the second largest employer after the Government, and generated about 85 percent of foreign exchange earnings, 30 percent of Government revenues and 15 percent of GDP.

The Government of Zambia gained control of the copper mines in 1973. In 1982, it created the state-owned Zambia Consolidated Copper Mines (ZCCM). At about that time, the commodity boom ended and copper prices started falling. Concurrently, external borrowing became more difficult and the proportion of the resources being generated by the copper industry going to the Government’s budget increased. This was largely done at the expense of reinvestment in the copper industry itself. The lack of reinvestment led to declines in productivity and frequent production problems. It ultimately compromised ZCCM’s financial sustainability.

Lacking the resources to revitalize the copper industry, the Government decided in 1995 to initiate a process to privatize ZCCM assets. It was envisioned that privatization would increase the efficiency of the copper industry, attract foreign investment to Zambia and thus boost the development of the private sector. The mining and other operating assets of ZCCM were sold to private investors. ZCCM was transformed into an investment holding company, ZCCM-IH, which became a minority shareholder with a 10-20 percent share in the newly privatized mining, processing and power companies in the Copperbelt. Privatization was essentially completed in March 2000 with the conclusion of deals with: i) Konkola Copper Mines (KCM), involving Anglo American, the International Finance Corporation (IFC), and the Commonwealth Development Corporation (CDC), and ii) Mopani Copper Mines (MCM), involving Glencore International and First Quantum.

ZCCM’s privatization was expected to mark a turning point in Zambia’s economic reform, providing the basis for improved environmental management, economic stability and growth. However, these improvements may be compromised by Anglo American's decision in January, 2002 to withdraw financing from the Zambian copper industries, specifically from KCM and the Konkola Deep Mining Project (KDMP). Without investment in KDMP, the life of the mining industry will end within the next 10 years.

_Environmental Issues Arising from Mining Activities_

Prior to 1980, little attention was paid to the environmental impacts of mining activities in Zambia. Pollution and environmental degradation, and their impact on public health and ecosystem functions, were considered to be an acceptable trade-off given the economic benefits and jobs provided by mining. This changed, starting from the mid 1970s, as civil society and governments became increasingly aware of the need to mitigate the long-term environmental impacts of industrial activities, to maintain quality of life. However, the poor economic performance of the mining sector in Zambia in the 1980's and 1990's led to an increasingly inadequate handling of environmental issues arising from mining activities. As a result, a massive "environmental mortgage" accrued that needed to be addressed once the decision was taken to privatize mining assets (see Annexes 13 and 15 for further details).
The main environmental issues related to mining in the Copperbelt and in Kabwe are:

- **Air Pollution.** The major environmental issue on the Copperbelt is air pollution. The copper smelters emit 300,000 to 700,000 tons per year of sulfur dioxide (SO₂) into the air. SO₂ can severely affect the health of neighboring populations (especially respiratory problems). Refurbishment of the Nkana smelter has not yet occurred and emissions remain at high levels. The Mufulira smelter is not currently equipped to capture any of its SO₂ emissions.

- **Soil Contamination.** SO₂ emissions from the smelter convert to H₂SO₄ (sulfuric acid) and then impact soils and cause loss of vegetation downwind of the smelter stack emissions. Dust particles containing copper, nitrous oxides and organic acids may also be in the emissions which may enter streams and affect aquatic fauna. Further soil contamination from mining operations, chemical and oil spills has also occurred. Soil from sites contaminated by oil laced with PCBs, by redundant chemicals or other hazardous waste (including radioactive waste and asbestos) must be properly removed and disposed of.

- **Water pollution.** Runoff and leakage from existing waste rock dumps and tailings dams pollute streams flowing out of the mine areas, causing widespread negative impacts downstream from the mines that extend as far as the Kafue River and affect wetlands and tributaries. The pollution has an impact on human health and ecological functions that is not fully determined. Lower water quality leads to increased water treatment costs. The pollution from the waste rock dumps and the tailings needs to be contained and the sites rehabilitated.

- **Catastrophic failure of tailing dams.** Some tailing dams are close to human habitation and failure could cause extensive physical damage, ecological damage and even loss of life. Dams need to be stabilized and rehabilitated.

- **Privatization impacts on environment.** Preparing ZCCM for privatization required a reduction of its workforce. This contributed to increased unemployment in the Copperbelt, which in turn placed a greater burden on the local environment. Scavenging for timber, fuelwood, metal and construction materials has increased, leading to habitat destruction. Such vandalism is compromising the integrity of tailing dams and other structures and can result in more serious environmental damage, including the failure of dams.

- **Lead contamination.** In addition to copper mining issues on the Copperbelt, ZCCM-IH has serious liabilities related to lead zinc mining in Kabwe. It is estimated tens of thousands of residents (including 9,000 children) may be affected by high lead levels in the soil, both from naturally occurring mineralization and the impact of the smelting and mining operations. Lead contamination is particular concerning for young children as it affects mental development and can cause serious health problems, including death in serious cases.

The main environmental problems on the Copperbelt are deforestation, soil acidity, pollution, land dereliction, poor urban sanitation, unplanned urban development and noxious weeds arising from eutrophication of waterways by sewage effluent. The impact of pollution from mining activities is compounded by the fact that nearly ninety per cent of the population on the Copperbelt is urban. This has resulted in concentrated demand for natural resources, such as water, energy and food. Competing demands for water by industry and households is already constraining the sustainable use of water resources. Mining and other industrial activities have generated air, water and land pollution. Over dependence on charcoal fuel by urban households has been the main cause of deforestation on the Copperbelt.

**Environmental Liabilities following Privatization**

At the time of the privatization, ZCCM was burdened with a huge "environmental mortgage" accrued over 70 years of mining operations, which it could not address because it lacked the necessary resources. Nonetheless, ZCCM set up an Environmental Services Group in 1993, following a preliminary review of its environmental liabilities. In 1996-1997, it retained the services of Steffen, Robertson and Kirsten (SRK) to prepare Environmental Impact Statements (EIS) for each of its twelve Mining License Areas (MLAs), to
meet the safety, health and environmental requirements for the renewal of mining licenses. These EISs provided an environmental baseline during privatization negotiations, but they were never intended to provide a comprehensive overview of the environmental and social impacts of mining in the Copperbelt.

Not surprisingly, the appropriate handling of environmental liabilities was a key issue during the negotiations, most particularly in the case of KCM. In hindsight, the KCM deal was the driving force that shaped the debate regarding the handling of environmental liabilities following privatization, in the following manner. Given the extent and seriousness of environmental and public health impacts documented in the EISs, the KCM Consortium was unwilling to accept any legal responsibility for historical environmental liabilities, most notably downstream impacts on populations and ecosystem functions. As a consequence, GRZ and ZCCM-IH agreed to retain the historical liabilities associated with assets purchased by KCM, and to implement adequate mitigation measures to address them. Most importantly, GRZ and ZCCM-IH remain responsible for potential future third party liability claims arising from past environmental damage. In addition, ZCCM-IH retained all liabilities for defunct assets excluded from the KCM purchase. Lastly, KCM obtained from GRZ a 15 year period of stability during which regulatory dispositions cannot be modified.

IFC's involvement created the obligation for KCM to meet IFC's environmental management guidelines. In response, KCM prepared a pair of Interim Environmental Management Plans (IEMP), one each for KCM and ZCCM-IH. These IEMPs identified the actions to bring mining and processing into compliance with applicable standards. Most importantly, the IEMP for ZCCM-IH created the obligation for ZCCM-IH to urgently address a list of issues, including: i) the rehabilitation of the Nkana smelter, ii) the demolition of the high-grade leach plant in Nchanga, iii) the clean up of the sites acquired by KCM, iv) the preparation of a final EMP. Moreover, ZCCM-IH had before privatization agreed to resettle affected populations in anticipation of the Konkola Deep Mine Project.

The longer term environmental liabilities not addressed by these IEMPs will be tackled in the final Environmental Management Plans (EMPs), one each for KCM and ZCCM-IH. KCM's final EMP was completed in the second quarter of 2001 and approved by the Environmental Council of Zambia (Zambia's environmental protection agency) in August 2001. The final EMP for ZCCM-IH is under preparation with funding provided by a PHRD grant. Similarly to the IEMPs, the pair of final EMPS must be complementary documents that clarify the division of responsibility for addressing environmental liabilities between KCM and ZCCM-IH.

The usual practice with EMPS is that they indicate how an investor will comply with established environmental standards. In the case of the KCM privatization, there is a strong presumption by the investor that environmental concessions regarding the applicability of regulatory dispositions were made at the time of privatization and that these concessions are now confirmed in their EMP. KCM assumes it is protected from lawsuits if pollution levels of ongoing mining operations remain within the targets set in the EMP, even if its mining operations exceed national standards. Since the statutes establishing these standards remain in effect, the consequence of these concessions is to transfer part of the liability for future pollution flows back to ZCCM-IH or GRZ. It is thus critical for ZCCM-IH and GRZ to limit the nature and the extent of the concessions sought by KCM in its EMP.

The KCM privatization set a precedent for handling environmental and social issues that has now been transposed to the other privatization deals. Each investment group (there are currently nine, including KCM) is expected to prepare an EMP to address its environmental liabilities and obligations. In counterpart, ZCCM-IH will prepare an EMP indicating how it will address the liabilities excluded by the investor. Suitable investor and counterpart EMPS will be prepared for each investment package, ensuring that all environmental issues are addressed and that the division of responsibilities between the investor and ZCCM-IH is clearly defined. Furthermore, the investor and counterpart EMPS will be based on
consultations between each investor and ZCCM-IH, and will be reviewed and approved by the relevant regulatory bodies.

The set of Investor and Counterpart EMPs will provide a good basis for addressing environmental issues at the mining sites. However, they will not provide an adequate understanding of the impact of mining activities on public health and ecosystem functions downstream from mining operations, or provide an adequate basis for setting mitigation priorities. This will require additional work beyond the scope of the site specific Investor and Counterpart EMPs, or the original Environmental Impact Statements for MLAs that provided the original baseline.

**Regulatory Framework for Environmental Management in the Mining Sector**

The extent of the environmental liabilities and obligations incumbent on investors and ZCCM-IH/GRZ is determined by the Environmental Protection and Pollution Control Act (EPPCA) CAP204, the Environmental Impact Assessment Regulations (EIAR) of 1997, the Mines and Minerals Act CAP213, the Mines and Minerals Environmental Regulations of 1997, and the Mines and Minerals Environmental Protection Fund Regulations.

The EPPCA establishes the Environmental Council of Zambia (ECZ) as the national body responsible for enforcing environmental regulations and coordinating sectoral government agencies involved in environmental management in their sectors. These responsibilities are managed by ECZ's Technical Secretariat, which effectively constitutes Zambia's Environmental Protection Agency (EPA). The EPPCA also sets environmental quality standards and makes the polluter responsible for meeting them. Thus under the EPPCA, all effluents and emissions from mining operations are regulated through a system of permits, licenses and fines. Dumps, including overburden dumps and tailings dams, are similarly regulated.

The Environmental Impact Assessment Regulations require that an Environmental Impact Assessment (EIA) be prepared for all investments that have a major impact on the environment. The identification and implementation of adequate environmental mitigation measures is also regulated by the EIAR.

The Mines and Minerals Act, the Mines and Minerals Environmental Regulations and the Mines and Minerals Environmental Protection Fund Regulations address the environmental, health and safety aspects of the mining licenses delivered by the Mines and Minerals Development Department. They regulate environmental protection and pollution control in the areas where prospecting, exploration and mining operations are being carried out. They also require that any licensed mining operator closing down a mining facility must first decommission the site to a level where it does not pose any danger to public safety and health. The body mandated with monitoring and enforcing compliance with the Mines and Minerals Environmental Regulations and the Mines and Minerals Environmental Protection Fund Regulations is the Mines Safety Department (MSD) within the Ministry of Mines and Minerals Development (MMMD).

The regulation of the environmental impacts of the mining sector also involves other sectors, each with its own regulatory instruments: water affairs, tourism, transport, radiation protection, health, energy, national heritage conservation, local government and land. These bodies are responsible for sectoral regulations and constitute Delegated Authorizing Agencies (DAAs) under the EPPCA. ECZ defers to these agencies on specific technical issues, but retains the role of overall coordination of their respective contributions. For example, MSD is the DAA for issues arising from mining licenses. Close coordination between ECZ and the all DDAs regarding mining activities, is crucial given the complex cross-sectoral nature of their environmental impacts.

The capacity of ECZ and of DAAs such as MSD to implement environmental regulations in the mining sector is very weak. As a result: i) identification and monitoring of environmental risks resulting from mining activities is often inadequate, ii) in many instances, the appropriate permits and licenses are not
issued, iii) existing regulations are seldom enforced, iv) revenue from licenses, permits and fines for mining pollution are only partially collected. Moreover, the regulatory dispositions for the mining sector are currently so weak that they do not deter polluters. The revenue that can be collected from polluters given the current fee rate only covers part of the cost of the skeleton staff presently assigned to pollution control, which is woefully insufficient for the task. The exemption by certain investors from the payment of environmental fees further undermines the financial sustainability and performance of the regulatory bodies. The poor handling of environmental and social safeguards in the mining sector has already led to the lead poisoning crisis in Kabwe, the demolition of community buildings in Kansanshi and the stripping of mining assets by an investor in Luanshya. Furthermore, due to poor maintenance and sometimes poor design, there is a risk of several major tailings leakages over the next 5 years, unless preventive measures are taken.

Because of the weakness of its regulatory bodies, GRZ will play from a weak hand when reviewing, negotiating or monitoring the implementation of Investor EMPs for the mining sector. Poorly negotiated EMPs are equivalent to handing out pollution credits, thus further shifting the environmental and social costs of pollution from the investors to GRZ. Poor public disclosure of EMPs can lead to misunderstandings or social conflict. Poor monitoring and enforcement will inevitably result in lax implementation of agreements. Without a dramatic increase in the capacity of ECZ and the DAAs to effectively control pollution, the mining sector's "environmental mortgage" will continue to accrue. This would be a worst case scenario.

The ongoing Environmental Support Program (ESP) funded by IDA is already helping ECZ increase its capacity to fulfill its regulatory role. The ESP was launched in 1998 to support the Ministry of Environment and Natural resources (now Tourism, Environment and Natural Resources) in implementing the environmental priorities defined by the National Environment Action Plan (NEAP). In 2001, ESP was restructured to provide direct support to ECZ for improving enforcement and compliance with national environmental safeguards. The ESP is set to close in 2003, but the Copperbelt Environment Project will continue to support the ECZ capacity building effort started under ESP.

ECZ is also currently supported by NORAD through the Industrial Pollution Prevention Programme (IPPP). The main objective of the program is the decrease of industrial pollution in Zambia by: i) strengthening of the ECZ Pollution Control Division, and ii) support of the Cleaner Production (CP) at the Zambia Association of Chambers of Commerce and Industry (ZACCI). The IPPP is set to close in 2003.

The Canadian International Development Agency (CIDA) is financing the Environmental Management in the Mining Sector Project (EMMS). The initial project was "to strengthen the technical and managerial capacity of MSD and other key mining sector institutions to execute statutory mandates to regulate, monitor, enforce and/or implement appropriate environmental management practices in the mining sector." However, during the course of its implementation EMMS is focusing exclusively on technical capacity building within MSD as well as on its financial sustainability. It does not include the resources necessary to monitor the compliance performance of the mining industry, nor to enforce existing regulations. Furthermore, it does not include significant support to ECZ, nor to any of the other DAAs concerned by mining activities. The World Bank and CIDA have agreed to co-ordinate their respective activities to ensure complementarity until closure of EMMS in 2004.

The Impact of Anglo-American’s Pull out from KCM

Following the announcement by Anglo-American of its decision to pull-out from KCM and thus cease its involvement in copper mining in Zambia, the GRZ and the World Bank Group agreed that the uncertainty regarding the future operations of KCM does not change the importance or timing of the CEP, since: i) new investors are less likely to consider investing unless historical liabilities are adequately addressed; ii) in the event of a pull out by investors, funds will be necessary to implement the closure plans of affected mines; iii) ZCCM-IH and GRZ must continue managing the environmental liabilities associated with the assets
purchased by KCM, regardless of the situation with KCM; iv) the CEP covers environmental issues that are not tied specifically to KCM, but still require urgent attention to avoid catastrophic failures; and v) significant awareness of environmental issues has been raised during project preparation, and there is now strong stakeholder support for environmental mitigation of mining impacts.

3. Sector issues to be addressed by the project and strategic choices:

The proposed project will address the main sector issues described above. The foremost issue is the management of historical environmental liabilities in the context of privatization. The GRZ has made the strategic choice to clearly delineate the liabilities to be transferred to investors from those that will remain with ZCCM-IH and GRZ. In line with this choice, the project has adopted the principle that for each privatization deal there will be two EMPs, one for the investor and the other for ZCCM-IH, in counterfeit to the investor EMP.

The second issue is the identification and selection of the liabilities to be addressed by ZCCM-IH and GRZ. ZCCM-IH and GRZ have agreed to give the highest priority to measures that address widespread public health problems or damage to ecological functions. This is a major shift from the previous policy of focusing on environmental issues that affect mining operations. Another major shift is the systematic consultation and participation of stakeholders in the design of measures that might affect them.

The identification of the issues to be addressed will be done through the comprehensive study, the Consolidated Environmental Management Plan (CEMP) that will prioritize measures using a risk-based methodology. The CEMP will incorporate the EMP pairs prepared for the different investment packages, and look beyond these EMPs at ecosystem-wide issues such as watershed management and air pollution, as well as soil and sub-surface water contamination. The CEMP will serve to rank issues according to their potential impacts, their severity and the potential environmental health, with an emphasis put on human health impacts. ZCCM-IH and GRZ will establish a mechanism to fund the mitigation measures given the highest priority. Prior to CEMP completion, the proposed project will proceed with the implementation of an interim work program that addresses the most urgent issues.

Finally, there is the issue of how to strengthen the regulatory framework to ensure that new environmental liabilities are not generated by ongoing mining activities. Zambia has chosen to use regulatory means to reduce the negative environmental and social impacts of mining operations. This is a major departure from the earlier situation when the industry was not accountable for its environmental impacts.

4. Rationale for the use of the IDA Grant:

For FY03, Zambia is eligible for $83 million equivalent of IDA grant funding in view of its debt vulnerable poor country status, the drought emergency and as one of the highest HIV/AIDS prevalence countries. Within this fiscal year, $62 million has already been allocated and approved for an HIV/AIDS and an Emergency Drought Recovery credits. The remaining $21 million equivalent is proposed to co-finance the CEP which is the final lending deliverable for the FY03 Zambia program. The use of IDA grant for the CEP responds to the following priorities identified by IDA 13 for grant funding:

*Mitigation of regional environmental externalities.* CEP interventions will address significant regional environmental externalities associated with long-term mining in the Copperbelt region and Kabwe—the most industrial, densely populated and heavily polluted regions of Zambia. The interventions will mitigate against environmental externalities that include the following: deterioration of ecological functions in the Kafue catchment of the Zambezi River system, pollution of water supply with contaminated mine leakage and runoff, and contamination of soil by lead, PCBs, radioactive material and other toxic substances. In addition, emergency interventions will aim at averting catastrophic failure of dilapidated tailings dams.
which could bring severe social dislocation and environmental damage to the region.

**Long term social benefits.** CEP will address key impacts of mining on human health, particularly acute and chronic lead poisoning, respiratory problems from air pollution, and water-borne diseases. It also aims at improving safety of communities exposed to health and life risks from subsiding ground around mines, flooding and other mining-related threats. Finally, through targeted involvement of local communities in site rehabilitation, management and long term use, it will extend social benefits such as employment and social inclusion to the poor and disenfranchised social groups that depend on the use of marginal lands in mining areas. The poor and marginalized people in the Copperbelt are the ones most exposed to the life and health hazards as their livelihoods depend significantly on subsistence farming in marginal lands, fishing in flooded mine pits and mine-polluted waters, or scavenging for scrap metal, bricks and other usable materials at the defunct mine sites. The environmental clean up will have a direct impact in improving the health status of these people and providing additional means to earn their livelihoods.

**Government preference and stakeholder support.** The proposed IDA grant-funded interventions are in full agreement with the priorities of the CAS completed in 1999 and the Government of Zambia’s PRSP completed in May 2002. One of the PRSP cross-cutting issues identified as requiring urgent attention and support is the environment, particularly in air and water pollution, soil degradation and poor sanitation. In addition, the CEP has benefited from extensive consultations with civil society, donors and other partners. Hence, the interventions directly respond to strong demand in the Copperbelt for environmental clean-up to reduce social costs borne by the poor, and to improve their livelihoods.

**Allocation of the IDA Grant**

In recognition of the severity and urgency of environmental degradation in the Copperbelt, the proposed IDA grant of $21 million equivalent is allocated solely to the Environmental Management Facility (EMF) established under CEP to address priority environmental liabilities. The proposed IDA Credit would finance the remaining US$15 million of the total US$36 million EMF.

**Monitoring of the IDA Grant**

The grant-funded project activities will be monitored against a set of end-of-project targets and indicators that include the following:

- Complete preparation of Environmental Management Plans for all mining sites, with adequate participation of all stakeholders.
- Complete prioritization of mining-related environmental liabilities based on a transparent and accepted ranking system.
- Complete implementation of mitigation measures prescribed by the Environmental Management Plans for the priority environmental liabilities.
- Zero leakage of tailings from project-rehabilitated dams.
- Seventy percent reduction of pollution flow from project-rehabilitated sites into the Kafue catchment.

**C. Project Description Summary**

1. **Project components** (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

   The project will comprise two components:

   * **Component 1 - The Environmental Management Facility (EMF).** The EMF will help GRZ and ZCCM-IH address the environmental and social problems resulting from ZCCM’s operations prior to...
privatization, as well as the permanent obligations of GRZ and ZCCM-IH under existing Zambian environmental laws and regulations following privatization. It does so by helping to define the environmental problems and by financing the costs of their mitigation. Since EMF funding is limited, the highest priority will be given to measures that address widespread public health problems or damage to ecological functions.

One of the first activities funded under the EMF will be the preparation of a Consolidated Environmental Management Plan (CEMP), which will identify priority issues to be financed through the EMF and provide criteria for the selection of sub-projects funded through the EMF. The CEMP will be a living document, developed in consultation with investors, to be reviewed and updated after two years. More broadly, it will provide a blueprint for handling environmental issues related to mining for the Copperbelt and for Kabwe over the next 25 years, within the broader context of environmental and social sustainability.

**Component 2 - Strengthening of the Environmental Regulatory Framework.** This component will assist the GRZ to ensure that historical and future environmental liabilities arising from mining activities are handled in compliance with national environmental and social safeguards. This will be achieved mainly by strengthening the capacity of ECZ and the delegated authorizing agencies such as MSD, to review EIAs, negotiate EMPs with investors and with ZCCM-IH, issue pollution permits, monitor compliance, and collect fees and fines. The project will also strengthen NGOs and relevant training institutions, such as the Copperbelt University, to increase national capacity to address environmental issues associated with the mining sector.

<table>
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<th>Component</th>
<th>Indicative Costs (US$M)</th>
<th>Total (US$M)</th>
<th>Bank Financing (US$M)</th>
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<td>100.0</td>
<td>40.00</td>
<td>100.0</td>
</tr>
</tbody>
</table>

2. **Key policy and institutional reforms supported by the project:**

**Policy reforms.** The Environmental Protection and Pollution Control Act (EPPCA) and the Mines and Minerals Act (MMA) adequately address environmental issues, and thus no major policy reform is envisaged. However, the concessions made to investors during privatization have created considerable uncertainty as to what environmental standards apply to existing large-scale mining operations. The project will help understand the impact of these concessions on environmental standards, and clarify the regulatory regime that applies to the investors that purchased ZCCM assets.

**Institutional reforms.** The most critical institutional reform sought through the project is the realignment of ECZ activities, to allocate a higher proportion of its resources and efforts to its regulatory mandate. The project will also help to update regulatory dispositions so that they have a significant deterrent impact on polluters, as well as provide a sufficient source of revenue to regulatory bodies. Finally, the project will help establish a mechanism to ensure cooperation between ECZ and the environmental units that serve as delegated authorizing agencies for their respective sectors. The mechanism would ensure that ECZ gives the final clearance on the basis of technical opinions from all relevant sectors, rather than only from the lead sector as is presently the case. More specifically in the case of mining, compliance requirements would not be limited to mining regulations, but would also include other concerns when relevant, such as water, energy, transport or local government.
3. **Benefits and target population:**

Managing and mitigating environmental problems in the mining sector would yield economic benefits from improved human health and ecosystem functions in the Copperbelt and in Kabwe. Health benefits will accrue from reduced exposure to environmental pollution and to the risk of accidents. The Project would also indirectly help improve worker health and safety conditions in existing and future mining enterprises, by strengthening the regulatory framework.

The proposed project will indirectly benefit the people of Zambia by removing a potential impediment to new private investments.

The proposed project will improve the capacity of mandated national agencies to regulate mining activities. It will strengthen the management and planning capacities of ECZ, and of delegated authorizing agencies such as MSD, and improve the skills of staff from these agencies to do strategic planning, monitoring, and to evaluate environmental issues and proposed mitigation measures. The Project would also help strengthen national capacity in environmental management through consultancies, studies and targeted training.

4. **Institutional and implementation arrangements:**

**Institutional framework**

**Component 1, Environmental Management Facility**

The Ministry of Finance and National Planning will finance environmental mitigation sub-projects related to mining activities from the portion of proceeds of the IDA credit titled Environmental Management Facility. The Minister of Finance will establish an EMF Steering Committee with a measure of autonomy to review the sub-projects to be funded by the EMF, screen them for priority ranking, appraise them to ensure compliance with IDA safeguard policies, approve them for funding, and monitor their implementation.

The EMF Steering Committee may delegate some of its responsibility to a technical subcommittee to ensure effective and timely execution of its functions. The Steering Committee will also ensure that the program of activities funded by the EMF is consistent with EMF objectives and the policies approved by GRZ and ZCCM-IH and agreed with the donors, and provide policy guidance to those involved. It will be chaired by the Secretary to the Treasury, and comprise as members the Permanent Secretaries of the Ministries of Environment, Local Government, Mines and Minerals Development, Energy and Water Development, Health, the General Manager of ZCCM-IH, the Director of ECZ and a representative each from the Mine Workers Union of Zambia, the Chamber of Commerce and Industry, the Chamber of Mines and a prominent member of the universities and of non-governmental organizations or civil society.

The decisions of the EMF Steering Committee will take into account the views and interests of all stakeholders, including inhabitants of mine townships and other members of civil society on the Copperbelt, and Kabwe, private sector investors in the mining industry. The EMF Steering Committee will authorize funding for a sub-project proposals developed on the basis of an application prepared by their respective sponsors. The proposal will fully justify disbursements against particular works or consultant services contracts designed for the mitigation or remediation of the environmental liabilities being addressed.

For the EMF Steering Committee to operate on a day-to-day basis, it will be served by a permanent secretariat called the EMF Secretariat. The Secretariat will have a Manager with qualifications and experience acceptable to IDA, assisted by an accountant and support staff (Program Assistant and Driver), with their operating offices in the Ministry of Finance and National Planning (MoFNP).
Manager and other staff from the EMF Secretariat will be supported by a technical assistance budget from the EMF. The EMF Steering Committee will also ensure effective and independent supervision by appropriate technical experts.

Prior to project effectiveness, the MoFNP-EMF Secretariat will enter into an agreement with ZCCM-IH acceptable to IDA, for the preparation and implementation of EMF sub-projects. The agreement will set out the arrangements for an on-lent part of the proceeds, to carry out sub-projects addressing its environmental liabilities, as well as a grant part of the proceeds, to carry out sub-projects addressing GRZ environmental liabilities. GRZ and ZCCM-IH will establish the mechanism described in the letter of sector policy, to determine their respective environmental liabilities and to address potential disagreements on the division of liabilities. MoFNP will disburse for each sub-project on a case-by-case basis, according to the sub-project's disbursement schedule.

ZCCM Investments Holdings Plc is a Government owned limited liability company that is charged amongst other tasks, with the management of: i) the defunct assets that it has retained following privatization, ii) environmental obligations agreed with investors as part of privatization deals, iii) environmental liabilities arising from mining operations prior to privatization. ZCCM-IH is accountable to the Ministry of Mines and Minerals Development (MMMD) for its operations. ZCCM-IH has designated the Environmental Services Group within ZCCM-IH, which will be named the ZCCM-IH Environmental Coordination Unit (ZECU), to be responsible for the development of detailed sub-project proposals, their implementation and their procurement. The ZECU will consist of a Manager supported by adequately qualified and experienced staff in environmental management, finance and accounting, procurement, environmental law, communications and community development. These functions are to be provided to the satisfaction of the EMF Steering Committee and of IDA. The sub-projects will be implemented through contractors supervised by ZECU. The ZECU has already managed CEP preparation and supervised the implementation of urgent mitigation measures funded through the Labor Retrenchment Program (LRP) surplus.

Component 2, Strengthening of the Environmental Regulatory Framework

The activities to strengthen the environmental regulatory framework in the mining sector will be executed by the Technical Secretariat of Environmental Council of Zambia (hereafter referred to as the Environmental Agency). The Agency is a semi-autonomous statutory body established by an Act of Parliament under the Environment Protection and Pollution Control Act of 1990 and governed by an independent Council. It is charged with ensuring, monitoring and enforcing compliance with Zambia’s environmental regulations. The Agency will receive funds directly from the Ministry of Finance, under a sub-grant agreement.

In fulfilling its regulatory duties, the Environmental Agency will rely on the delegated authorizing agencies that are responsible for the various sectoral regulations that touch on relevant issues. The Environmental Agency will coordinate the contributions of these agencies through an Interagency Regulatory Committee, that will be established during project implementation. The delegated authorizing agency for issues related to mining licenses is the Mines Safety Department (MSD) within MMMD. The MSD will maintain its lead role in the implementation of the Environmental Management in the Mining Sector Project funded by CIDA, which focuses on environmental management issues linked to mining and exploration licenses.

The Agency will ensure that mining activities are compliant with existing environmental regulations, and that the Environmental Management Plans (EMPs) of investors and the counterpart EMPs of ZCCM-IH are implemented as agreed.
Accounting, financial reporting and auditing arrangements

Financial Management will be the respective responsibility of the three institutions: the EMF Secretariat in Ministry of Finance and National Planning, and the ZECU for Component 1; and the Environmental Agency for Component 2.

EMF Secretariat

The EMF Secretariat will have the overall accountability responsibility for the EMF. It will be organized and staffed to provide efficient financial management, reporting and administration. Its tasks will include:

- managing the transfer of EMF funds to ZCCM-IH, to prepare sub-project proposals for applications cleared by the EMF Steering Committee, and to implement the sub-project proposals approved by the EMF Steering Committee; these funds will include the cost of project implementation, as well as the preparation and implementation supervision costs incurred by ZCCM-IH;
- monitoring the use of EMF funds by ZCCM-IH;
- establishing accounts for the EMF;
- installing appropriate accounting/budgetary and management information systems, capable of producing timely, understandable, relevant and reliable financial information that will enable management to plan, implement, monitor and appraise overall progress towards the achievement of EMF objectives;
- preparing annual budgets for the EMF;
- producing financial statements on a quarterly and annual basis for the EMF Steering Committee and IDA;
- preparing withdrawal applications from IDA and any other source of funding;
- undertaking an annual audit by qualified external auditors acceptable to IDA.

The EMF Secretariat will ensure that these functions are not only acceptable to the Government, the World Bank and any other Cooperating Partners, but also are carried out on a day to day basis as prescribed in the Project Implementation Manual (PIM) throughout project implementation.

ZECU

The agreement with ZCCM-IH requires that ZECU provide personnel in accounting/financial management. ZECU is obliged to maintain accurate and systematic accounts in respect of funds that they receive from the EMF Secretariat to prepare and implement sub-projects, in accordance with internationally accepted accounting principles. ZECU will also maintain contract records, audit records, financial information, financial statements and accounting records. As part of the agreement, ZECU will develop and implement a computerized system to monitor sub-project preparation and implementation expenditures. Both the EMF Secretariat and IDA shall have unrestricted access to these records and data. Provisions have been made to provide both the EMF Secretariat and IDA, or their authorized representative, to inspect or audit ZECU accounts, financial information, financial statements and technical information. ZECU will provide regular reports to the EMF Secretariat, as proposed in the agreement. These may include, but are not limited to: monthly technical and financial reports, quarterly cost summary tables, quarterly unaudited accounts, annual technical and financial reports, annual work plans and proposed budgets, and annual audited accounts.
**Environmental Agency**

The grant agreement with the Environmental Agency requires that it provide personnel in accounting/financial management. The Agency will:

- establish accounts for Component 2;
- install an appropriate financial management system, capable of producing timely, understandable, relevant and reliable financial information that will enable management of the Agency to plan, implement, monitor and appraise the overall progress towards the achievement of CEP objectives;
- prepare annual budgets for the Component 2;
- produce financial statements on a quarterly and annual basis for ECZ Board, the Ministry of Finance and National Planning and IDA;
- prepare withdrawal applications from IDA and any other source of funding;
- undertake an annual audit by qualified external auditors acceptable to IDA.

The Environmental Agency will ensure that these functions are not only acceptable to the Government, the World Bank and any other Cooperating Partners, but also are carried out on a day to day basis as prescribed in the Project Implementation Manual (PIM) throughout project implementation.

**Procurement**

Procurement for the EMF will be delegated to ZECU for expenditures related to sub-project preparation and implementation. The EMF Secretariat will undertake procurement for its own expenditures. The Environmental Agency will undertake procurement for Component 2.

**Procurement of Consultant services.** Consultant contracts will be awarded in accordance with the Guidelines for the Selection and Employment of Consultants by World Bank Borrowers (January 1997, revised September 1997, January 1999 and May 2002). Most consultant contracts will be awarded using the Quality and Cost based Selection (QCBS) procedures by evaluating the quality of the proposal before comparing the cost of the services to be provided. Short lists of consulting firms for contracts valued at less than US$100,000 may be comprised entirely of national firms if at least three qualified national firms are available at competitive costs.

**Procurement of Goods and Works.** All contracts will be awarded in accordance with Guidelines for Procurement of Goods and Services by World Bank Borrowers (January 1995; revised January 1996, August 1996, September 1997 and January 1999). Civil works would mostly comprise the rehabilitation of tailings dams, and the decontamination of polluted sites. Contracts for goods and civil works may be awarded on the basis of International Competitive Bidding (ICB) for contracts that are valued from US$250,000 to US$500,000, or National Competitive Bidding (NCB) procedures for lesser sized contracts.

**Monitoring and Evaluation**

**Component 1, Environmental management Facility**

The EMF Secretariat will be held responsible for monitoring overall progress of the EMF against agreed performance indicators for the EMF specified in the Project's Design Summary Matrix (Annex 1), and the Project Implementation Manual, including the Environment and Resettlement Framework. In addition, the EMF Secretariat will be required to submit quarterly reports for IDA review summarizing the utilization of EMF funds and progress made by ZECU, including applications submitted, the preparation status of applications cleared by the EMF Steering Committee, the implementation status of sub-project proposals approved by the EMF Steering Committee, deviations if any from applications and
sub-project proposals, problems and constraints and corrective measures being taken, and updated disbursement tables.

In implementing Monitoring and Evaluation, the EMF Secretariat will utilize a variety of activities to get feedback on progress and performance. These will include: i) monitoring reports by ZECU, ii) meetings with EMF stakeholders and target beneficiaries, iii) IDA supervision missions, iv) quarterly and annual financial reports, v) mid-term review of project implementation, vi) key performance indicators at dated implementation milestones, as provided in the Development Financing Agreement.

**Component 2, Strengthening of the Environmental Regulatory Framework**

The Council Secretary within the Environmental Agency will be responsible for monitoring the overall progress of Component 2 against agreed performance indicators for this component specified in the Project's Design Summary Matrix (Annex 1), and the Project Implementation Manual. The Council Secretary will be required to submit quarterly reports for IDA review summarizing the utilization of Component 2 funds, including the implementation status of the annual work program, problems and constraints and corrective measures being taken, and updated disbursement tables.

In implementing Monitoring and Evaluation of Component 2, the Council Secretary will utilize a variety of activities to get feedback on progress and performance. These will include: i) meetings of the Interagency Regulatory Committee, ii) visits of mining sites, including consultations with investors and mining pollution affected persons (MPAPs), iii) IDA supervision missions, iv) quarterly and annual financial reports, v) mid-term review of project implementation, vi) key performance indicators at dated implementation milestones, as provided in the Development Financing Agreement.

**D. Project Rationale**

1. Project alternatives considered and reasons for rejection:

   The 70 year history of mining and poor environmental practices on the Copperbelt have created a situation that needs to be addressed for the sake of public health and to create an environment suitable for future investment. The option of having no project to address these issues was considered and rejected for the reasons discussed below. The Project was then designed to most effectively define and manage the environmental issues.

   **Analysis of Project Alternatives.** The project team considered the option of no CEP and several alternative designs to the CEP.

   The option of not having a project was rejected due to the potential negative impact on public health in the Copperbelt and in Kabwe, on the environment, and on future investment in the mining sector. In particular:
   - Several environmental liabilities directly affect public health, and thus both short and long term impacts on wage earning and medical costs.
   - As part of the privatization process, ZCCM-IH and GRZ gave certain assurances to investors that they would adequately address the legacy of environmental liabilities. The privatization would not have been completed without these assurances. Not having an environmental mitigation project could result in ZCCM-IH/GRZ defaulting on environmental obligations to the investors, leading certain investors to pull out. This would unravel the privatization process, and thus seriously undermine GRZ's economic development plans.
   - Furthermore, the privatization process is attracting considerable international attention. Since the World Bank is closely associated with the privatization process in the eyes of public opinion, the Bank's reputation is at risk for having promoted "privatization without adequate safeguards" in the event of an environmental accident in the Copperbelt.
The assurances given by ZCCM-IH/GRZ to investors were most clearly translated into a set of explicit short-term obligations during the negotiations with KCM. ZCCM-IH was put in the situation of having to urgently fund the set of obligations agreed on with KCM. The negotiation of the final EMP prepared by KCM, as well as the preparation of a counterpart EMP to be prepared by ZCCM-IH/GRZ, will hopefully bring discussions regarding the environmental aspects of the assets purchased by KCM to closure. Eventually, similar closure should be reached with each of the other investment groups.

To ensure that privatization would move forward, the World Bank assured the Government that funds would be made available to cover environmental obligations for an initial period, if a project consistent with that proposed in the CAS could be prepared in compliance with World bank safeguard policies.

**Choice of project design.** Project design was initially driven by the need to fulfill short-term obligations vis-a-vis investors, with little discussion about the broader issue of the impacts on populations and environmental resources "downstream" from the mining operations. The proposed project emphasizes the long-term concerns regarding impacts on human health and the maintenance of ecosystem functions, and these concerns will be taken into account during the preparation of the counterpart EMPs, before being integrated into the CEMP. The CEMP also allows for cumulative impacts to be considered and for overall environmental priorities to be established. The EMF will finance the highest priority environmental mitigation and management activities. Finally, the project recognizes the need for capacity building to ensure the implementation of the project and to strengthen the regulatory framework.

Three scenarios were considered for implementing the project:

- **Scenario I** was to have two distinct projects. The first project would have included funding to: i) mitigate urgent, short-term liabilities and obligations, ii) finalize the CEMP, iii) put in place the capacity and institutional framework required by Zambia to review, negotiate and monitor the implementation of the EMPs to be prepared by ZCCM and private investors. The second project would have included funding for medium and long-term mitigation measures, most of which would be identified and prioritized in the consolidated EMP. The preparation of the second project would have started soon after the first became effective. This option was rejected during the Project Concept Document (PCD) review as not being cost-effective. In addition, this approach would not have made it possible to address on an urgent basis issues not identified during preparation, as funding for these would only have been available during the second project.

- **Scenario II,** having an Adaptable Program Lending (APL), was rejected for essentially the same reasons.

- **Scenario III** bridges the gap between short-term obligations and the yet to be defined medium- and longer-term measures by establishing an Environmental Management Facility. In this manner, rather than having to identify all the measures to be funded by the project during preparation, the emphasis is shifted to defining criteria for prioritizing the measures to be funded. The use of a Facility also gives the added benefit of opening up the funding pipeline to a wider audience, including local government and NGOs. This option was recommended during the PCD review meeting.

The proposed project's environmental assessment also considered the following options:

- **Focusing on specific rehabilitation investments.** This was rejected because: i) not all of the environmental impacts could be adequately defined at the time of appraisal, ii) the allocation of liabilities between investors, ZCCM-IH and GRZ will not be finalized until their respective EMPs are finalized and approved by ECZ, and iii) the allocation of liabilities might need to be readjusted, if privatization deals unravel (the case of Luanshya) or are modified (the case of KCM).

- **Expanding the project to address a broad range of issues arising out of mine privatization.** This was rejected due to the limited amount of resources available, the urgency of the environmental issues, and since other activities such as the Mine Township Services project are addressing some of
Incorporating the regulatory framework component into existing projects. The capacity building under the CEP will address issues not covered by existing projects, such as the Environmental Support Project (ESP) funded by IDA, Phase II of the Industrial Pollution Prevention Programme funded by NORAD, or the EMMS funded by CIDA. Furthermore, all three of these programs are due to end 2003. However, CEP will coordinate with other activities to maximize the benefit of the project component and avoid duplication.

Postpone the Project until the formulation of the Kafue Integrated Watershed Management Plan. This was rejected because of the urgency of the environmental issues, and because time bound commitments were made to investors. The initial pilot project for the Kafue is not due to commence until at least one year from now. However, the CEP may provide valuable input preparation of the plan, and more generally will coordinate with the Water Resources Action Plan (WRAP).

Identification of Issues. The categorization of environmental issues is based on extensive studies, including: i) a review prepared by Steffen, Robertson and Kirsten (SRK) in 1993, ii) an initial mitigation plan prepared in 1996, in an effort to comply with national regulations then coming into force, iii) Environmental Impact Statements (EIS) for each of the Mining License Areas, prepared by SRK and funded by IDA, which later on provided the baseline data and analysis that underpinned the preparation of privatization agreements, iv) interim EMPs for facilities taken over by KCM, as well as for the defunct facilities, prepared by Envirolink and commissioned by Anglo American.

Financing of urgent environmental mitigation measures. When the project was first considered in May 2000, ZCCM-IH requested that CEP address urgent environmental commitments and short term obligations to investors. Given the need to deal immediately with these issues and the difficulty of rapidly mobilizing financing from other sources, GRZ instead decided to amend the Subsidiary Loan Agreement for financing ZCCM-IH’s Labor Reduction Program (LRP) that had been established under the Public Sector Reform and Export Promotion adjustment credit (PSREP), to utilize surplus funds that became available as a result of savings in the cost of retrenchments of the work force. US$ 9 million of the LRP savings was allocated for these urgent issues, including the following:

- Actions specified in the Interim Environmental Management Plan agreed with KCM. Lack of fulfillment of these liabilities was seen as a prerequisite to the capacity of KCM to mobilize the funds required to develop the Konkola Deep Project. These obligations include:
  - Resettlement of villagers that would be affected by the Konkola Deep Mining Project (KDMP), according to a Resettlement Action Plan (RAP) cleared by IFC;
  - Removal of scrap material;
  - Demolition of defunct facilities, most particularly the High Grade Leach Plant in Nchanga;
  - Preparation of final EMP for historical liabilities associated with assets taken over by KCM.
- The rehabilitation of the Kansanshi Mine, agreed to in 1997 with Cyprus Amax (later transferred to Phelps Dodge and then to First Quantum), as a prerequisite for mine's redevelopment. Failure to comply had earlier caused delays.
- The stabilization of Tailings Dam 33C, south of the Nkana Mine. This dam breached in 1997, releasing an estimated 1 million tons of tailings into the Chibuluma stream and damaging traditional farmlands. The dam needed to be stabilized in 2000-2001 to avoid new breaches.
- Removal of PCBs. Part of the PCB stock accumulated by ZCCM-IH is stored in a brick shed at the Nkana plant. At least one barrel has spilled; PCBs have seeped into the soil and are entering into one of the watersheds. Contamination of soils and the watershed are accelerated during the rainy season.

The implementation of the Resettlement Action Plan at Konkola constituted a high priority social action as expectations have been raised and agreements made with the villagers that would have been affected by the Konkola Deep Mining Project. Although some of the defunct facilities do not appear to be a major
environmental issue, their demolition and removal are a priority because of contractual agreements reached with KCM, and because of their impact on operations. In addition, funds for the rehabilitation of the Nkana smelter were provided by DFID.

Consequently, these issues will not be part of the Project design. However, their progress was monitored during preparation and confirmed during appraisal.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

<table>
<thead>
<tr>
<th>Sector Issue</th>
<th>Project</th>
<th>Latest Supervision (PSR) Ratings (Bank-financed projects only)</th>
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</thead>
<tbody>
<tr>
<td><strong>Bank-financed</strong></td>
<td></td>
<td></td>
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<tr>
<td>The objective of the Economic Recovery and Investment Promotion Technical Assistance Credit Project is to support the implementation of the Economic Recovery and Investment Promotion Reform Program which aims to: (i) downsize the parastatal sector by privatizing ZCCM and other parastatals; (ii) revitalize the mining sector by strengthening the capacity of the Ministry of Mines and Minerals Development; and (iii) promote private sector business by improving the legal framework governing business activity.</td>
<td>ERIPTA Credit # 28750</td>
<td>Implementation Progress (IP)</td>
</tr>
<tr>
<td>The main objective of the Mine Township Services Project is to facilitate the completion of the privatization of ZCCM by supporting the provision of efficient and reliable water supply services, waste water services and solid waste management in five mine townships during a transitional period following the privatization.</td>
<td>Mines Township Services Credit # 33860</td>
<td>S</td>
</tr>
<tr>
<td>The Environmental Support Project will support the Government's development strategy of poverty reduction within the framework of economic growth and protection of the environment and national resources. The program aims to mainstream environmental and natural resources management in Zambia's development</td>
<td>Environmental Support Project Credit # 29610</td>
<td>S</td>
</tr>
</tbody>
</table>
processes at the national and local levels.

The PSREP was designed to support Zambia’s economic reform program to reduce poverty by promoting broadly-shared, private sector-led growth and improving the delivery of vital social services. The focus of the project changed during preparation to focus more on privatization of ZCCM. However, after approval, there was no revision of project objectives or components.

The project is the purchase and 2-year rehabilitation program of the mining and processing facilities of the Konkola, Nchanga and Nampundwe divisions of ZCCM. The Konkola and Nchanga divisions are located on the Copperbelt about 400 km from Lusaka, the capital of Zambia. The Nampundwe division is located 50 km from Lusaka.

The objectives of the projects were to support the Government in implementing an effective strategy for the mining sector. Specifically in the short term: improving the efficiency and productivity of the mining sector so that it could generate the resources needed to support the recovery and diversification of the economy. In the long term: (i) supporting the development of new copper mines by private investors; (ii) ensuring the systematic phasing out of depleted operations; (c) supporting the development of non-copper mining exports, especially gemstones; (iv) helping strengthen environmental protection in mining.

Other development agencies
CIDA—the project goal is to strengthen the technical and managerial capacity of the Mines Safety Department and to a lesser extent other key institutions

- 20 -
such as the Environmental Council of Zambia (ECZ), ZCCM-IH and the University of Zambia School of Mines and the Copperbelt University to execute statutory mandates to regulate, monitor and enforce environmental management by mining companies in Zambia.

DFID

SFT - Norwegian Pollution Control Authority. The overall objective of the Air Pollution Control Component is to control air pollution so as to provide for a clean and healthy ambient air for the people of Zambia arising from the reduction of emissions from point sources of air pollutants and local noxious and green house gases.

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

While environmental clean up projects are relatively new for the Bank, lessons have been drawn from the implementation of other projects in Zambia, most particularly projects focusing on the environment, and from the Bank's mine closure and reform activities in other countries. The Bank has also had considerable experience in mine closure and restructuring in Romania, Poland, Ukraine and Russia, and mining reform projects in Bolivia, Ghana, Peru, Argentina, Tanzania, as well as Zambia itself. Based on this experience, the following lessons have been drawn and have been incorporated into the design of this project.

The effectiveness and capacity of the implementing agency. ZCCM-IH will implement Component 1 (EMF) of the Project. ZCCM-IH is intimately familiar with the major environmental issues to be addressed. The size of its management staff was drastically reduced following privatization, in line with the new company's role as an investment holding company. As a consequence, ZCCM-IH will need to strengthen its implementation capacity, including working with and educating communities on proper mine site use, and reviewing projects for compliance with World Bank safeguards. The EMF will not finance community projects that extend beyond its mandate to mitigate adverse social and environmental impacts of mining activities, such as income generating projects, but it can assist communities to prepare proposals for funding from other more specialized projects, such as ZamSIF.

The capacity of the regulatory agency. The experience of the World Bank shows the importance of separating the implementation of mitigation measures from regulatory functions, as is the case under the Project. It also confirms that successful management of environmental liabilities requires effective regulatory bodies. The Environmental Agency and the delegated authorizing agencies such as MSD are currently not capable of fully enforcing environmental regulations and ensuring compliance. In an effort to help GRZ address the management of the environmental implications of the mining sector, the Project will include a component to strengthen the Environmental Agency to fulfill its duties, and will collaborate closely with the Environmental Management in Mining Sector (EMMS) project funded by CIDA and with
other potential donors. The EMMS project aims to strengthen the technical and managerial capacity of the Mines Safety Department of the Ministry of Mines and Minerals Development (MMMD), and to a lesser extent other key mining sector institutions in Zambia, to execute statutory mandates to regulate, monitor and enforce environmental management by mining companies in Zambia.

**Complete environmental assessment and management plan.** Mine closure and decommissioning activities typically involve three main concerns: (i) physical closure, (ii) environment and (iii) social issues. Physical closure is most often the easiest to define and plan. However, the environmental and social impacts of long term mining (particularly from past decades where environmental management was less rigorous or nonexistent) can be significant. The environmental and social impacts of the project were reviewed and discussed during preparation. Furthermore, the project includes the preparation of a Consolidated Environmental Management Plan that will address environmental issues in a comprehensive manner.

**Selection of Priority Mitigation Measures.** The Project will finance the costs of priority environmental mitigation measures that: i) are located in properties sold to investors under the condition that ZCCM-IH address certain environmental issues, ii) are outside properties but rest with ZCCM-IH, or iii) are incumbent on GRZ by default. The project will establish a system to identify the issues to be funded as a priority, with the highest priority given to those measures that address widespread health problems or environmental damage.

The approach adopted by the CEP is similar to that of the World Bank Project in Bolivia (Environment, Industry and Mining Project, 1995). This project used risk-based eligibility criteria tailored to the mining sector, with the impact on public health as its major criteria. Similarly, the United States Environmental Protection Agency (USEPA) Superfund uses a Hazard Ranking System (HRS) by which the threat to human health of a site can be assessed. The experience of these operations will be built into the design of the eligibility criteria for sub-projects. A first working set of criteria will be initially applied to sub-projects, and made public. The final risk-based selection system will be formulated as part of the CEMP. The selection of sub-projects will also consider suitability in the context in Zambia, to reduce risk while maximizing the use of the limited funds available.

**Social Impacts.** The CEMP will test specific sites to assess the degree of risk from agricultural, fishing and other current or potential site uses. Sub-project design will include extensive consultations with the populations currently using the mine sites, as well as cost-benefit analyses to assess whether the costs of limiting site access, and therefore denying income sources to those currently using a site, outweigh the benefits of permitting controlled site use. ZCCM-IH will therefore minimize potentially negative social impacts by allowing site use as long as it does not endanger the site stability or human health and safety. Closed mine sites, if tested for safety, may provide areas for community gardens or other uses.

A general lack of community understanding of mine pollution issues other than sulfur dioxide (which is visible and has a strong odor) may be one of the factors contributing to weak monitoring in the sector. The CEMP and the sub-projects under EMF will include education and consultation of communities regarding nearby sites; it may also potentially involve organization and outreach to residents downstream of defunct mine sites to raise awareness of the importance of maintaining these sites in order to have continued access to river water.

It is important to note that the World Bank is funding a separate project, the Mine Township Services Project, to address the municipal social services aspects (water, sanitation, and solid waste management) of the ZCCM privatization.
4. Indications of borrower and recipient commitment and ownership

GRZ is committed to the management of the environment. This is demonstrated by the adoption of a Nature Conservation Strategy (1985), the enactment of the EPPCA in 1990, the creation of the ECZ in 1991, the establishment of a ministry responsible for the environment in 1992, the preparation of a National Environmental Action Plan (NEAP) in 1994, and its implementation through the Environmental Support Program (ESP) from 1998. ESP has been rated as unsatisfactory for the past one and one-half years largely because of financial management problems in the implementing agency (Ministry of Tourism, Environment, and Natural Resources) – this Ministry will not play any substantive role in the implementation of the proposed Copperbelt Environment Project.

More specifically for the mining sector, Government adopted the Mines and Minerals Act in 1995, the Mines and Minerals Environmental Regulations in 1997, and the Mines and Minerals Environmental protection Fund Regulations in 1997. An Environmental Services Unit was created within ZCCM following the SRK study in 1993, to address the environmental issues associated with copper mining. Following privatization, ZCCM-IH and GRZ are committed to assume historical environmental liabilities accrued over 70 years of operation of the copper and lead mines. More directly, Government has reallocated US$9 million from the LRP to address urgent mitigation measures. Lastly, ZCCM-IH has already initiated public meetings to discuss the proposed project with the populations living next to targeted sites.

5. Value added of Bank support in this project:

The Bank has been a major driving force behind the privatization of the copper mines and is thus in a unique position because of it. There was an understanding during negotiation discussions that the Bank would welcome a request by GRZ in mitigating environmental liabilities in order to help GRZ complete the privatization negotiations. The Bank's support is critical, both as a front-row source of funds but also to attract other donors.

The Bank has had a good understanding and relationship with ZCCM-IH, MSD and ECZ since the 1990s through a series of operations (ERIP, ERIPTA, Environmental Support Program, Public Sector Reform and Export Promotion Credit, and the Mines Township Services Project). As a result, the Bank is familiar with the issues faced by ZCCM-IH following privatization, as well as the constraints confronting the institutions responsible for environmental compliance.

The Bank also has gained experience in similar situations in Bolivia and in Eastern Europe.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):
   - Cost benefit  \( \text{NPV}=\text{US}\$9.5 \text{ million}; \text{ERR}=18\% \) (see Annex 4)
   - Cost effectiveness
   - Other (specify)

CEP is amenable to a cost-benefit analysis. Thus the economic analysis of the project is based on summary measures of performance calculated on the incremental benefits and costs of the project to society as a whole (using the “with-project and without-project” criterion). The main benefits and costs, including the key underlying assumptions made are shown in Annex 4.

2. Financial (see Annex 4 and Annex 5):
   \( \text{NPV}=\text{US}\$ \text{ million}; \text{FRR}=\% \) (see Annex 4)

Annex 5 provides a breakdown of planned project expenditures by year. The funding of the EMF is designed to be spent over the life of the project, to allow for the development of sufficient capacity to use
the funds in accordance with World Bank guidelines. Operating costs for the project have been budgeted and sufficient funds allocated for operating expenses during the life of the project. The Project Implementation Manual details operating costs as well as the accounting procedures to be used by the implementing agencies.

Fiscal Impact:

Fiscal impact will be limited, as counterpart funding from GRZ will only be required for sub-projects that address GRZ liabilities. ZCCM-IH will provide counterpart funding for the portion that it borrows through the EMF, while the Environmental Agency will fund counterpart requirements for Component 2 from its fees, permits, licenses and fines. Component 2 may lead to an increase in the collection of environmental fees and fines, and therefore may generate some fiscal benefit.

3. Technical:

The majority of the cost of the Project is to plan for and address technical environmental issues from mining. Zambia has a history of mining and there is a wealth of technical skills and experience in Southern Africa and around the world to address these issues.

The project is designed to ensure that issues are identified, defined, ranked in importance and addressed on a priority basis. The CEMP will serve as a blueprint for addressing mining impacted environmental issues on a broad scale. Each mine investor and ZCCM-IH will also prepare detailed EMPs for each site with specific plans to address environmental issues. Issues will be ranked using a risk based methodology as described in Annex 13, with priority given to issues impacting human health and serious ecological damage. A final ranking methodology will be an output of the CEMP.

The EMPs will be approved by ECZ to ensure compliance with Zambian environmental legislation and requirements. Detailed plans for the mitigation works will be prepared by qualified experts. The plans are to be designed in the most cost effective manner to reduce the level of risk to an acceptable level. Technical skills to carry out these activities within realistic cost estimates are available, many within Zambia.

4. Institutional:

4.1 Executing agencies:

The Ministry of Finance will host Component 1. However, the Ministry will delegate oversight to the EMF Steering Committee, day to day management to the EMF Secretariat, and the preparation and implementation of sub-projects to ZCCM-IH. ZCCM-IH is a well established company, experienced in mining and capable of implementing sub-projects.

Component 2 will be implemented by the Environmental Agency (ECZ).

4.2 Project management:

The Ministry of Finance has the capacity to oversee the implementation of Component 1. The actual appraisal of the sub-projects will be carried out by the EMF Steering Committee with the support of the EMF Secretariat. The persons identified as members of the Steering Committee have the capacity to review sub-project proposals, with the support of TA employed by the EMF Secretariat, as necessary. The project will fund the cost of the EMF Secretariat and its staff.

The ZECU has already been created. ZCCM-IH will recruit additional staff using project funds to ensure the requisite mix of skills.
The Environmental Agency (ECZ) has the necessary technical staff. It also has considerable experience in managing foreign funded projects. The proposed project will finance the training of existing staff in financial management and procurement to meet World Bank requirements.

4.3 Procurement issues:

Procurement arrangements are described in Annex 6. Efficient procurement is critical for project implementation to succeed and for its outcomes to be sustainable. The capacity assessment done during pre-appraisal noted that ZCCM-IH and ECZ had staff that were familiar with IDA procedures. Nonetheless, ECZ will strengthen procurement planning through training of existing staff; the ZECU within ZCCM-IH will recruit a second procurement specialist before effectiveness.

In addition, the Ministry of Finance will appoint an Independent Technical Consultant to undertake the necessary due diligence activities where remedial civil works is undertaken for sub-projects approved to access proceeds of the Credit through the EMF, and thus ensure that procurement is conducted in a cost effective manner. In this regard, ZCCM-IH's Procurement Procedures Manual will constitute an integral part of the Project Implementation Manual (PIM) prepared by ZCCM-IH and ECZ.

4.4 Financial management issues:

Recent assessments by the World Bank of fiduciary risk in Zambia's indicate that it is relatively high. However, the financial management assessment made during project preparation concluded that project risk is considered to be moderate and the World Bank's financial management requirements would be met, provided the conditions outlined in the Financial Management Assessment Action Plan (see Annex 20) are fulfilled prior to credit effectiveness. It is most critical that the project establish a strong financial management control environment from inception. It should be noted that the EMF Secretariat for Component 1 has not yet been established. An accredited Financial Management Specialist from the World Bank will have to perform a financial management assessment to determine the readiness and capability of the EMF Secretariat to produce FMRs before the project can be declared effective. The EMF Secretariat must also install a satisfactory Financial Management System and recruit accounting staff. Key features of the financial management arrangements include:

- Identifying and installing a suitable Financial Management System for Component 1.
- Recruiting a Financial Management Consultant to install the accounting package and prepare the Project's Financial Procedures Manual;
- Recruiting a Financial Management Consultant to prepare a Financial Procedures Manual for each of the project's two components.
- Training relevant staff within the EMF Secretariat in the operation of the EMF financial system, and within the Environmental Agency in the operation of the Pastel accounting package.
- Customizing accounting software packages (where possible), to suit specific reporting requirements for the World Bank (which may be additional to GRZ's normal requirements) such as:
  - Monthly bank reconciliation statements,
  - Monthly cash flow management / forecasting reports,
  - Monthly Status of Funds reports,
  - Quarterly Financial Monitoring Reports (FMRs).
- Recruiting the relevant accounting staff for the EMF and for the Environmental Agency.
- Ensuring that project budgeting for each component follows existing GRZ procedures.
- Preparing Project Financial Statements in compliance with International Accounting Standards
- Performing annual external audits on terms of reference acceptable to the World Bank.
- Comparing on a regular basis the physical progress of sub-projects with financial progress.
The CEP will operate a cash accounting system. Thus, for the period of the project, Project funds will be accounted for on a cash basis.

5. Environmental: Environmental Category: A (Full Assessment)
5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

- Readers will note that the EA talks about 3 project components, whereas the PAD only has 2. This is because components 1 and 2 of the original design were merged. However, the scope of the activities remains as stated in the EA.

The core objective of the EA was to ensure that the mitigation actions proposed under the project do not cause negative environmental or social effects, that these measures are appropriate, and that the level of public consultation and disclosure complied with national environmental legislation and World Bank Safeguard policies. The EA focused on three tasks: i) providing an overview of the social and environmental context for the project; ii) evaluating overall mining hazards in the Copperbelt and Kabwe from a risk-based perspective, focusing on the impacts on human health, animals and plants; and iii) assessing the environmental and social impact and risk from the proposed project and the type of remediation activities planned. Because of evidence early on in the social assessment process that many of the risks to sustainable mitigation stemmed from social interaction with sites and the importance of human health issues to Kabwe, the draft EA and a draft social assessment were combined to form the final EA.

Because the CEP incorporates a funding mechanism (the EMF) rather than specific pre-identified investments, avoiding harmful effects requires an adequately defined process for environmental and social screening. ZECU will refer to the Environment and Resettlement Framework to screen proposals for safeguards; the EMF Secretariat will then appraise proposals, including a review to verify that safeguards requirements are met. A detailed checklist, by type of sub-project, will accompany each sub-project proposal.

According to the EA, the type of activities envisioned under the project are not, a priori, expected to cause negative environmental impacts as long as proper safeguards are followed. Because of the unique mineralogy of the majority of Copperbelt mines, the waste materials are relatively benign in most cases, and thus the environmental risks associated with remediation are not expected to be high. However, risks may be associated with improper implementation, insufficient consultation, or delays in the project processing which could lead to delayed rehabilitation of more urgent mine sites, during which time some tailings dams could fail causing potential loss to human life and economic resources; emergency response plans will be an important element for the project to support to address the risk of inaction or delayed action to stabilize dams. More significant risks in this region stem from social issues (denying access to income opportunities through site restriction, insufficient communications on site use, possible resettlement if areas are found to be unsafe).

In Kabwe, the significant health impacts associated with lead and the proximity of the lead smelter to population centers, mean that the potential remediation actions pose comparatively more risk. The disposal of waste materials improperly or in places accessible to residents, might have further health impacts. In addition, efforts to revegetate lead tailings could pose health risks if people use this vegetation for fuel or food. These risks can be managed as long as proper procedures for waste disposal, mine site security and public communication are followed.

As noted, the EA identified the main mine environmental issues. The primary environmental health issue in the Copperbelt mining sector is exposure to sulphur dioxide and particulate emissions in the towns of Mufulira, Kitwe and Chambishi. The primary environmental health issue related to mining in Kabwe is lead contamination from lead mining. Sulfur dioxide emissions are currently controlled by the private mine
companies, and are therefore affected only by regulation and EMPs agreed to with the investors. In contrast, lead contamination is primarily historical in nature, although current investors may engage in activities that could exacerbate exposure (such as lack of site security). Other mining and non-mining issues identified in the EA include:

**Mining Related Issues**

**Environmental**
- Kabwe health effects of lead contamination, primarily in soil and possibly food.
- Sulfur dioxide emissions from Mufulira, Nkana, Chambishi and Luanshya smelters.
- Siltation into streams and the Kafue River.
- Localized accidents from residential access of mine sites, including a number of fatalities each year.
- Potential for heavy metal uptake by food crops and fish.

**Social**
- Possible resettlement of people currently living in potentially unsafe areas on ZCCM-IH land.
- Transfer of large portions of ZCCM-IH land to Municipal Councils. Current economic uncertainty has resulted in an influx of settlers on this land, which now hosts at least 25,000 squatters (1996 estimate) and an estimated 1300 mine retrenchees, all currently without title.
- Loss of income generating opportunities based on using the sites (scavenging or fishing) versus remedial measures to ensure long-term stability of these sites and to protect users from potential hazards.
- Increases in deforestation, vandalism of mine sites and mine site accidents, with decline in mine security.
- Knock down effects from failed privatization deals such as Luanshya and KCM.

**Non-mining Related Issues**

**Environmental**
- Rapid increase in deforestation and settlement in national forest reserves and watershed areas in the Kafue basin, some by resettled retrenchees or retired miners.
- Outdated, poorly maintained sewage treatment plants and direct discharge of sewage into the Kafue River.
- Increased levels of solid waste being disposed within neighborhoods and on ZCCM-IH lands, causing increased air pollution from burning waste and breeding grounds for rats and malaria.
- Theft of PCB-based oil from electricity transformers for illegal sale as cooking oil.

**Social**
- Increasing tariffs for water, electricity, education, health care and other services are felt most acutely by certain groups that have not benefited directly from the recent growth in the mining sector. These groups include municipal employees (many of whom have not been paid for many months), public sector and university employees on fixed salaries, residents of Luanshya who are dependent on the now non-functioning mining sector, residents of Kabwe, retrenched miners with few skills, retired miners, other already vulnerable groups such as widows and those affected by AIDS. Some of these groups participate in scavenging at mine sites.
- Overtaxed public health facilities; increased fee payments and more restricted access to mine hospitals mean that retrenchees, retirees and others are overwhelming the already stretched public facilities in some towns. Compounding this problem has been the drain of medical personnel reported to have left the country for more lucrative positions within the past year.
Weak municipal governments unable to effectively collect tax revenues from mining sector, yet needing to augment services. Many defunct mine sites would eventually revert to local government control.

5.2 What are the main features of the EMP and are they adequate?

**Strengthening capacity**

The CEP’s design assumes that the model of an investor EMP and a counterpart EMP by ZCCM-IH will be applied to all investment groups to ensure that all environmental issues are included and that there is concurrence between the two EMPs on who is responsible for what issues. It also assumes that the investor and counterpart EMPs will be reviewed and approved concurrently by ECZ and by the Mines Safety Department (MSD), the latter as the delegated authorizing agency for handling environmental issues related to mining licenses, under the Environmental Protection and Pollution Control Act (EPPCA) and the Mines and Mineral Act of 1995. To ensure full compliance of the mining sector with national environmental regulations, CEP will fund appropriate capacity building within ECZ, MSD and delegated agencies under the EPPCA, as well as universities and recognized training and research institutions.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: January 24, 2002

The EA was disclosed in the InfoShop as of February 8, 2002, and in-country from February 12, 2002.

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

Stakeholder analysis and consultations carried out as part of this EA raised a number of environmental and social issues affecting the Copperbelt province and the Kabwe region that have been reflected in the project design. The EA also includes specific recommendations for the consultation and involvement of stakeholders during the preparation of the counterpart EMPs and the of the CEMP; these recommendations have been integrated into the Project Implementation Manual.

**Consultations during the EA**

The EA included discussions with stakeholders and NGOs at the national, provincial and district levels, such as OXFAM, Citizens for a Better Environment (CBE), PUSH, and Advocacy for Environmental Restoration (a complete list of those consulted is attached in Annex 19). Feedback from these consultations resulted in additional work under the EA. Furthermore, the EA involved consultations and discussions with specific groups that could be directly affected by the CEP. The majority of the consultations were carried out in local languages by a skilled facilitator in the majority. Target groups included:

- residents downwind of smelters,
- residents in neighborhoods which may have high levels of contaminants in Kabwe,
- fishermen, residents and farmers along streams receiving mine effluent,
- scavengers on mine sites,
- squatters on mine sites,
- farmers on mine sites,
- fishermen on tailings dams,
- residents adjacent to mine sites.
Disclosure of the EA

The EA was widely disclosed. Copies of the EA were made available in public places in 8 Copperbelt towns, as well as in Kabwe and in Lusaka. Availability of these documents was advertised repeatedly in various local and national newspapers. In addition, ZCCM-IH directly distributed the EA to NGOs, local government, academics and others, both in CD-ROM and in hard copy.

Affected communities are generally not aware of the impacts of pollution from mines on their health, except for sulfur dioxide which is visible and odorous. This lack of awareness was an impediment to effective participation from communities on project design. In response, ZCCM-IH provided information on the EA to affected communities in a simple and understandable manner. It developed summaries of environmental issues for each specific town, which identified sites of concern, highlighted the EA's conclusions on these sites, and mentioned the types of activities likely to be eligible for funding under the EMF. The summaries were prepared in both English and the most appropriate local languages. Meetings to discuss town summaries were held in 8 towns in the Copperbelt and in Kabwe in April and May 2002. In addition to meeting disclosure requirements, the meetings provided what was often the first opportunity for stakeholders to be educated on mining pollution issues and to gather their concerns and preferences regarding the project design.

ZCCM-IH also held a public consultation on the EA in Lusaka. Annex 19 outlines the specific consultations and disclosure procedures that have been followed, and how these correspond to Zambian legislation on disclosure. The EA did not evaluate specific investments; consultation and disclosure on the specific investments proposed under environmental management plans will be required when these plans are completed; such procedures are incorporated into the PIM.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

The impact of the project on the environment will be monitored and evaluated through two different channels. The first channel is through the regular progress reports on Component I prepared by the EMF Secretariat. Since the project's impact indicators are essentially environmental in nature, these reports will thus cover the project's impact on the environment. Moreover, the CEMP will provide a comprehensive baseline of environmental indicators, that will be revisited two years into the project. Broader environmental impacts, for example on water quality in the Kafue, or the reduction of lead in blood level in Kabwe, will be addressed in the performance evaluations scheduled for the project.

The second channel is through the activities of Component 2, Strengthening of the Regulatory Framework. Component 2 will include regular monitoring of pollution permits, as well as tailings dams, for compliance with national regulations. Thus the activity reports by the Environmental Agency will show whether or not the project has improved environmental quality in mining areas.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

Key Social Issues

1. Social impacts of the EMF. Improved environmental management of ZCCM-IH controlled mine sites will require the involvement of those currently using the mine sites. The EA found that these sites are frequently used for fishing, scavenging, charcoal collection, agriculture or recreation (boating, swimming, playing by children). Poverty driven scavenging and deforestation have, in numerous cases, resulted in the dismantling of decant structures and destabilization of tailings dams.
The EMF will only be effective and sustainable if it addresses the local awareness, and ownership of these sites.

2. Nonexistent Site Security. The dismantling of ZCCM's police force left most sites with no security and as a result, human activity noted above has increased. Any plans for mine sites will therefore need to develop alternative, community-focused solutions to improving safety and stability at these sites. These may include community policing where appropriate.

3. Long-term Site Maintenance Post Closure. Since many sites will involve minimal amounts of long-term maintenance, and since ZCCM-IH eventually plans to hand these sites over to local stakeholders, the involvement of stakeholders likely to take over these functions (local government, local stakeholder groups) will be essential both through the Steering Committee and through the process of developing project briefs for specific sites. At present, awareness of the existence of many sites among local residents is low.

4. Land distribution, possible resettlement. ZCCM-IH continues to hold broad tracts of land throughout the Copperbelt region. In many areas, this land is inhabited by squatter settlements or used by farmers, scavengers, fishermen and others. Some areas will need to be evaluated for safety from subsidence and caving. In some instances this land has been allocated to specific groups, such as retired miners, but has also been settled by squatters causing disputes over land rights. ZCCM-IH plans to redistribute this land.

5. Social impacts of ZCCM privatization. ZCCM privatization has had an impact on the well being of Copperbelt populations, in terms of access to employment and social services, such as water, sanitation. This is being handled through ERIPTA and the Mines Municipal Services Project.

Social Development Outcomes

The project's expected social development outcomes include the following:

1. Reducing the negative health effects of mine pollution. The project will address the cumulative impact of mining operations on the health of communities living next to the defunct Kabwe Mine. In the Copperbelt, project activities should improve safety of residents living downstream of tailings dams.

2. Preventing the degradation of water resources. A primary outcome of the CEP in the Copperbelt will be to improve water quality in the streams that flow from mine sites controlled by ZCCM-IH. Downstream farmers frequently use these streams for irrigation. The project would help protect the income generated from such resources.

3. Increasing community awareness of mine pollution. The CEP will seek to increase the awareness of neighboring communities regarding mine pollution and mine site safety, to reduce the number of mine site accidents and minimize human exposure to contaminated sites, rivers and areas. In Kabwe, environmental education should yield tangible health benefits. The CEP will also attempt to reduce harmful vandalism (theft of signs, stealing dam decants, deforestation of stabilizing vegetation) at mine sites. Ensuring the safety of squatter settlements can also be grouped under this objective. An analysis of the risks and benefits of permitting continued access must be performed on a site by site basis, rather than applying a blanket policy of restriction that may pose hardships to those currently using the sites.

4. Supporting the development of a ZCCM-IH land policy. Such a policy would govern the equitable distribution or divestiture of ZCCM-IH land and would complement the CEP Environment and Resettlement Framework.
6.2 Participatory Approach: How are key stakeholders participating in the project?

- Participation is categorized as follows:
  - information sharing (IS)
  - consultation (CON)
  - collaboration (COL)

Public and stakeholder involvement in the CEP is an essential element in the sustainability of the site rehabilitation, and of the project. The Project Implementation Manual includes a communication and participation strategy that will guide the structure and procedures for this participation (the draft strategy is in Annex 18 for reference). Several avenues to ensure such participation have been integrated into project design. These include:

1. Participation of stakeholders at the institutional level (COL). Key stakeholders (local government, NGOs, Ministry of Health, Mine company representatives, etc.) will make key project decisions through their representation at the EMF Steering Committee. The Steering Committee will, for example, review sub-project proposed for funding, and approve final project design.

2. Participation of stakeholders in each region and town under the EMF (CON, COL). Residents adjacent to sites, local government leaders, NGOs and others will be consulted and asked for feedback on proposed site remediation plans during the development of specific site remediation plans (as outlined in the Project Implementation Manual). Each sub-project proposal will include a community plan detailing local involvement in development of the proposal and in eventual site use and long-term maintenance. Suggestions on specific remediation options will be sought from residents, and integrated if technically sound, particularly in cases concerning communication and sustainable site use. Site users may be directly hired to guard sites, to replant sites, or for other labor intensive remediation works. NGOs and community development consultants will be contracted under the EMF, where appropriate, to manage community education and community site management components. In Kabwe, ZCCM-IH has also formed a task force with representation from local government and health authorities to follow the remediation plans.

3. Consultation during the EMP/CEMP (CON, IS). Local stakeholders and NGOs will be consulted during various stages of the EMP and CEMP processes (screening terms of reference, during implementation, during review) in accordance with Zambian law and World Bank requirements; these groups will provide information on potential environmental and social impacts, and their input may influence the definition of priorities. When necessary, the project will fund measures to enhance the quality of public consultations through public education or stakeholder workshops.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

The project will involve consultations and collaboration with NGOs and affected groups by:

(i) Consulting them during the EIA/EMP process, in compliance with the EIA law in Zambia and the requirements of the World Bank. Hence, NGOs and affected groups will provide information on potential environmental and social impacts. Their inputs may influence sub-project design and be incorporated in the Consolidated Environmental Management Plan (See Annex 18, Draft Communications and Participation Plan).

(ii) Consulting Stakeholders while establishing the criteria that will be employed by government to finance priority environmental projects under the Environment Management Fund. Publication of these criteria.

(iii) Possible sub-contracting to NGOs or community development consultants, where appropriate, to organize community education on specific mine site hazards, and develop more sustainable
site use plans. In cases where the risks of site use outweigh the potential benefits, community
development consultants may also be contracted to help those who no longer have access to the
site to develop proposal for alternative income generating activities for submission to the
Zambia Social Investment Fund (ZamSIF).

6.4 What institutional arrangements have been provided to ensure the project achieves its social
development outcomes?

The Project provides a valuable opportunity to increase the participation of citizens, NGOs, educational
institutions, local government and others in the improvement of the mine environment in the Copperbelt and
Kabwe. The EA included several recommendations to ensure this participation at key points in the project
(see Section 6.2 above), which have been incorporated into the PIM.

The ZECU within ZCCM-IH will recruit a Communications and a Community Development Specialist to
complement current staff skills. These specialists will manage the public consultation and community
participation for EMF funded sub-projects, and devise an appropriate communication strategy that ensures
that authorized representatives from NGOs, site users, miners, private sector, illiterate and vulnerable groups
receive information on the project in a timely manner in order to engage in a meaningful dialogue. The
Community Development Specialist will essentially embark upon a four stage process comprising:

(i) awareness building around specific sites,
(ii) analysis of the site management problems from the community’s/site users perspective,
(iii) consulting on specific options for remediation, receiving feedback, and
(iv) building consensus, finalizing agreements on site management and supervising any required
contracts for community education, community consultants or NGOs.

The Communications Specialist will conduct comprehension checks to ensure that stakeholders comprehend
information and recommend that their views be taken fully into account. The specialist will also monitor
indicators, as defined in the Project Implementation Manual, to assess whether consultations/participation
are taking place in the project according to the public consultation/participation plan.

In Kabwe, achievement of the CEP social development objective will require close collaboration at all
project stages with the health care and health communication community. The Ministry of Health is
represented in the project Steering Committee; ZCCM-IH has consulted health care providers in both the
public and private sectors as part of project preparation; and ZCCM-IH is forming a group of stakeholders in
Kabwe, which includes representatives of the health sector, to follow the CEP. Moreover, effective risk
communications will play a central role in reducing household exposure to lead in Kabwe; as part of project
preparation and implementation risk communications and medical specialists will be involved in program
development.

The achievement of social development outcomes in Kabwe will require close collaboration at all project
stages with the health care and health communication community. The Ministry of Health is represented in
the project Steering Committee; ZCCM-IH has consulted health care providers in both the public and private
sectors as part of project preparation; and ZCCM-IH is forming a group of stakeholders in Kabwe, which
includes representatives of the health sector, to monitor CEP implementation. Moreover, effective risk
communications will play a central role in reducing household exposure to lead in Kabwe; as part of project
preparation and implementation risk communications and medical specialists will be involved in program
development.

6.5 How will the project monitor performance in terms of social development outcomes?

The Community Development specialist within ZECU will be responsible for monitoring the social
development outcomes of the project on a day-to-day basis. The solutions towards decreasing vandalism
and deforestation at sites will need to be developed with communities, and their effectiveness will need to
be evaluated as the project is implemented. Monitoring of and feedback on the effectiveness of risk communication in places such as Kabwe will need to be integrated into the design of the risk communication strategy, and may be supplemented by Knowledge, Attitude, Practice Surveys (KAPS) or other similar techniques early in project implementation to allow for timely adjustment of any risk communication messages.

The Project Implementation Manual will define the final monitoring indicators for social outcomes. The types of indicators which could be refined include:

- Percent of sites where stabilizing vegetation has not been cut down;
- Percent of sites where decant structures remain intact, where signs remain, etc;
- Number of accidents on ZCCM-IH controlled mine sites;
- Awareness of residents around a mine site concerning the site, potential risk, and its appropriate use;
- Level of awareness among residents downstream of ZCCM-IH tailings dams concerning the dam, what actions by nearby residents may cause failure, and risks (assessed through KAPS);
- Awareness in Kabwe of actions that can be taken to reduce exposure to lead;
- Reduction or elimination in the number of vulnerable groups (pregnant women, children) accessing Kabwe's lead mine site;
- Reduction in blood lead levels in Kabwe;
- Improved effectiveness of any lead treatment program in Kabwe in terms of blood lead levels.

In order to monitor these outcomes, baseline data and rapid surveys may need to be conducted (for example on the risk communications strategy in Kabwe) for several indicators. In addition, stakeholder participation in project activities will be independently evaluated through beneficiary assessments of key stakeholders and residents surrounding mine sites once every two years. The assessments will incorporate a qualitative assessment of how stakeholders view their participation in the project. Any resettlement may require further evaluation.

7. Safeguard Policies:

7.1 Are any of the following safeguard policies triggered by the project?

<table>
<thead>
<tr>
<th>Policy</th>
<th>Triggered?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Natural Habitats (OP 4.04, BP 4.04, GP 4.04)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Forestry (OP 4.36, GP 4.36)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Pest Management (OP 4.09)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Cultural Property (OPN 11.03)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Indigenous Peoples (OD 4.20)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Involuntary Resettlement (OP/BP 4.12)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Safety of Dams (OP 4.37, BP 4.37)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*</td>
<td>☐ Yes ☐ No</td>
</tr>
</tbody>
</table>

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

To ensure compliance with the safeguard policies, CEP will follow detailed procedural requirements for safeguarding EMF sub-projects defined in the Environment and Resettlement Framework and implement several capacity building measures. At the heart of CEP safeguard management is a safeguard screening mechanism that is built into the sub-project cycle and consists of rigorous environmental and social screening of EMF sub-projects at the stage of sub-project identification. At this stage, ZECU will be responsible for screening the proposed sub-projects for activities which may trigger any of the safeguard
policies. The Environmental and Resettlement Framework will be subject to formal review by the World Bank within 6 to 12 months of project approval.

**Procedural Requirements for Safeguarding EMF Sub-Projects**

Safeguard requirements identified at the sub-project identification stage will be addressed during the sub-project cycle following detailed procedural requirements. The procedural requirements for each triggered safeguard policy at each stage of the sub-project cycle are detailed in the Environment and Resettlement Framework. The Environment and Resettlement Framework complements the Project Implementation Manual and specifies the individual responsibilities of ZECU, the EMF Secretariat and the World Bank in respect to individual safeguards, including public consultation and disclosure requirements. The key aspects of procedural requirements ensuring compliance with individual safeguards are summarized as follows.

Compliance with Operational Policy (OP) 4.01 on Environmental Assessment will be ensured through environmental and social screening of sub-projects. The screening will include review of available data and field reconnaissance to determine the anticipated social and environmental impacts of sub-projects. Depending on the significance of the anticipated impacts, ZECU will prepare full Environmental Assessment including an environmental mitigation plan for sub-projects with significant adverse impacts, or Environmental Analysis with environmental mitigation measures for sub-projects with limited adverse impacts. The World Bank and the EMF will review the Environmental Assessment reports and the Environmental Analysis report respectively. EMF will ensure adequate funding for the mitigation recommended in the reports. ZECU will implement the recommended mitigation and report on implementation to EMF following the procedural requirements in the Environment and Resettlement Framework.

Compliance with OP 4.12 on Involuntary Resettlement will be ensured through adherence to the Resettlement Framework included in the Environment and Resettlement Framework document. The Resettlement Framework was prepared by the Government with significant World Bank input and integrates World Bank requirements with Zambian legislation to describe in detail the processes and methods that will govern resettlement under CEP. The Resettlement Framework identifies the Resettlement Action Plan (RAP) as the key resettlement instrument. ZECU will be responsible for preparation of RAPs and adequate participation of affected persons in the resettlement process.

Compliance with OP 4.37 on Safety of Dams will be ensured through comprehensive geotechnical and safety review of tailing dams in the CEP area at the start of the CEP by an Independent Expert on dam safety in cooperation with ZECU. The review will identify safety issues of tailing dams and recommend prioritized measures to bring safety to acceptable level. Where applicable, ZECU will prepare standard dam safety instruments including Emergency Preparedness Plan, Construction Supervision and Quality Assurance Plan, Operation and Maintenance Plan, and Instrumentation Plan. To improve dam safety in the long term, the dam safety review will consider not only the immediate repair of tailing dams but also their rehabilitation and upgrading for long-term use. The safety measures will be designed to minimize the need for ongoing maintenance and promote sustainable uses of tailing dams by communities.

Compliance with OP 11.30 on Physical Cultural Property and OP 4.04 on Natural Habitats will be ensured through the environmental and social screening and subsequent steps for outlined in the section on Environmental Assessment. Consistently with OP 4.01, ZECU will integrate measures to adequately manage physical cultural resources and potential conversion or degradation of natural habitats by sub-project activities in the environmental and social review. Environmental Assessment or Environmental Analysis will serve as the key instruments for planning and designing measures required by OP 11.30 and

Prior Review

The first five Category I and Category 2 sub-projects, as per the Environment and Resettlement Framework, will be subject to prior review by the World Bank.

Safeguard Capacity Building

To build adequate capacity for addressing World Bank safeguard policies, CEP includes the following training, knowledge management and capacity building measures at the early stages of project implementation:

i) Safeguard Policy Training and Guided Practical Work. ZECU will internationally engage the services of a highly qualified consultant for the period of project start up, to advise on the application of World Bank Safeguard Policies and to develop the capacity of ZECU staff to carry out social and environmental screening, identify issues relevant to safeguarding natural habitats, physical cultural resources, persons affected by resettlement, and recognize sub-project activities that may trigger any other World Bank safeguard. To develop adequate expertise, the Advisor will combine theoretical safeguard training with guiding the ZECU staff in their work on handling the safeguard requirements of EMF sub-projects. The Advisor will work within ZECU until sufficient capacity for handling routine safeguard issues is developed within the unit. ZECU will engage additional experts as necessary to complement the expertise of the advisor. The World Bank may request ZECU to carry out an independent audit of the ZECU capacity in respect to environmental and social safeguards. The audit would be carried out before the end of the Advisor’s assignment to verify that adequate safeguard capacity has been developed sufficiently to handle safeguard issues without external assistance.

Technical staff of the EMF responsible for reviewing sub-project Applications and other documents related to safeguards will also participate in the training. As part of the joint training, ZECU and environmental assessment (EA) practitioners from ECZ should identify, with the guidance of the Advisor, ways for streamlining the sub-project documentation to avoid duplication and ensure that the safeguard documents (e.g. Environmental Assessment, resettlement plans, etc.) meet the Zambian and World Bank requirements.

ii) Safeguard Trigger Questions Checklist. ZECU, with the help of the Advisor, will prepare a Safeguard Trigger Questions Checklist to aid the screening of EMF sub-project for activities that are likely to trigger safeguard policies. The checklist will guide ZECU staff during field reconnaissance and assist them to identify the safeguard issues in sub-project Application and other documents. It will also help to assure consistency and comprehensiveness of screening across various sub-projects. Based on the checklist, ZECU may also develop detailed guidelines for reviewing environmental and social impacts of the most common types of sub-projects (e.g. tailing dams rehabilitation).

iii) Cumulative and Indirect Impact Guidelines. ZECU, with the help of the Advisor, will develop guidelines for identifying and addressing cumulative environmental impacts from the sub-projects on the main areas of concern (e.g. surface waters, soil, air, landscape, etc.). ZECU, with the help of the Advisor, will also develop guidelines for addressing indirect (induced) impacts of sub-projects. Adequate attention to cumulative and indirect impacts will be particularly important given the (large) number and (sometimes misleadingly small) scale of EMF sub-projects.

iv) Safeguard Knowledge Management. ZECU, with the assistance of the Advisor, will design and establish a mechanism for retaining the practical knowledge gained from managing safeguard
aspects of EMF sub-projects. This may include establishment of a simple website or database (e.g. CR-ROM) with key documents (literature, legal documents, policies, guidelines, good practice, TOR, checklists, progress reports, contacts for key resource persons and consultants) that will aid ZECU staff and others, e.g. regulatory agencies, local governments, NGO's or general public, that may be involved in sub-project preparation.

To safeguard knowledge management activities will include periodic independent audits of the safeguard performance (after a sufficient number of sub-projects has been handled). The findings of the audit will serve to derive lessons for improving the safeguard capacity and as a quality assurance mechanism.

Capturing the safeguard know-how will assist ZECU in managing sub-projects, facilitate disclosure of relevant information to the public, encourage consistency throughout the sub-project portfolio, encourage safeguard dialogue with other donors and reduce disruptions potentially caused by turnover of ZECU staff.

F. Sustainability and Risks

1. Sustainability:

From a development perspective, the proposed project will increase the long-term sustainability of environmentally sound and profitable mining operations in Zambia.

From an operational perspective, ZCCM-IH will in perpetuity be responsible for managing the environmental liabilities accrued during the years before privatization. Eventually, the scope of these liabilities will wane, but in the meantime ZCCM-IH must take measures to address them. The project will increase ZCCM-IH's longer-term capacity to address environmental issues, staring from the existing nucleus of core capacity that it has set up.

The CEP has been designed to address several potential risks to sustainability. A first risk to the long-term impact of the project is the willingness of ECZ and delegated authorizing agency to enforce existing regulations and the power conferred to enforcement agents. Rigorous enforcement would create a revenue stream that would ensure longer-term sustainability. Ultimately, this will depend on the willingness of GRZ to regulate the mining sector and the guaranteed job security for enforcement agents.

A second risk is that environmental liabilities mitigated through the EMF might reemerge following project completion, because routine minimal maintenance is not performed (for example at tailings dams), or because communities interfere with the sites (cutting down stabilizing vegetation for example). It is expected that the Environmental Management Facility established through the project will continue to attract funding after project completion. The CEP's emphasis on community involvement and education seeks to address the issue of community ownership and thus diminish the extent of vandalism, by promoting sustainable uses of rehabilitated sites. The involvement of local authorities and interest groups such as downstream users in discussions on long-term maintenance requirements will also target this issue.

A third risk is that some of the more critical sites fail because of delays in project implementation. The up-front funding of those most unstable sites should provide for faster project implementation.

Finally, the profitability of copper mining activities is another major risk to sustainable management of mining liabilities and obligations, as fewer resources might be available for environmental management if mining revenue is low.
2. **Critical Risks** (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

<table>
<thead>
<tr>
<th>Risk</th>
<th>Risk Rating</th>
<th>Risk Mitigation Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Outputs to Objective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder institutions fail to fulfill their role in project implementation</td>
<td>S</td>
<td>Formation on a Steering Committee headed by the Ministry of Finance.</td>
</tr>
<tr>
<td>Inadequate compliance by stakeholders with established standards</td>
<td>M</td>
<td>Supervision by World Bank staff.</td>
</tr>
<tr>
<td>Insufficient commitment by GRZ to improving environmental management of the mining sector and enforcing environmental regulations</td>
<td>S</td>
<td>Leadership by the Secretary of the Treasury and participation of key ministries and other stakeholders including NGOs.</td>
</tr>
<tr>
<td>The private industry will fail to have the resources to implement agreed plans and actions</td>
<td>S</td>
<td>Monitoring and enforcement of environmental regulations by ECZ and MSD.</td>
</tr>
<tr>
<td>EMF not managed in accordance with the established procedures and agreed priorities and funds misused.</td>
<td>M</td>
<td>Broad based stakeholder involvement on Steering Committee, clear procedures and audits to ensure compliance with financial management arrangements.</td>
</tr>
<tr>
<td>From Components to Outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy-in and participation of key government officials and NGOs.</td>
<td>M</td>
<td>Inclusion of key government ministries and NGOs Steering Committee and stakeholder involvement in establishment of criteria for ranking environmental liabilities.</td>
</tr>
<tr>
<td>Overall Risk Rating</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

3. **Possible Controversial Aspects:**

As the project deals with environmental issues and possible health impacts it is highly likely that some aspects of the project will be controversial. Potentially controversial issues include the following:

**Lead Pollution in Kabwe**

The Kabwe Mine commenced operations in 1904 and closed in 1994. The area in Kabwe and more particularly the areas adjacent to the mine have indicated the presence of impacts of lead. The lead has been detected in part of the population and is considered a serious health issue. The project will develop a plan to reduce or eliminate the risk to residents and treat those impacted as required. Public disclosure of the problem is likely to raise concerns and provoke reaction by residents against the former mine operators and GRZ. The issue is known to be of interest to international NGOs and will receive international media attention.

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Under the project ZCCM-IH has been engaged in public disclosure and is hiring a communications specialist to assist on this issue. The Bank maintains good relationships and contact with interested NGOs. The Bank's External Relations Unit is involved in the project team and is briefed regularly by the task manager.

**Ranking of Priorities**

Limited funds are available and priority measures will receive funding first under the project. Priority will be based on risk to human health and ecological damage, and will also take account of time bound contractual obligations made during privatization. Best international risk based methodology will be used, with input from a broad base of stakeholders. Nevertheless it is likely that opinions over priorities will differ.

The process and criteria will be transparent and the basis of the ranking of priorities will be explained to stakeholders.

G. Main Conditions

1. Effectiveness Condition

**Conditions for Effectiveness**

- The agreement with ZCCM-IH, and the Subsidiary Project Agreement with ECZ are signed;
- Financial Management Systems are installed and operational within the EMF Secretariat and within ECZ;
- The Ministry of Finance and National Planning will recruit the EMF Secretariat Manager and the EMF Accountant;
- The following project accounts have been opened and an advance deposited:
  - **Ministry of Finance and National Planning**: A Project Account for GRZ liabilities under Component I and a deposit of Kwacha 400 million into the account;
  - **ZCCM-IH/ZECU**: A Project Account for ZCCM-IH liabilities under Component 1, and a deposit of Kwacha 400 million into the account;
  - **ECZ**: A Project Account for Component 2, and a deposit of Kwacha 200 million into the account.

2. Other [classify according to covenant types used in the Legal Agreements.]

**Other Covenants**

- ZCCM-IH counterpart EMPs are ready by May 31, 2003;
- The CEMP is completed by May 31, 2004;
- Revised investor EMPs are completed by May 31, 2004, and relevant permits are issued and monitored;
- The EMF Steering Committee is maintained as established throughout the life of the Project;
- The Ministry responsible for Finance ensures that the following positions are filled from July 1, 2003 and maintained at all times during project implementation, in a manner acceptable to IDA: EMF Secretariat Manager and EMF Financial Management Specialist;
- At all times during project implementation, the EMF Secretariat ensures that EMF sub-projects comply with applicable safeguard policies of the World Bank, and well as Zambia's environmental regulations;
• The EMF Steering Committee will ensure that a study regarding the sustainability of after care maintenance of rehabilitated sites is completed by March 2006;
• ZCCM-IH ensures that the following positions are filled from July 1, 2003 and maintained at all times during project implementation, in a manner acceptable to IDA: a lawyer to work on environmental issues (preferably versed in mines issues), a geotechnical engineer, a financial management officer, two procurement officers, a communications and community liaison officer, and a community development officer;
• At all times during project implementation, the ZECU Manager position is filled and the recruitment process is acceptable to IDA;
• At all times during project implementation, the position of Director of the ECZ Agency is filled through a recruitment process acceptable to IDA, and the Agency is operated in an efficient manner;
• The ECZ Agency ensures that the following positions are filled from July 1, 2003 and maintained at all times during project implementation: Component 2 Coordinator, Council Secretary, Procurement Officer and Financial Management Officer;
• ECZ establishes and maintains the Interagency Regulatory Committee (IRC) by January 1, 2004, and provides IDA with annual reports on its activities, during the first quarter of the following year, throughout project implementation;
• The ECZ Agency regulates all mining activities by mid-term review, either through compliance or through litigation;
• MSD performance is satisfactory by mid-term review, as shown by an independent performance audit of environmental compliance in the mining sector;
• In anticipation of the mid-term review, which should take place no later than 30 months after project effectiveness, the EMF Secretariat, ZECU and ECZ each commission the preparation of a mid-term project report by an independent team of reviewers, including an assessment of the project's impact on stakeholders; the report shall be distributed to all participants one month prior to the start of the review.

H. Readiness for Implementation

☐ 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
☒ 1. b) Not applicable.
☐ 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
☒ 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
☐ 4. The following items are lacking and are discussed under loan conditions (Section G):
I. Compliance with Bank Policies

☐ 1. This project complies with all applicable Bank policies.
☐ 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Yves Andre Prevost
Team Leader

Richard G. Scobey
Sector Manager

Christiaan J. Poortman
Country Director
Annex 1: Project Design Summary

ZAMBIA: Copperbelt Environment Project

<table>
<thead>
<tr>
<th>Sector-related CAS Goal: Environmentally sustainable economic growth</th>
<th>Key Performance Indicators</th>
<th>Data Collection/Strategy</th>
<th>Critical Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector Indicators: Environmental degradation in mining sector managed and regulated. Environmental management related to privatization in the mining sector established and maintained. Pollution flows from rehabilitated project sites into Kafue River Watershed reduced by about 70 percent over the next 5 years. Zero breaching of tailings dams rehabilitated under the project.</td>
<td>Sector/country reports: State of the Environment Report.</td>
<td>(from Goal to Bank Mission) Mineral commodity prices allow for a viable mining sector. Good governance and management of mining revenues.</td>
<td></td>
</tr>
</tbody>
</table>

| Project Development Objective: Address environmental liabilities associated with the mining sector, following the privatization of the mining assets. Mining sector complies with environmental and social regulations. | Outcome / Impact Indicators: ZCCM-IH and GRZ liabilities are addressed on a priority basis. Investors address their liabilities as described in the EMPs. Environmental regulations applied to current mining activities. Mining sector in compliance based upon results of regular monitoring. Pollution flows and loads resulting from mining operations are reduced. | Project reports: ECZ, ZCCM-IH and EMF Secretariat progress reports. | (from Objective to Goal) GRZ can mobilize enough resources to address accumulated liabilities. Stable macro-economic environment that encourages growth in the sector. Existence of strong political will and commitment to ensure environmental sustainable mining development through the application of environmental regulations. GRZ has the capacity to enforce environmental regulations and monitor compliance. No significant new source of pollution introduced into the region. |

<table>
<thead>
<tr>
<th></th>
<th>Data Collection/Strategy</th>
<th>Critical Assumptions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(from Goal to Bank Mission)</td>
<td>Mineral commodity prices allow for a viable mining sector. Good governance and management of mining revenues.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(from Objective to Goal)</td>
<td>GRZ can mobilize enough resources to address accumulated liabilities. Stable macro-economic environment that encourages growth in the sector. Existence of strong political will and commitment to ensure environmental sustainable mining development through the application of environmental regulations. GRZ has the capacity to enforce environmental regulations and monitor compliance. No significant new source of pollution introduced into the region.</td>
</tr>
<tr>
<td>Hierarchy of Objectives</td>
<td>Key Performance Indicators</td>
<td>Data Collection Strategy</td>
<td>Critical Assumptions</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------</td>
<td>--------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td><strong>Output from each Component:</strong></td>
<td><strong>Output Indicators:</strong></td>
<td><strong>Project reports:</strong></td>
<td><strong>(from Outputs to Objective)</strong></td>
</tr>
<tr>
<td>1. Mechanism established to scope, plan, prioritize and fund mitigation of environmental liabilities associated with the mining sector, following privatization of ZCCM.</td>
<td>Establishment of EMF.</td>
<td>EMF and ECZ reports.</td>
<td>Stakeholder institutions fulfill their role in project implementation</td>
</tr>
<tr>
<td></td>
<td>CEMP completed and approved by the Project Steering Committee and by ECZ including an inventory of environmental liabilities and obligations of ZCCM-IH and GRZ and a ranking system of environmental liabilities.</td>
<td>Progress reports from EMF, ZCCM-IH and ECZ.</td>
<td>Any disputes between GRZ and investors on ownership of liabilities do not hamper implementation.</td>
</tr>
<tr>
<td></td>
<td>Environmental liabilities of ZCCM-IH prioritized according to a transparent and accepted ranking system.</td>
<td>EMF Minutes</td>
<td>All stakeholders comply with the established standards.</td>
</tr>
<tr>
<td></td>
<td>Pipeline of environmental sub projects prepared based on agreed priorities.</td>
<td>EMF progress reports</td>
<td>EMF will be managed in accordance with the established procedures and agreed priorities and funds will used accordingly.</td>
</tr>
<tr>
<td></td>
<td>Completion of sub projects to agreed standard.</td>
<td>Independent audit</td>
<td>GRZ is committed to the improved environmental management of the mining sector and to enforcement of environmental regulations.</td>
</tr>
<tr>
<td></td>
<td>Preparation of an Environmental Regulatory Framework Study.</td>
<td>ECZ progress reports</td>
<td>ECZ have sufficient capacity to negotiate and approve EMPs</td>
</tr>
<tr>
<td>2. Environmental monitoring and regulation of the mining sector.</td>
<td>Establishment of an Inter Agency Coordination Committee.</td>
<td>MOU, minutes of meetings</td>
<td>The industry (private and public) has the resources to implement agreed plans and actions.</td>
</tr>
<tr>
<td></td>
<td>Investor and Counterpart EMPs for each site completed with adequate participation of local governments and stakeholder groups (NGO’s, community organizations).</td>
<td>Progress reports from ZCCM-IH and ECZ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All mines monitored and regulated within 3 years</td>
<td>ECZ and MSD reports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non compliance resulting in levying of appropriate fees, fines and legal measures.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Components / Sub-components</td>
<td>Inputs: (budget for each component)</td>
<td>Project reports:</td>
<td>(from Components to Outputs)</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------</td>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>1. Establishment of the Environmental Management Facility (EMF)</td>
<td>US$ 37.57 million</td>
<td>Quarterly disbursement reports</td>
<td>Buy-in and participation of key government officials and NGOs.</td>
</tr>
<tr>
<td>2. Strengthening of the environmental regulatory framework</td>
<td>US$ 4.2 million</td>
<td>Quarterly disbursement reports</td>
<td>Stakeholder institutions are committed to performing their mandate and introducing effective environmental management practices.</td>
</tr>
</tbody>
</table>
Annex 2: Detailed Project Description

ZAMBIA: Copperbelt Environment Project

By Component:

Project Component 1 - US$37.57 million

The development objectives of the Copperbelt Environment Project (CEP) are to assist Zambia to: i) address environmental liabilities associated with the mining sector, following the privatization of the mining assets, and ii) improve future compliance of the mining sector with environmental and social regulations.

These objectives will be pursued by two project components: i) establishing an Environmental Management Facility (EMF) to finance the implementation of priority environmental and social measures required of ZCCM-IH and GRZ according to a Consolidated Environmental Management Plan (CEMP); and ii) strengthening the regulatory and institutional frameworks to improve compliance of the mining sector with environmental regulations and Environmental Management Plans (EMPs).

Component 1 - The Environmental Management Facility

The main objectives of the Environmental Management Facility (EMF) are to help GRZ and ZCCM-IH address the environmental problems that are the result of ZCCM's mining operations before privatization and to fulfill the permanent obligations of GRZ and ZCCM-IH under existing Zambian environmental laws and regulations. It does so by helping to define the environmental problems and by financing the costs of their mitigation, including the costs of overseeing the implementation of priority mitigation measures. The environmental problems either:

1. are located in properties that were sold to investors under the condition that ZCCM-IH would assume the responsibility for the remediation of historical damage;
2. are found outside the properties that were sold to investors, and are incumbent on ZCCM-IH; or
3. arise from past mining operations, are not incumbent on ZCCM-IH or on an investor, and thus now rest with GRZ by default.

The breakdown of liabilities between investors, ZCCM-IH and GRZ will be determined on an investor-by-investor basis through the preparation by each investor of an Environmental Management Plan (EMP), and by ZCCM-IH of a Counterpart EMP. ZCCM-IH is also legally compelled to implement measures specified in mine closure plans prepared by ZCCM in late 1997, in compliance with the provisions of the new Mines and Minerals Act, 1995, and the associated Mining Environmental Regulations. The EMF is likely to address issues such as:

- Stabilization, rehabilitation and decommissioning of tailing dams,
- Sedimentation controls;
- Rehabilitation of waste rock dumps.
- Removal of tailing and siltation from waterways;
- Habitat rehabilitation;
- Clean up of contaminated soils and waterways;
- Improving safety at abandoned sites;
- Removal of defunct facilities;
- Disposal of scrap materials.

Since EMF funding is limited, the highest priority will be given to measures that address widespread public health problems or damage to ecological functions. The EMF will allocate resources in a manner that ensures the implementation of the highest priority mitigation measures during the five-year period of the project. The procedures and guidelines for the management and administration of the EMF are detailed in...
the Project Implementation Manual, and must remain to the satisfaction of IDA during project implementation (also see Annexes 12 and 13).

The EMF will as an urgent priority following project effectiveness fund the preparation of a Consolidated Environmental Management Plan (CEMP), which will be undertaken by qualified advisors. The CEMP will identify priority issues to be financed through the EMF and provide criteria for the selection of sub-projects funded through the EMF. The CEMP will:

i) consolidate the site specific environmental obligations that remain with ZCCM-IH (as detailed in the Counterpart EMPs) and those obligations that are the responsibility of investors (as detailed in the Investor EMPs),

ii) identify, and if necessary investigate, the cumulative and downstream impacts of mining activities on public health and critical ecological functions that are not captured in Investor or Counterpart EMPs, or that constitute GRZ responsibilities, most particularly the impact of mining activities on the Kafue River watershed;

iv) rank environmental issues using a risk-based methodology that takes into account potential impacts on public health and basic ecosystem functions, and provide selection criteria that will be applied to all applications to the EMF for funding;

v) develop a model of the impacts of mining activities, which will serve as a framework for future monitoring of impacts;

The CEMP will be a living document, developed in consultation with investors, to be reviewed and updated after two years. Its availability is critical for ZCCM-IH, since it will identify the measures required to bring the land and assets remaining with ZCCM-IH in compliance with the EPPCA and thus set ZCCM-IH's environmental obligations over the next 20 years.

More broadly, the CEMP will provide a blueprint for handling environmental issues related to mining for the Copperbelt and for Kabwe over the next 25 years, within the broader context of environmental and social sustainability.

Prior to the CEMP being available, an interim list of priority activities has been identified using preliminary selection criteria. It includes:

- Mitigation of lead contamination in Kabwe, including risk communication;
- Stabilization of dam eroded walls, including community outreach and communication;
- Dam stability risk assessment and emergency planning;
- Decommissioning of defunct facilities considered a safety or health risk
- Removal and disposal of PCBs

**Project Component 2 - US$4.20 million**

**Component 2 - Strengthening of the Environmental Regulatory Framework**

**Component 2 - Strengthening of the Environmental Regulatory Framework.** This component will assist the GRZ to ensure that historical and future environmental liabilities arising from mining activities are handled in compliance with national environmental and social safeguards. Compliance will be achieved mainly by strengthening the capacity of the ECZ Agency and the delegated authorizing agencies to review EIAs, negotiate EMPs with investors and ZCCM-IH, and to monitor their implementation, issue pollution permits and monitor compliance, and collect fees and fines. As necessary, the project will also facilitate capacity building in key stakeholders such as the University of Zambia, the Copperbelt University, and NGOs involved in the mitigation of the environmental impacts from mining.
As the focal institution for environmental compliance, the component will strengthen the ECZ Agency's core regulatory functions as they relate to the mining industry. The ECZ Agency will rely on the delegated authorizing agencies responsible for the various sectoral regulations that are relevant to one or more mining activity. It will coordinate the contributions of these agencies through an Interagency Regulatory Committee, which will be established during project implementation. The delegated authorizing agency for issues related to mining licenses is the Mines Safety Department (MSD) within MMMD. The MSD will maintain its lead role in the implementation of the Environmental Management in the Mining Sector (EMMS) Project funded by CIDA, which focuses on environmental management issues linked to mining and exploration licenses. EMMS aims to strengthen the technical and managerial capacity of the Mines Safety Department and the Mines Development Department of the Ministry of Mines and Minerals Development (MMMD) to regulate, monitor and enforce environmental management by mining companies in Zambia. More generally, the project will work jointly with other potential donors to enhance environmental management capacity in the mining sector.

The project component is designed to support a time slice of ECZ's institutional capacity building program to continue after the Environmental Support Program (ESP) support ends in 2003. It takes into consideration several institutional recommendations that arose from the ESP, as well as those proposed in the environmental assessment prepared for the CEP.

The project will fund the following sub-components: i) revision and harmonization of environmental regulations in the mining sector, ii) monitoring and enforcement of compliance, iii) environmental emergency response system, iv) support to the Inter-Agency Committee for environmental compliance in the mining sector, v) environmental awareness and public participation, vi) ECZ capacity building and project monitoring.

Consultancy services funded through a PHRD grant will, prior to project effectiveness, provide a baseline for future support to the delegated authorizing agencies: The consultant will: i) clarify the roles and responsibilities ECZ, MSD, other delegated agencies, in addressing environmental liabilities associated with mining activities; ii) propose mechanisms to ensure effective coordination between all the actors involved in the environmental regulation of mining activities, iii) develop a program of activities for ensuring full compliance with EA, EMP and license requirements for mining activities; iv) identify training and logistical requirements for the ECZ Agency and the delegated authorizing agencies, including off-the-job training and technical assistance.
Annex 3: Estimated Project Costs
ZAMBIA: Copperbelt Environment Project

<table>
<thead>
<tr>
<th>Project Cost By Component</th>
<th>Local US$ million</th>
<th>Foreign US$ million</th>
<th>Total US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management Facility</td>
<td>15.40</td>
<td>17.17</td>
<td>32.57</td>
</tr>
<tr>
<td>Strengthening of Regulatory Framework</td>
<td>2.70</td>
<td>1.50</td>
<td>4.20</td>
</tr>
<tr>
<td>Total Baseline Cost</td>
<td>18.10</td>
<td>18.67</td>
<td>36.77</td>
</tr>
<tr>
<td>Physical Contingencies</td>
<td>1.00</td>
<td>1.50</td>
<td>2.50</td>
</tr>
<tr>
<td>Price Contingencies</td>
<td>1.00</td>
<td>1.50</td>
<td>2.50</td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td><strong>20.10</strong></td>
<td><strong>21.67</strong></td>
<td><strong>41.77</strong></td>
</tr>
<tr>
<td><strong>Total Financing Required</strong></td>
<td><strong>20.10</strong></td>
<td><strong>21.67</strong></td>
<td><strong>41.77</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Cost By Category</th>
<th>Local US$ million</th>
<th>Foreign US$ million</th>
<th>Total US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Works</td>
<td>1.56</td>
<td>17.12</td>
<td>18.68</td>
</tr>
<tr>
<td>Goods</td>
<td>0.92</td>
<td>0.85</td>
<td>1.77</td>
</tr>
<tr>
<td>Services</td>
<td>2.02</td>
<td>3.50</td>
<td>5.52</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>4.44</td>
<td>0.00</td>
<td>4.44</td>
</tr>
<tr>
<td>PPF Refinancing</td>
<td>0.30</td>
<td>0.30</td>
<td>0.60</td>
</tr>
<tr>
<td>EMF resources not yet earmarked</td>
<td>5.00</td>
<td>5.76</td>
<td>10.76</td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td><strong>14.24</strong></td>
<td><strong>27.53</strong></td>
<td><strong>41.77</strong></td>
</tr>
<tr>
<td><strong>Total Financing Required</strong></td>
<td><strong>14.24</strong></td>
<td><strong>27.53</strong></td>
<td><strong>41.77</strong></td>
</tr>
</tbody>
</table>

Identifiable taxes and duties are 0 (US$m) and the total project cost, net of taxes, is 41.77 (US$m). Therefore, the project cost sharing ratio is 45.49% of total project cost net of taxes.
1. Introduction

The Copperbelt Environment Project (CEP) comprises two components: establishing an environmental management facility (EMF) to finance the costs of priority environmental and social measures required of ZCCM-IH/GRZ totalling US$36 million, including preparation of a consolidated environmental management plan (CEMP) that will provide an overview of the impact of the mining activities on the environment and affected populations, clarify investors obligations and the obligations remaining with ZCCM-IH and identify priority mitigation measures; strengthening the regulatory and institutional frameworks to ensure compliance of the mining sector with environmental regulations and to monitor implementation of investor and ZCCM-IH/GRZ environmental management plans (EMP) at a cost of US$4 million.

In this Annex the results of cost-benefit analysis (CBA) is presented, carried out to estimate the environmental and social costs and benefits of mitigation measures that have been proposed under the EMF as well as the costs and benefits related to the CEMP and EMP components of the CEP.

The results of estimations of the costs and benefits are presented in Section 2 followed by the approach and method in Section 3. The main findings and sensitivity are summarized in Section 4.

Summary of Benefits and Costs:

The results of the CBA presented in this Annex clearly indicate there are positive efficiency gains to be had by investing US$40 million under the auspices of both the EMF and institutional components.

2. Results

2.1 Costs

The costs of the CEP include investment costs and maintenance costs. In the case of the US$36 million allocated to the EMF, investment costs are assumed to be US$6.0 million per year over 5 years and maintenance costs are assumed to be US$0.3 million per year over 20 years. With the inclusion of an additional US$4 million allocated to institutional strengthening, investment costs are estimated to increase by US$0.8 million per year to US$6.8 million per year over 5 years.

In addition to the estimation of costs the cost computations include consideration of a “with-and-without” CEP scenario; maintenance costs without the CEP are expected to be double (US$0.6 million) the maintenance costs with the CEP (US$0.3 million). The incremental costs (i.e. investment costs minus incremental maintenance costs) are US$6.5 million per year for the first 5 years and there is an incremental costs savings of US$0.3 million per year thereafter.

2.2 Benefits

The main benefits expected to flow from the mitigation measures specified under the EMF include reductions in soil contamination, water pollution and air pollution as well as reduction in the likelihood of a tailings dam failure:

2.2.1 Benefits from reduced soil contamination

Soil contamination, due to lead, is prevalent in Kabwe and deemed to impact on human health.
It is estimated a total of 92,772 persons in Kabwe may be impacted by lead in soil. This includes 42,000 and 39,000 persons in Makululu and Katondo respectively resident in unplanned settlements and 5,400, 3,996 and 3,120 persons in Railways, Chowa and Kasanda Mine respectively resident in conventional housing areas.

The benefits from reduced soil contamination in the cost-benefit analysis are attributed to: (i) savings in treatment costs for children aged 0-5 years; (ii) savings in treatment costs in persons aged 6-18 years; (iii) reduction in work days lost in those 19 years and older.

Of those persons that may be impacted by lead in soil in Kabwe approximately 13,916 are aged 0-5 years, 39,892 are aged 6-18 years. The remaining 38,964 are 19 years or older, of whom approximately half, or 19,482, are (potentially) income earning.

The cost of treating 13,916 children using the drug DSMA (Succimer), in the case of each child taking the recommend course of treatment, estimated to be US$195 per child per year, is US$2,713,620 per year. The cost of treating 38,964 people, in the case of each person making one visit per year to a medical center for a lead-related illness, estimated to be US$12 per person per year, is US$478,704 per year. The cost of workdays lost, in the case of each person forgoing 5 work days per year, estimated to be US$9.79 per person per year, is US$190,728 per year. This is based on an average income of US$431 per year earned over 220 workdays.

The benefits of mitigation measures are translated into: a 95 percent savings in treatment costs of children aged 0-5 years with costs rising at 2 percent per year; a 50 percent savings in treatment costs of persons aged 6-18 years with costs increasing at 2 percent per year; a 50 percent reduction in workdays lost by half of those persons aged 19 years and over using half of annual income (reflecting a combination of work and leisure lost) rising at 2 percent per year. The total non-discounted benefits are US$70.71 million.

2.2.2 Benefits from reduced water pollution

Water pollution, in the form of suspended solids entering the Kafue River, is deemed to impact on quality of life.

It is estimated that suspended solids entering the Kafue River may impact upon up to 100,665 households.

The benefits from reductions in suspended solids in the cost-benefit analysis are attributed to a reduction in the costs of maintenance and treatment of pump stations located long the Kafue River.

Those areas that may be impacted are Kalulushi and Chambishi, Chililabombwe, Chingola and Kitwe numbering some 10,395, 9,401, 25,349, 55,520 households respectively. On average, 70 percent of households are connected to piped water, paying US$43 per year, approximately 23 percent of which is for the maintenance and treatment of water.

Of those impacted by suspended solids in water the cost to households of maintenance and treatment is US$71,964 in Kalulushi and Chambishi, US$65,083 in Chililabombwe, US$175,491 in Chingola and US$384,365 in Kitwe.

The benefits of mitigation measures are translated into a 15 percent savings in maintenance and treatment per year. The total non-discounted benefits are US$2.43 million.

2.2.3 Benefits from reduced air pollution

Air pollution, due to dust and sulphur dioxide, is prevalent in Mufulira and deemed to have a high impact on human health in Kankoyo and a medium impact on human health in Kantanshi.
It is estimated that a total of 16,442 persons in Kankoyo and 46,267 in Kantanshi may be impacted by dust and sulphur dioxide in the air.

The benefits from reduced air pollution in the cost benefit analysis are attributed to: (i) savings in treatment costs in 0-5 year olds; (ii) savings in treatment costs in 6-18 year olds; (iii) reduction in work days lost in those 19 years and older.

Of those persons that may be impacted by dust and sulphur dioxide in the air approximately 2,466 and 6,490 are aged 0-5 years in Kankoyo and Kantanshi respectively, 7,070 and 19,895 are aged 6-18 years in Konkoyo and Kantanshi respectively. The remaining 6,906 in Konkoyo and 19,882 in Kantanshi are 19 years or older, 3,453 and 9,941 of whom respectively, are (potentially) income earning.

For Kankoyo, where human impact is high, the cost of treating 2,466 children, in the case of each child making two visits per year to a medical center for a air pollution-related illness, estimated at US$12 per person per year, is $US59,184. The cost of treating 7070 people, in the case of each person making one visit per year to a medical center, similarly estimated at $US12 per person per year, is $84,840. The cost of workdays lost, in the case of each person forgoing 5 work days per year, estimated to be $US9.79 per person per year, is $US33,805.

With human impact in Kantanshi considered to be medium, the number of visits to a medical center and workdays lost due to a air-pollution related illness are taken to be half that of Kankoyo. So the cost of treating 6,490 children, in the case of each child making one visit to a medical center, is US$77,880; the cost of treating 19,895 people, in the case of one in every two persons making a single visit per year, is US$119,370. And the cost of work days lost, where each person forgoes 2.5 days per year, estimated to be US$4.90 per person per year, is $US48,711.

The benefits of mitigation measures are translating into a 50 percent savings in treatment costs of children aged 0-5 years and persons aged 6-18 years with costs rising at 2 percent per year; a 50 percent reduction in workdays lost, by half those persons aged 19 years and over using half of annual income (reflecting a combination of work and leisure lost) rising at 2 percent per year. The total non-discounted benefits are US$4.86 million.

2.2.4 Benefits from reduced likelihood of a tailings dam failure

Water pollution, in the form of suspended solids entering the Luanshya River, in the event of a failure of the tailings dams at Chonga and Akatiti, would have an impact on quality of life.

The benefits from reducing the likelihood of a tailings dam are attributed to a savings in the costs of treatment of drinking water and maintenance of pump stations located along the Luanshya River.

On average 70 percent of the 22,282 households, potentially impacted upon, are connected to piped water, paying US$43 per year, approximately 23 percent of which is for maintenance and treatment of water; the costs to households of maintenance and treatment would amount to US$154,258.

The benefits of mitigation measures are translated into a 15 percent savings in maintenance and treatment per year. The total non-discounted benefits are US$3.64 million.

2.3 Net Present Value

The costs and benefits of mitigation measures under the EMF without the CEMP and EMP are shown in Table 1. The net present value (NPV) discounted @ 10 percent is US$9.50 million.
2.4 Sensitivity Analysis

What is the impact of a 5% over-estimation of benefits or a 5% under-estimation of benefits accruing from reduced soil contamination, water pollution and air pollution?


Main Assumptions:

3. Approach and Method

The rationale for using a CBA is to measure the efficiency of investing $40 million, that is, does a dollar value invested (i.e. costs) in mitigation measures under the auspices of the CEP result in more than a dollar of damages avoided (i.e. benefits)?

This has involved the collation of secondary data presented in the Environmental Assessment of the Copperbelt Environment Project (Komex International Ltd, 2002, esp. pp. 79 – 82); collection of information during the course of discussions with relevant experts carried out during a field visit to the Copperbelt, March 14-20, 2002.

During the course of the fieldwork it became evident that data and information necessary to estimate all the environment and social benefits, that are likely to accrue form the proposed mitigation measures, either was not available or was insufficient. Thus the following analysis is confined to those benefits that could be reasonably quantified and measured in dollar terms; those additional and non-quantifiable benefits are presented in Section 4.

The CBA of the CEP has comprised five related activities the details of which are presented below.

(i) Major impacts of mining activities on the environment and populations have been identified and prioritized. The major impacts, prioritized in order of likelihood and size of impact of mining activities, are deemed to be on human life, human health, human quality of life, agricultural and aquatic fish production, animal, plant and habitat life, and (water, air and soil) resources (See Annex 13).

(ii) Various mitigation measures have been identified and estimates made of the costs of these measures. The mitigation measures comprise a core of hard and soft options (See Annex 13). A sum of US$36 million is allocated to fund these mitigation measures under the EMF and an additional US$4 million is allocated for strengthening the regulatory and institutional frameworks.

(iii) Benefits of the mitigation measures have been identified and estimates made of the benefits accruing from these measures. While the benefits of the mitigation measures are likely to accrue to both human and non-human habitats, benefit estimates are confined to the human health and human quality of life, and include: soil contamination, due to lead, which is prevalent in Kabwe and deemed to impact on human health; water pollution in the form or suspended solids entering the Kafue River, which is deemed to impact on human quality of life; air pollution due to dust and sulphur dioxide, which is prevalent in Mufulira and deemed to high impacts on human health in Kankoyo and a medium impact on human health in Kantanshi; water pollution in the form of suspended solids in the event of a failure of the tailings dam at Chonga which would impact on human quality of life in Luanshya. In Kabwe benefits will accrue from reduced soil contamination; benefits are estimated using a combination of savings in treatment costs and reduction in workdays lost. In the case of the Kafue River benefits will accrue from reduced water pollution; benefits are estimated using a reduction in the costs of treatment of drinking water and maintenance of pump stations located along the Kafue River. In Mufulira benefits will
accrue from reduced air pollution; benefits are estimated using a combination of savings in treatment costs and reduction in workdays lost. In the case of the tailings dams at Chonga and Akatiti benefits will accrue from reducing the likelihood of a tailings dam failure; benefits are estimated using a savings in the costs of treatment of drinking water and maintenance of pump stations located along the Luanshya River.

(iv) A sensitivity analysis is carried out to gauge the impact of a 5 percent under-estimation and a 5 percent over-estimation of benefits accruing from reduced soil contamination, reduced water pollution and reduced air pollution.

Sensitivity analysis / Switching values of critical items:

4. Summary

The results of the CBA presented in this Annex clearly indicate there are positive efficiency gains to be had by investing US$40 million under the auspices of both the EMF and with the inclusion of the CEMP and EMP. The sensitivity analysis, furthermore, indicates only a marginal variation in the NPV. Some caution, however, should be exercised in interpreting these results.

First, there are several instances where the calculations presented above may under-estimate the benefits of the proposed mitigation measures. This may be the case with benefits from reduced water pollution. Should the proposed mitigation measures (e.g. repairing and closing dams) not be sufficient, the costs of maintenance and treatment of pump stations located along the Kafue River is likely to be at least several orders of magnitude higher than what is occurring now.

What impact might this have on the NPV? Suppose several scenarios in which the costs of maintenance and treatment of water, for the 70 percent of impacted households in Kalulushi and Chambishi, Chililabombwe, Chingola and Kitwe, was to increase:

- Scenario I - the impact of maintenance and treatment costs doubling would increase the NPV by almost 7 percent to US$10.16 million;
- Scenario II - the impact of maintenance and treatment cost quadrupling would increase the NPV by approximately 21 percent to US$11.49 million.

Secondly, some of the benefits, that have not been quantified and which are not captured in the analysis, relate to benefits from reduced water pollution and benefit from reduced likelihood of tailings dam failure. Apart from impacting on human life these events may result in loss of agricultural and fishery production (e.g. contaminants to damage the agricultural soil with a deposition of a fine silt layer, reducing the quality of irrigated and stock water, copper poisoning of fisheries), loss of aquatic life (e.g. the "hippo pools", fish and crustacean breeding habitats and their food sources), loss of habitat and natural resources (e.g. grassland, shrub-land, forestry, wildlife such as birds, gazelle, antelope) and even the loss of human life.

In the absence of quantification of these benefits the NPV calculations should be taken as conservative estimates of the efficiency gains to be had by investing US$40 million under the auspices of both the EMF and with the inclusion of the regulatory and institutional strengthening.

Finally, in the cost-benefit computations, no account has been taken of the possible benefits that might accrue from the strengthening of the regulatory and institutional frameworks. For instance, assuming the EMP is effective in strengthening the regulatory and institutional frameworks that increase compliance, this may contribute to larger reductions in soil contamination, water pollution and air pollution, both in areas where the mitigation measure would be implemented under the CEP, and within the wider Copperbelt area.
Again, the in the absence of quantification of these benefits the NPV figure computed for the EMF with the regulatory and institutional strengthening should be viewed as a conservative estimate of the efficiency gains to be had by investing US$40 million.

Table 1: Costs and benefits of mitigation measures under the Project (millions of US$ in 2002 prices)

<table>
<thead>
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<th>Costs</th>
<th>Total</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td></td>
</tr>
<tr>
<td>Maintenance Costs</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance costs with project</td>
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<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
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<td>3.00</td>
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</tr>
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<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
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<tr>
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<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Incremental costs</td>
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<td>6.50</td>
<td>6.50</td>
<td>6.50</td>
<td>6.50</td>
<td>(0.30)</td>
<td>(0.30)</td>
<td>(0.30)</td>
<td>(0.30)</td>
<td>(0.30)</td>
<td>(0.30)</td>
</tr>
</tbody>
</table>

Benefits

A From Reduced Soil Contamination**
   - Savings in 0-5 years treatment costs | 63.17 | 2.60 | 2.65 | 2.71 | 2.76 | 2.81 | 2.87 | 2.93 | 2.99 | 3.05 | 3.11 | 3.47 |
   - Savings in 6-18 years treatment costs | 5.83 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.28 | 0.28 | 0.29 | 0.30 |
   - Reduction in 19+ years workdays lost | 1.70 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.09 |
   - Total from Soil Contamination | 70.71 | 2.91 | 2.97 | 3.03 | 3.09 | 3.15 | 3.21 | 3.28 | 3.34 | 3.41 | 3.48 | 3.84 |

B From Reduced Water Pollution**
   - Savings in maintenance and treatment costs | 2.43 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.12 | 1.33 |

C From Reduced Air Pollution***
   - Savings in 0-5 years treatment costs | 1.70 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.93 |
   - Savings in 6-18 years treatment costs | 2.43 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.12 | 1.33 |
   - Savings in 19+ years workdays lost | 0.73 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.40 |
   - Total From Air Pollution | 4.86 | 0.20 | 0.20 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 2.67 |

D From Reduced Likelihood of a Tsailing Dam Failure****
   - Total Benefits | 81.64 | 3.36 | 3.43 | 3.50 | 3.57 | 3.64 | 3.71 | 3.78 | 3.85 | 3.94 | 4.02 | 44.85 |
   - Net Benefits | 53.64 | (3.14) | (3.07) | (3.00) | (2.93) | (2.86) | 4.01 | 4.08 | 4.16 | 4.24 | 4.32 | 47.85 |
   - Net Present Value of Net Benefits @ 10% | 9.50 | (2.85) | (2.54) | (2.26) | (2.00) | (1.78) | 2.26 | 2.10 | 1.94 | 1.80 | 1.66 | 11.17 |

Economic Rate of Return
   - 18%
Annex 5: Financial Summary
ZAMBIA: Copperbelt Environment Project

Years Ending 2003 to 2008

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<thead>
<tr>
<th>Total Financing Required</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<td>8.4</td>
<td>7.3</td>
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<td>9.9</td>
<td>8.4</td>
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</table>

<table>
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<tr>
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<th>Year 4</th>
<th>Year 5</th>
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<th>Year 7</th>
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<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Project Financing</td>
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<td>9.9</td>
<td>8.4</td>
<td>7.3</td>
<td>5.8</td>
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</tr>
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</table>

Main assumptions:
Totals may vary due to rounding in millions.

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Annex 6: Procurement and Disbursement Arrangements
ZAMBIA: Copperbelt Environment Project

Procurement

General

Public procurement in Zambia is regulated by the Zambia National Tender Board Act 1982 (TBA), Tender Regulations 1990 (TR) and GRZ Procurement Guidelines 2001. The rules covering all aspects of public procurement in the country are covered in the 1990 regulations as issued by the Ministry of Finance. While the above mentioned Act provided for the establishment of an autonomous Zambian National Tender Board (ZNTB), it also authorizes the Ministry of Finance to issue basic rules for carrying out public procurement by line ministries. Its application is therefore elaborated in several ministerial directives. In this regard, the Tender Board, through it's Secretariat and the large parastatals generally follow acceptable international and domestic procurement practices. However, the line Ministries who actually implement the major share of public procurement follow less than acceptable procurement practices and need considerable improvement.

The GRZ has benefited from Bank assistance in implementing projects that have provided support for the development of procurement systems. A Country Procurement Assessment Review (CPAR) was carried out in 1997. Its main recommendations were GRZ should: finalize national procurement guidelines; develop training programs and establish career streams; develop code of contact; and establish advisory council with the private sector representatives.

Nonetheless, the problems with use of IDA credit resources, and noncompliance with procurement and financial good practices are still considered to be persistent challenges to the management of the portfolio of projects in Zambia. As such, provision of training in project management and developing standard GRZ guidelines that are harmonized with donor procurement guidelines are necessary high priority actions to be taken in order to address delays in project implementation due to weak institutional procurement capacity.

The Public Service Capacity Building Project (PSCAP) currently under implementation is focusing support to the ZNTB as the key national institution in Zambia for ensuring improved governance in public sector procurement. In addition, the Bank is currently in the midst of preparing a new CPAR for Zambia to sustain ongoing reforms in public sector procurement. The report is expected to be delivered to GRZ within FY02.

ZCCM-IH as a former lead parastatal in the mining sector has demonstrated a satisfactory level of procurement performance during the implementation of the PPF, while ECZ's significantly lower capacity rating has been influenced by the absence of capable procurement specialists, a concern which has only been addressed recently through a new recruitment.

Procurement Assessment

A procurement capability assessment and a financial management assessment have been made by the Procurement Specialist and the Financial Specialist from the Zambia Country Office. These interviews with ZCCM-IH, in addition to other documents that were reviewed, have indicated a definite strengthening is required to improve existing procurement and financial practices for this project. As a result of this assessment, it is felt that procurement credibility and project economy would be significantly improved with procurement activities managed as part of a well-organized Environmental Coordinating Unit (ZECU) located at ZCCM-IH's offices in Kitwe. ZCCM-IH has already established ZECU, with a Director/Manager, a Financial Officer and a Procurement Officer. The ZECU staff would be expanded prior to start of implementation, and the budget for hiring a second Procurement Specialist has been approved by the management of ZCCM-IH. In-service training in IDA's financial, procurement, and other managerial
aspects would also be made available to existing and newly recruited ZECU staff as a project expense as needed.

The overall risk assessment of the Borrower's procurement capacity has been rated as "high" but could be significantly improved by modifying the Borrower's existing procurement practices in accordance with the suggested improvements provided in the following paragraph. National Competitive Bidding (NCB), advertised locally, will be carried out in accordance with procurement laws and regulations of GRZ acceptable to IDA, provided that: (i) all bidders are given sufficient time to submit bids (four weeks); (ii) bid evaluation and bidder qualification are clearly specified in bidding documents; (iii) no margin of preference is granted to domestic contractors and manufacturers; (iv) no bid is rejected during bid opening in accordance with the confidentiality clause of the guidelines; (v) bids opened lot by lot basis, read aloud, and results of sealed written bids tabulated in the presence of bidders representatives (vi) eligible firms are not precluded from participation; and (vii) award is made to the lowest evaluated bidder who meets the appropriate standards of capability and resources in accordance with predetermined criteria specified in the bidding documents. A procurement procedures manual as part of the PIM, and standard bidding documents for the procurement of goods and works prepared by the project and found acceptable to the Bank will be used during project implementation for NCB. ICB and selection of consultants will be based on Bank guidelines.

Advertising

A General Procurement Notice (GPN) would be published in the UN Development Business (UNDB) on-line and in hard copy. It would indicate all the procurement contracts estimated to cost the equivalent of US$ 100,000 or more where the International Competitive Bidding (ICB) method of procurement would be used. The GPN would be updated on a yearly basis and would show all outstanding International Competitive Bidding (ICB) for goods contracts and all International Consulting Services. Specific Procurement Notices (SPN) for goods to be procured under ICB and Expressions of Interest for consultant services estimated to cost the equivalent of US$ 100,000 and above would also be published in the Development Business as well as in the national press. All consultancy assignments estimated to cost the equivalent of US$ 200,000 or more will be advertised in an international newspaper and in the UNDB. In addition, expressions of interest may be sought from prospective consultants by advertising in a national newspaper or technical magazines. In the case of assignments estimated to cost US$ 100,000 or less the assignment may be advertised nationally and the shortlist may be made up entirely of national consultants provided that at least three qualified national firms or individuals are available in the country and foreign consultants who wish to participate are not excluded from consideration.

Procurement Planning

The Overall Procurement Plan (OPP) for goods, works, and consultant services is part of the Project Implementation Manual (PIM) for both the ZCCM-IH and ECZ components, were reviewed at appraisal and finalized at negotiations. The OPP includes relevant information on goods, works, and equipment and consulting services as well as the timing of each milestone in the procurement process. The first year's draft Detailed Procurement Plan (DPP) for the EMF was prepared during appraisal and will be finalized as part of the Interim Management Plan before effectiveness. The DPPs for the remaining years of the project, indicating the procurement method and processing time for each contract, will be submitted to IDA every year for its review and comments not later than three months before the end of each fiscal year.
Procurement methods (Table A)

**Procurement Guidelines**

All procurement of civil works and goods under the project, regardless of funding source, would be carried out in accordance with the provisions of "Guidelines: Procurement under IBRD Loans and IDA Credits, January 1995, revised January and August 1996, September 1997, and January 1999" (Guidelines). Bank’s Standard Bidding Documents and standard evaluation forms would be used where practicable. Procurement carried out for any community sponsored sub-projects would be carried out in accordance with paragraph 3.15 of the Guidelines (Community Participation in Procurement) and the Bank Guidelines for Simplified Procurement and Disbursement for Community-Based Investments (February 1998). These have been described in a specific chapter (chapter 8) of the Project Implementation Manual for the ZCCM-II component. The same is expected for the ECZ component by negotiations.

All procurement of consultants’ services would be done in accordance with the provisions of IDA’s "Guidelines Selection and Employment of Consultants by World Bank Borrowers " published by IDA in January 1997, and revised in September 1997, and January 1999. Consultants’ Terms of Reference and qualifications would be reviewed and found acceptable by IDA. IDA’s Standard Request for Proposals, Selection of Consultants dated July 1997, revised April 1998 and July 1999, would be used for consultant contracts with firms.

Prior to contracts being awarded, bids would be reviewed and a written evaluation using the standard evaluation forms would be made by a qualified and four-member evaluation committee. Members of the Evaluation Committee would be appointed by the Project Director/Manager and would consist of three or more specialists with adequate knowledge of the TOR, evaluation methods, etc. The Evaluation Committee would be chaired by the Project Director/Manager.

**Procurement Methods**

**Civil Works.** Civil works already identified for high priority sub-projects to be funded through the EMF are estimated to cost about US$ 18.68 million (US$18.42 million financed by IDA). Civil works contracts equal to or greater than US$ 500,000 equivalent would be bid using International Competitive Bidding (ICB) procedures. National Competitive Bidding (NCB) procedures using IDA’s Standard Bidding Documents (SBDs) for civil works contracts, or other bidding documents satisfactory to IDA, may be used for civil works estimated to cost less than US$ 500,000 per contract up to an aggregate amount not exceeding US$ 2.0 million. Small civil works with less than US$ 30,000 in value per contract up to an aggregate amount not to exceed US$ 500,000 shall be procured under lump-sum fixed price contracts awarded on the basis of quotations obtained from three qualified domestic contractors in response to a written invitation to bid. The invitation shall include a detailed description of the works, including basic specifications, the required completion date, a basic form of agreement acceptable to IDA, and relevant drawings where applicable. The awards will be made to the contractors who offer the lowest price quotations for the required work, provided they demonstrate they have the experience and resources to complete the contract successfully. The aggregate amount of small civil works procured under this method will be no more than US$ 500,000 equivalent.

**Goods.** Goods for the project are estimated to cost about US$ 1.77 million (US$ 1.68 million financed by IDA). Goods to be procured would include vehicles, office furniture and equipment, computers and associated equipment, field equipment and communication equipment. To the extent possible and practicable, contracts for goods and equipment would be combined into packages estimated to cost the equivalent of US$ 100,000 or more. Goods contracts estimated to cost US$ 100,000 or more would be bid
using ICB procedures. Goods contracts estimated to cost less than US$ 100,000 up to an aggregate amount not to exceed US$ 400,000 may be bid using NCB procedures. Goods estimated to cost less than US$ 30,000 per contract, up to an aggregate amount not to exceed US$ 300,000 may be procured from IAPSO in accordance with the provisions if paragraph 3.9 of the Guidelines. Procurement of readily available, off-the-shelf goods or standard specification commodities, with value equal to or less than US$ 30,000 per contract, up to an aggregate amount not to exceed US$ 300,000 equivalent may be procured using shopping procedures acceptable to IDA, with comparison of written quotations from at least three eligible suppliers.

Consulting Services. Consultancy services under the project are estimated to cost about US$ 5.52 million equivalent (all financed by IDA) and would include technical assistance, seminars, workshops, and training. All training, workshops and seminars under the Project will be carried out on the basis of programs, which shall have been approved by the Bank on a quarterly basis, and which shall, inter alia, identify: (a) the training, workshops and seminars envisaged; (b) the personnel to be trained; (c) the institutions which will conduct the training; (d) the duration of the proposed training; and (e) an estimate of the cost. Terms of reference for technical assistance would be submitted to IDA for “no objection” prior to the RFP. IDA’s standard RFP would be used to contract technical assistance. Technical assistance would include, inter alia, consultants to prepare an Environmental Management Plan; to define capacity building and training requirements; and to provide training to ZCCM, the Mines Safety Department, and ECZ in EMP monitoring. Training under the project is estimated to cost about US$ 0.31 million equivalent and would include seminars, workshops and in-service training designed to strengthen institutional capacity of ZCCM-IH and other stakeholders to manage the environmental aspects of the proposed project.

All contracts with consulting firms with value equal to or more than US$ 100,000 would be contracted using Quality and Cost Based Selection (QCBS) with the competitive evaluation being made using the appropriate terms set out in Section II of the Guidelines. Firms whose contract value would be less than US$ 100,000 equivalent may be contracted using the Selection Based on Consultant’s Qualifications (SBCQ) procedures in agreement with Section III, Paragraph 3.7 of the Guidelines. For assignments estimated to cost less than US$ 200,000 the assignment may be advertised nationally and the shortlist may be made up entirely of national consultants, provided that at least three qualified national forms are available in country, and foreign consultants who wish to participate are not excluded from consideration in accordance with Section II, Paragraph 2.6 of the Guidelines. Individual consultants would be contracted using Section V, Paragraph 5.1 to 5.3 of the Guidelines. For both firms and individual, Single Source (SS) selection procedures may be used only an exceptional basis up to an aggregate limit of US$ 250,000, with prior agreement by IDA, in accordance with the provisions of Section III, Paragraph 3.8 through 3.11 of the Guidelines. Auditors would be selected using the “Least Cost Selection” procedure as outlined in Section III, Paragraph 3.18, of the Guidelines.

Recurrent Costs. Project incremental recurrent costs are estimated about US$ 4.44 million (US$ 4 million financed by IDA) and would include salaries and allowances (US$ 3.5 million) for incremental contracted staff necessary to implement the project. Included also, as recurrent costs are travel and subsistence for staff (US$ 275,000), incremental maintenance and operational costs of vehicles (US$ 125,000) and communications and facilities (US$ 180,000). Rental of vehicles or facilities, where required, would be included as recurrent costs and considered recurrent operational cost. Office supplies, consumables and contingencies (US$ 360,000) would also be included as recurrent costs.
Table A: Project Costs by Procurement Arrangements  
(US$ million equivalent)

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<td>(0.80)</td>
<td>(0.03)</td>
<td>(0.00)</td>
<td>(1.68)</td>
</tr>
<tr>
<td>3. Services</td>
<td>3.50</td>
<td>0.00</td>
<td>2.02</td>
<td>0.00</td>
<td>5.52</td>
</tr>
<tr>
<td></td>
<td>(3.50)</td>
<td>(0.00)</td>
<td>(2.02)</td>
<td>(0.00)</td>
<td>(5.52)</td>
</tr>
<tr>
<td>4. Operating Costs</td>
<td>0.00</td>
<td>0.00</td>
<td>4.44</td>
<td>0.00</td>
<td>4.44</td>
</tr>
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<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(4.00)</td>
<td>(0.00)</td>
<td>(4.00)</td>
</tr>
<tr>
<td>5. Refinancing of PPF</td>
<td>0.20</td>
<td>0.30</td>
<td>0.10</td>
<td>0.00</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(0.30)</td>
<td>(0.10)</td>
<td>(0.00)</td>
<td>(0.60)</td>
</tr>
<tr>
<td>4. EMF (resources not yet earmarked)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>()</td>
<td>()</td>
<td>10.76</td>
<td>0.00</td>
<td>10.76</td>
</tr>
<tr>
<td></td>
<td>()</td>
<td>()</td>
<td>(9.78)</td>
<td>(0.00)</td>
<td>(9.78)</td>
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<tr>
<td>Total</td>
<td>21.67</td>
<td>2.61</td>
<td>17.49</td>
<td>0.00</td>
<td>41.77</td>
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<td>(21.67)</td>
<td>(2.40)</td>
<td>(15.93)</td>
<td>(0.00)</td>
<td>(40.00)</td>
</tr>
</tbody>
</table>

1/ Figures in parenthesis are the amounts to be financed by the Bank Credit/Grant. All costs include contingencies.
2/ Includes civil works and goods to be procured through national shopping, consulting services, services of contracted staff of the project management office, training, technical assistance services, and incremental operating costs related to (i) managing the project, and (ii) re-lending project funds to local government or non-governmental units.
**Consultant Selection Arrangements**

<table>
<thead>
<tr>
<th>Selection Method of Contracts</th>
<th>Estimated Number of Contracts</th>
<th>Estimated Value (US$000)</th>
<th>Number of Contracts Requiring Prior Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>QCBS Firms</td>
<td>33</td>
<td>4,500</td>
<td>28</td>
</tr>
<tr>
<td>CQ Firms</td>
<td>30</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Individual Consultants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individuals</td>
<td>30</td>
<td>300</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>93</strong></td>
<td><strong>5,100</strong></td>
<td><strong>38</strong></td>
</tr>
</tbody>
</table>

**Table A1: Consultant Selection Arrangements (optional)**

(US$ million equivalent)

<table>
<thead>
<tr>
<th>Consultant Services Expenditure Category</th>
<th>QCBS</th>
<th>QBS</th>
<th>SFB</th>
<th>LCS</th>
<th>CO</th>
<th>Other</th>
<th>N.B.F.</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Firms</td>
<td>4.65</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>0.30</td>
<td>(0.27)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>5.22</td>
</tr>
<tr>
<td>B. Individuals</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.30</td>
<td>0.00</td>
<td>(0.30)</td>
<td>0.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4.65</td>
<td>0.00</td>
<td>0.00</td>
<td>0.30</td>
<td>0.27</td>
<td>0.30</td>
<td>0.00</td>
<td>5.52</td>
</tr>
</tbody>
</table>

\(1\) Including contingencies

Note: QCBS = Quality- and Cost-Based Selection
QBS = Quality-based Selection
SFB = Selection under a Fixed Budget
LCS = Least-Cost Selection
CO = Selection Based on Consultants' Qualifications
Other = Selection of individual consultants (per Section V of Consultants Guidelines), Commercial Practices, etc.
N.B.F. = Not Bank-financed
Figures in parenthesis are the amounts to be financed by the Bank Credit/Grant.
Prior review thresholds (Table B)

Table B provides prior review thresholds. Prior review by IDA would include the following:

1. All Direct Contracting (single source contracts) notwithstanding the contract value;
2. Civil works contracts estimated to cost equal to or more than US$250,000;
3. Goods contracts estimated to cost equal to or more than US$100,000;
4. IDA prior review will cover all consultant services contracts with (i) firms estimated to cost US$100,000 or more; and (ii) individuals estimated to cost US$50,000 or more. Prior review will apply to the terms of reference of such contracts, single-source selection of firms for assignments of a critical nature as determined by IDA regardless of their amount, or to amendments of contracts raising the contract amount value above the threshold for prior review;
5. Modifications to all contracts as set forth in Appendix 1, Paragraph 3 of the Guidelines, notwithstanding the contract value.

### Table B: Thresholds for Procurement Methods and Prior Review

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>Contract Value Threshold (US$ thousands)</th>
<th>Procurement Method</th>
<th>Contracts Subject to Prior Review (US$ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Works</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) BOQ, Lump sum mostly for Tailings</td>
<td>&gt;US$500,000</td>
<td>ICB</td>
<td>All contracts</td>
</tr>
<tr>
<td></td>
<td>&lt; US$500,000</td>
<td>NCB</td>
<td>First two contracts and all contracts above US$250,000</td>
</tr>
<tr>
<td>(b) Small Works and community based</td>
<td>&lt;US$30,000</td>
<td>Lump sum, fixed price on basis of three quotations</td>
<td>Post Review</td>
</tr>
<tr>
<td>2. Goods</td>
<td>&gt;US$100,000</td>
<td>ICB</td>
<td>All contracts</td>
</tr>
<tr>
<td></td>
<td>US$30,000 - US$100,000</td>
<td>NCB</td>
<td>First two contracts and all contracts above</td>
</tr>
<tr>
<td></td>
<td>&lt;US$30,000</td>
<td>Shopping/UN Agencies</td>
<td>US$250,000 Post Review</td>
</tr>
<tr>
<td>3. Services (Firms)</td>
<td>&gt;=US$100,000</td>
<td>QCBS</td>
<td>All contracts</td>
</tr>
<tr>
<td></td>
<td>&lt;US$100,000</td>
<td>CQ</td>
<td>All contracts</td>
</tr>
<tr>
<td>4. Services (Individuals)</td>
<td>&gt;US$50,000</td>
<td>Section V of Guidelines</td>
<td>All contracts</td>
</tr>
<tr>
<td></td>
<td>&lt;US$50,000</td>
<td>Section V of Guidelines</td>
<td>Post Review</td>
</tr>
<tr>
<td>5. Training, Study Tours, Workshops</td>
<td>&gt;=US$50,000</td>
<td>CQ</td>
<td>All contracts</td>
</tr>
<tr>
<td></td>
<td>&lt;US$50,000</td>
<td>Annual Plans</td>
<td>Post Review, but Training Plans, study tours an workshops to be received by IDA for approval</td>
</tr>
</tbody>
</table>

Total value of contracts subject to prior review: US$26.0 million

**Overall Procurement Risk Assessment**

High

**Frequency of procurement supervision missions proposed:** One every 6 months (includes special procurement supervision for post-review/audits)

Share of contracts not subject to IDA prior review and would be post-reviewed is approximately 30%.

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1 Thresholds generally differ by country and project. Consult OD 11.04 “Review of Procurement Documentation” and contact the Regional Procurement Adviser for guidance.
Disbursement

Allocation of credit/grant proceeds (Table C)

The proceeds of the IDA Credit and Grant of US$ 40 million will be disbursed over a period of five years. Disbursements will be against the four main expenditure categories: Civil Works; Goods and Vehicles; Consultants Services; and Incremental Costs (see Table C below).

Table C: Allocation of Credit/Grant Proceeds

<table>
<thead>
<tr>
<th>Expenditure Category</th>
<th>Amount in US$million</th>
<th>Financing Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.A. Civil Works for Part A of the Project</td>
<td>18.42</td>
<td>100% of foreign expenditures and 90% of local expenditures</td>
</tr>
<tr>
<td>2.A. Goods and Vehicles for Part A of the Project</td>
<td>1.37</td>
<td>100% of foreign expenditures and 90% of local expenditures</td>
</tr>
<tr>
<td>2.B. Goods and Vehicles for Part B of the Project</td>
<td>0.31</td>
<td>100% of foreign expenditures and 90% of local expenditures</td>
</tr>
<tr>
<td>3.A. Consultant Services including technical assistance, training, studies and reports for Part A of the Project</td>
<td>4.52</td>
<td>100% of total expenditures</td>
</tr>
<tr>
<td>3.B. Consultant Services including technical assistance, training, studies and reports for Part B of the Project</td>
<td>1.00</td>
<td>100% of total expenditures</td>
</tr>
<tr>
<td>4.A. Incremental recurrent costs of local travel, subsistence and maintenance, and operating costs for Part A of the Project</td>
<td>2.31</td>
<td>90% of total expenditures</td>
</tr>
<tr>
<td>4.B. Incremental recurrent costs of local travel, subsistence and maintenance, and operating costs for Part B of the Project</td>
<td>1.69</td>
<td>90% of total expenditures</td>
</tr>
<tr>
<td>5. Refinancing of PPF</td>
<td>0.60</td>
<td>Amounts due pursuant to Section 2.02 (c) of the Development Financing Agreement</td>
</tr>
<tr>
<td>6. Unallocated (EMF resources not yet earmarked)</td>
<td>9.78</td>
<td></td>
</tr>
<tr>
<td><strong>Total Project Costs</strong></td>
<td><strong>40.00</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

The project will disburse an estimated sum of $36 million for the EMF, through the Ministry of Finance and National Planning, and the sum of $4 million for Component 2, through the ECZ, an established statutory body.

The Ministry of Finance and National Planning will provide financing to ZCCM-IH under an agreement for the implementation of Component one of the project, while financing will be provided to ECZ under an agreement for the implementation of Component two of the project.
Use of statements of expenditures (SOEs):

The Project will use the transaction-based disbursement method. However, SOEs can be used for contracts with values equal to or below the following thresholds:

i) civil works contracts with an estimated value of $250,000 or less;
ii) goods contracts with an estimated value of $100,000 or less;
iii) consulting firm contracts with an estimated value of $100,000 or less;
iv) individual consultant contracts with an estimated value of $50,000 or less.

Payments to contractors will be made by the EMF Secretariat. The EMF Secretariat will directly reimburse ZCCM-IH for expenses incurred during the preparation and implementation of sub-projects.

Special account:

Special Account

In order to ensure the timely provision of funds to finance IDA’s share of eligible expenditures under the Credit, GRZ will open and maintain two Special Accounts in US dollars in commercial banks, under terms and conditions acceptable to IDA. The Special Accounts (A and B), will be operated respectively by the EMF Secretariat within the Ministry of Finance and National Planning, and by the ECZ Agency. The initial deposits into the accounts will be as indicated in the Development Financing Agreement. The deposit in Special Account A will be contingent on the establishment of the EMF Secretariat, and a satisfactory assessment of its financial management capacity and procedures. Similarly, the deposit in Special Account B will be contingent on a satisfactory assessment of ECZ’s financial management capacity and procedures.

Project Account

Three Project Accounts will be opened and maintained to facilitate timely disbursement of counterpart funds, in Kwacha, in commercial banks, and under terms and conditions acceptable to IDA:

1. A Project Account maintained by GRZ, to meet counterpart requirements for the portion of the EMF that addresses GRZ liabilities.
2. A project account maintained by ZCCM-IH, to meet the counterpart requirements for the portion of the EMF that is on-lent to ZCCM-IH.
3. A project account maintained by the ECZ Agency, to meet the counterpart requirements associated with Component 2.

GRZ will make an initial contribution of US$100,000 equivalent into its Project Account; ZCCM-IH will make an initial contribution of US$100,000 equivalent into its Project Account, and; ECZ will make an initial contribution of US$50,000 equivalent into its Project Account. Thereafter, GRZ, ZCCM-IH and ECZ will replenish their respective Project Account quarterly in each year with such amounts as shall be required to meet counterpart funding requirements. Disbursements from these bank accounts will be only for eligible expenditures under the project. GRZ, ZCCM-IH and ECZ will each maintain separate books of accounts for their respective banks account described above.

Retroactive Financing

An amount equal to US$ 1.0 million of eligible expenditures made after April 1, 2002 may be financed retroactively from the Credit.
**Audit**

Separate external audits will be undertaken, one for Component 1 and Special Account A under the Ministry of Finance and National Planning, and one for Component 2 and Special Account B under the Environmental Agency, on TORs acceptable to the Bank by relevantly qualified and experienced auditors acceptable to the Bank. International Auditing Standards will be followed and audit reports will be submitted to the Bank within 6 months after year-end.

Besides expressing a primary opinion on the financial statements in compliance with IFAC standards, the auditors must include a separate paragraph commenting on the special account and funds withdrawn from it, on the accuracy and propriety of expenditures withdrawn under SOE procedures, and on the extent to which these can be relied upon as a basis for credit disbursements. The auditors will also express an opinion as to the degree of compliance with Bank procedures, and the closing balance at year end.

Additionally, the auditors will prepare a separate Management Letter giving observations and comments, and providing recommendations.
Annex 7: Project Processing Schedule
ZAMBIA: Copperbelt Environment Project

<table>
<thead>
<tr>
<th>Project Schedule</th>
<th>Planned</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time taken to prepare the project (months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Bank mission (Identification)</td>
<td>01/10/2000</td>
<td>10/02/2000</td>
</tr>
<tr>
<td>Appraisal mission departure</td>
<td>01/02/2001</td>
<td>03/11/2002</td>
</tr>
<tr>
<td>Negotiations</td>
<td>01/13/2003</td>
<td>01/14/2003</td>
</tr>
<tr>
<td>Planned Date of Effectiveness</td>
<td>06/20/2003</td>
<td></td>
</tr>
</tbody>
</table>

Prepared by:

Preparation assistance:

Bank staff who worked on the project included:

<table>
<thead>
<tr>
<th>Name</th>
<th>Speciality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yves Prévost</td>
<td>Senior Environment Specialist (AFTES)</td>
</tr>
<tr>
<td>Nina Chee</td>
<td>Environment Specialist (AFTES)</td>
</tr>
<tr>
<td>Christopher Sheldon</td>
<td>Senior Mining Specialist (CMNPO)</td>
</tr>
<tr>
<td>Nightingale Rukuba Ngaiza</td>
<td>Senior Counsel (LEGOP)</td>
</tr>
<tr>
<td>Emile Sawaya</td>
<td>Private Sector Specialist, Consultant</td>
</tr>
<tr>
<td>Maninder Gill</td>
<td>Senior Sociologist (SDV)</td>
</tr>
<tr>
<td>Robert Etheredge</td>
<td>Financial management and Procurement Specialist, Consultant</td>
</tr>
<tr>
<td>Fenwick M. Chitalu</td>
<td>Financial Management Specialist (AFMZM)</td>
</tr>
<tr>
<td>Bwalya Mfula Mumba</td>
<td>Procurement Specialist (AFMZM)</td>
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<tr>
<td>Tedd Pollett</td>
<td>Resettlement Specialist (IFC)</td>
</tr>
<tr>
<td>Marie-Claude Verlaeten</td>
<td>Program Assistant (AFTES)</td>
</tr>
<tr>
<td>Caroline Guazzo</td>
<td>Program Assistant (AFTES)</td>
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<tr>
<td>Martin Fodor</td>
<td>Environmental Specialist (ENV)</td>
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<tr>
<td>Edith Ruguru Mwenda</td>
<td>Counsel (LEGAF)</td>
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<tr>
<td>Sarah Keener</td>
<td>Communication Specialist, Consultant</td>
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<tr>
<td>Modupe Adebowale</td>
<td>Senior Finance Officer (LOAG2)</td>
</tr>
<tr>
<td>Alex Mwanakasale</td>
<td>Agricultural Officer (AFTR1)</td>
</tr>
<tr>
<td>Mike Mengesha</td>
<td>Senior Energy Specialist (AFTPC)</td>
</tr>
<tr>
<td>Iraj Talai</td>
<td>Lead Financial Management Specialist (AFTFM)</td>
</tr>
<tr>
<td>Aberra Zerabruk</td>
<td>Lead Counsel, LEGAF</td>
</tr>
<tr>
<td>Joe Mifsud</td>
<td>Mining Specialist, Consultant</td>
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<tr>
<td>Pentti Noras</td>
<td>Mining Specialist, Consultant</td>
</tr>
<tr>
<td>Dan Vadnjal</td>
<td>Economist, Consultant</td>
</tr>
</tbody>
</table>
Annex 8: Documents in the Project File*
ZAMBIA: Copperbelt Environment Project

A. Project Implementation Plan
Draft Project Implementation Manual (PIM) submitted April 9th, 2002
Environmental Assessment,
Environment and Resettlement Framework

B. Bank Staff Assessments

C. Other
Project Information Document
Minutes of PCD Review Meeting (09/19/2000)
Aide-memoire from Preparation Mission (10/2-20/2000)
Minutes of PAD Decision Meeting (03/07/2002)
Aide-memoire from Appraisal Mission (03/10-28/2002)
Minutes of Technical Meetings (05/9-14/2002)
Integrated Safeguards Data Sheet (02/11/2002)
Safeguard Policies Risk Management & Compliance Monitoring Sheet (02/08/2002)
Draft Operational Manual - ZAMSIF (03/16/2002)
Minutes of Negotiations (02/04/2003)

*Including electronic files
### Annex 9: Statement of Loans and Credits
**ZAMBIA: Copperbelt Environment Project**
**06-Feb-2003**

<table>
<thead>
<tr>
<th>Project ID</th>
<th>FY</th>
<th>Purpose</th>
<th>Original Amount in US$ Millions</th>
<th>IBRD</th>
<th>IDA</th>
<th>Cancel.</th>
<th>Undisb.</th>
<th>Origi Fm Rev'd</th>
<th>Difference between expected and actual disbursements</th>
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<tbody>
<tr>
<td>P003248</td>
<td>2003</td>
<td>HIV/AIDS (ZANARA)</td>
<td>0.00</td>
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<td>45.82</td>
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<td>P003249</td>
<td>2003</td>
<td>Emergency Drought Recovery Project</td>
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<td>Regional Trade Fac. Proj. - Zanmia</td>
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<td>0.00</td>
<td>-0.06</td>
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<td>P003252</td>
<td>2003</td>
<td>RAILWAYS RESTRUCTURING PROJECT</td>
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<td>0.00</td>
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<td>Soal Investment Fund (ZAMSIF)</td>
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<td>12.95</td>
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<td>P003254</td>
<td>2003</td>
<td>PUB SVC CAP (PSCAP)</td>
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<td>28.00</td>
<td>0.00</td>
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<td>0.00</td>
<td>23.27</td>
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<tr>
<td>P003255</td>
<td>2003</td>
<td>MINE TOWNSHIP SERVICES PROJECT</td>
<td>0.00</td>
<td>37.70</td>
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<td>BASIC ED SEC INV PRG</td>
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<td>NATIONAL ROAD</td>
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<td>P003258</td>
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<td>POWER REHAB</td>
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<td>Environmental Support Program</td>
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<td>1997</td>
<td>ENTERPRISE DEVELOPMENT</td>
<td>0.00</td>
<td>45.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>3.74</td>
</tr>
<tr>
<td>P003261</td>
<td>1996</td>
<td>ERUPTA</td>
<td>0.00</td>
<td>23.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>2.25</td>
</tr>
</tbody>
</table>

**Total:**
<table>
<thead>
<tr>
<th>IBRD</th>
<th>IDA</th>
<th>Cancel.</th>
<th>Undisb.</th>
<th>Origi Fm Rev'd</th>
<th>Difference between expected and actual disbursements</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>493.20</td>
<td>0.00</td>
<td>321.70</td>
<td>150.83</td>
<td>8.62</td>
</tr>
</tbody>
</table>
## ZAMBIA
### STATEMENT OF IFC's Held and Disbursed Portfolio
#### Jun 30 - 2002
##### In Millions US Dollars

<table>
<thead>
<tr>
<th>FY Approval</th>
<th>Company</th>
<th>Committed</th>
<th>Disbursed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IFC</td>
<td>IFC</td>
</tr>
<tr>
<td></td>
<td>Loan</td>
<td>Equity</td>
<td>Quasi</td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEF Amaka Cotton</td>
<td>1.30</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2001</td>
<td>AEF Chingola Htl</td>
<td>0.96</td>
<td>0.00</td>
</tr>
<tr>
<td>1998</td>
<td>AEF Drilltech</td>
<td>0.12</td>
<td>0.00</td>
</tr>
<tr>
<td>1999</td>
<td>AEF Esquire</td>
<td>0.30</td>
<td>0.00</td>
</tr>
<tr>
<td>1997</td>
<td>AEF JY Estates</td>
<td>0.89</td>
<td>0.00</td>
</tr>
<tr>
<td>2001</td>
<td>AEF Michelangelo</td>
<td>0.20</td>
<td>0.00</td>
</tr>
<tr>
<td>1997</td>
<td>AEF Pentire</td>
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<td>0.00</td>
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<tr>
<td>2000</td>
<td>APC Ltd.</td>
<td>2.50</td>
<td>0.00</td>
</tr>
<tr>
<td>1972/73</td>
<td>Bata Shoe ZA</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1997</td>
<td>Finance Bank</td>
<td>0.25</td>
<td>0.00</td>
</tr>
<tr>
<td>2000</td>
<td>KCM</td>
<td>0.00</td>
<td>5.67</td>
</tr>
<tr>
<td>2000</td>
<td>Marasa Holdings</td>
<td>4.60</td>
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<tr>
<td>1998</td>
<td>Nicozam</td>
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<tr>
<td>1999/00</td>
<td>Zamcell</td>
<td>2.97</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>Total Portfolio:</strong></td>
<td><strong>14.47</strong></td>
<td><strong>6.41</strong></td>
<td><strong>26.46</strong></td>
</tr>
</tbody>
</table>

### Approvals Pending Commitment

<table>
<thead>
<tr>
<th>FY Approval</th>
<th>Company</th>
<th>Loan</th>
<th>Equity</th>
<th>Quasi</th>
<th>Partic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>AEF QNet</td>
<td>0.34</td>
<td>0.00</td>
<td>0.08</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Total Pending Commitment:** 0.34 0.00 0.08 0.00
Annex 10: Country at a Glance

**ZAMBIA: Copperbelt Environment Project**

### POVERTY and SOCIAL

#### Sub-Saharan Africa
- Population, mid-year (millions): 10.3

#### Low-Income
- Population, mid-year (millions): 674

#### Average annual growth, 1995-01
- Population (%): 2.3
- Labor force (%): 2.8

#### Most recent estimate (latest year available, 1995-01)
- Poverty (% of population below national poverty line): 73
- Urban population (% of total population): 40
- Life expectancy at birth (years): 45
- Infant mortality (per 1,000 live births): 114
- Access to an improved water source (% of population): 63
- Male primary school enrolment (% of school-age population): 81
- Female primary school enrolment (% of school-age population): 79

#### KEY ECONOMIC RATIOS and LONG-TERM TRENDS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (US$ billions)</td>
<td>4.0</td>
<td>3.4</td>
<td>3.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Gross domestic investment/GDP</td>
<td>19.5</td>
<td>11.0</td>
<td>19.2</td>
<td>20.9</td>
</tr>
<tr>
<td>Exports of goods and services/GDP</td>
<td>28.7</td>
<td>34.6</td>
<td>17.3</td>
<td>22.1</td>
</tr>
<tr>
<td>Current account balance/GDP</td>
<td>-19.7</td>
<td>-15.2</td>
<td>-18.6</td>
<td>-20.4</td>
</tr>
<tr>
<td>Interest payments/GDP</td>
<td>2.5</td>
<td>7.1</td>
<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>Total debt/GDP</td>
<td>91.3</td>
<td>206.3</td>
<td>194.9</td>
<td>161.3</td>
</tr>
<tr>
<td>Total debt service/exports</td>
<td>36.0</td>
<td>51.1</td>
<td>36.8</td>
<td>36.8</td>
</tr>
<tr>
<td>Present value of debt/GDP</td>
<td>129.3</td>
<td>114.9</td>
<td>114.9</td>
<td>114.9</td>
</tr>
</tbody>
</table>

#### STRUCTURE of the ECONOMY

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>17.0</td>
<td>17.4</td>
<td>22.3</td>
<td>22.0</td>
</tr>
<tr>
<td>Industry</td>
<td>40.1</td>
<td>51.0</td>
<td>25.3</td>
<td>25.7</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>19.3</td>
<td>36.7</td>
<td>11.4</td>
<td>11.2</td>
</tr>
<tr>
<td>Services</td>
<td>31.6</td>
<td>52.4</td>
<td>52.4</td>
<td>52.4</td>
</tr>
</tbody>
</table>

#### Economic Ratios

- **GDP**
- **GDP per capita**
- **Exports of goods and services**

#### Growth of Investment and GDP (%)

- **GNI**
- **GDP**

#### Growth of exports and imports (%)

- **Exports**
- **Imports**

**Note:** 2001 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.
**PRICES and GOVERNMENT FINANCE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic prices</th>
<th>Implicit GDP deflator</th>
<th>Government finance</th>
<th>Overall surplus/deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>Consumer prices: 13.0</td>
<td>Implicit GDP deflator: 7.8</td>
<td>Current revenue: 23.5</td>
<td>Overall surplus/deficit: -16.0</td>
</tr>
<tr>
<td>1991</td>
<td>92.6</td>
<td>92.7</td>
<td>18.7</td>
<td>-10.5</td>
</tr>
<tr>
<td>2000</td>
<td>28.0</td>
<td>30.0</td>
<td>19.4</td>
<td>3.4</td>
</tr>
<tr>
<td>2001</td>
<td>21.7</td>
<td>24.3</td>
<td>19.1</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

**TRADE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total exports (US$ millions)</th>
<th>Total imports (US$ millions)</th>
<th>Exports of goods and services</th>
<th>Imports of goods and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>996</td>
<td>1,085</td>
<td>746</td>
<td>871</td>
</tr>
<tr>
<td>1991</td>
<td>1,149</td>
<td>1,169</td>
<td>872</td>
<td>1,041</td>
</tr>
<tr>
<td>2000</td>
<td>1,650</td>
<td>1,258</td>
<td>1,317</td>
<td>1,235</td>
</tr>
<tr>
<td>2001</td>
<td>3,621</td>
<td>6,968</td>
<td>6,311</td>
<td>5,884</td>
</tr>
</tbody>
</table>

**BALANCE OF PAYMENTS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Current account balance to GDP (%)</th>
<th>Financing items (net)</th>
<th>Changes in net reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>-780</td>
<td>371</td>
<td>409</td>
</tr>
<tr>
<td>1991</td>
<td>-513</td>
<td>544</td>
<td>-31</td>
</tr>
<tr>
<td>2000</td>
<td>-608</td>
<td>716</td>
<td>-108</td>
</tr>
<tr>
<td>2001</td>
<td>-743</td>
<td>860</td>
<td>-117</td>
</tr>
</tbody>
</table>

**EXTERNAL DEBT and RESOURCE FLOWS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total debt outstanding and disbursed (US$ millions)</th>
<th>Total debt service (US$ millions)</th>
<th>Composition of net resource flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>3,621</td>
<td>421</td>
<td>41</td>
</tr>
<tr>
<td>1991</td>
<td>6,968</td>
<td>1,041</td>
<td>194</td>
</tr>
<tr>
<td>2000</td>
<td>6,311</td>
<td>1,235</td>
<td>113</td>
</tr>
<tr>
<td>2001</td>
<td>5,884</td>
<td>1,253</td>
<td>186</td>
</tr>
</tbody>
</table>

**Notes:**
- Exports and imports are in US$ millions.
- Terms of trade (1995=100) are calculated as the ratio of total exports to total imports.
- Current account balance to GDP (%) is calculated as the ratio of current account balance to GDP.
- Financing items (net) are calculated as the sum of net transfers, changes in net reserves, and changes in net liabilities.
- Composition of net resource flows includes grants from official and private sources, as well as assets from the World Bank and other multilateral institutions.
1. Overview

Background. In 1995, the Government of the Republic of Zambia (GRZ) began the process of privatizing the assets of Zambia Consolidated Copper Mines Limited (ZCCM) with the objective of restructuring the Zambian economy, developing the private sector and encouraging investment in Zambia. Privatization of all ZCCM units composed of Kansanshi, Konkola, Nchanga, Mufulira, Nkana, Chambishi, Chibuluma, Luanshya and Nampundwe was completed in March 2000. As a result, ZCCM was transformed into an investment holding company, ZCCM-IH Plc, with a 10-20% minority shareholding in the newly privatized mining companies including processing plants and electrical power supply companies.

The Copperbelt Environment Project (CEP) proposes to help the GRZ address environmental liabilities and obligations associated with the privatization of mining assets that are incumbent on GRZ, in particular the liabilities related to public health and safety. The CEP forms one of a series of measures funded by the World Bank, to facilitate the successful and sustainable privatization of Zambia’s mining assets.

Project components. The proposed CEP will support GRZ over a period of five years to address environmental liabilities that it has accepted as a consequence of mining sector reform and will comprise the following two components:

- **Component 1 - The Environmental Management Facility (EMF).** The EMF will finance the costs of priority environmental and social mitigation measures resulting from ZCCM’s past operations, as well as commitments made to the investors that purchased mining assets. The measures that will be given the highest priority will be those associated with widespread health problems or environmental damage. It is likely that the number of mitigation measures that will require EMF funding will far exceed the resources available therefore a prioritization system will be established to allow issues to be addressed as identified. The EMF will allocate the resources to ensure that the highest priority mitigation measures are implemented within the five-year period of the project. The procedures and guidelines for the management and administration of the EMF will be established to the satisfaction of IDA.

One of the first activities of the EMF will be to prepare a Consolidated Environmental Management Plan (CEMP) that will establish the overall environmental management priorities within the broader context of environmental and social sustainability. The CEMP will consolidate the environmental obligations that will remain with ZCCM-IH (as detailed in the Counterpart EMPs) and those obligations that will be the responsibility of the new investors (as detailed in the Investor EMPs) and consider any cumulative impacts of mining activities. In addition the CEMP will include any gaps not covered by Investor and Counterpart EMPs such as downstream impacts or GRZ responsibilities. The CEMP will also prioritize environmental issues to be addressed using a risk-based methodology and will form the basis of the majority of projects to be funded by the EMF. The CEMP will be a living document to be reviewed and updated after two years.

- **Component 2 - Strengthening the regulatory framework for environmental management in the mining sector.** The CEP will help ensure full compliance of the mining sector with national environmental regulations. For this purpose, the CEP will fund appropriate capacity building within ECZ and delegated authorizing agencies under the Environmental Protection and Pollution Control Act (EPPCA), such as MSD, as well as universities and recognized training and research institutions.
Environmental Assessment (EA) of the CEP. The CEP was categorized as an “A” project under World Bank guidelines and thus requires a full environmental assessment (EA) to be completed and disclosed prior to project appraisal. The overall objectives of the EA are to ensure that actions proposed under the project do not cause negative environmental or social effects, that the proposed measures to mitigate identified environmental and social impacts are appropriate, and that the level of public consultation and disclosure complies with national environmental legislation and World Bank Safeguard policies. The EA was executed in direct accordance with World Bank Operational Policy (OP) 4.01 on Environmental Assessments. The EA identifies potential impacts but does not quantify them, for example the footprint of a tailing dam failure and the downstream impacts on numbers of people and property is not determined. It is anticipated the detailed impacts will be addressed during the preparation of EMPs or through the CEMP.

Privatization in the mining sector. Following privatization of its mining assets, Zambia Consolidated Copper Mines (ZCCM) was transformed from a state mining corporation to an Investments Holding Company, ZCCM-IH, almost entirely owned by GRZ. ZCCM-IH retained liability for a wide range of environmental concerns which were not passed on to the private investment consortia and is charged with, amongst other tasks, managing the remediation of defunct sites and lands, as well as implementing and/or financing the obligations agreed with investors as part of specific privatization deals (largely decommissioning of defunct sites within the new Mine License Areas, and some resettlement at the Konkola Mine). ZCCM-IH continues to own assets or portions of assets that have not been sold (for example Ndola Lime and the smelter at Kitwe). The overall sector – including mines outside of the Copperbelt - is comprised of 14 mine sites owned by eight companies including ZCCM, which owns between 10% to 20% of Chambishi, Mufulira, Nkana, RAMCOZ, Kansanshi, Konkola, Nchanga, and Nampundwe mines, and 100% of Ndola Lime and the Nkana Smelter.

As a defunct mine site, the Kabwe mine is still controlled in many areas by ZCCM-IH, but 14 small-scale investors are also using the site.

Environmental management in the mining sector. With at least 12 different mine sites active in the Copperbelt, most with different management and ownership structures, the sector, and the treatment of environmental management is complex. The Mines Safety Department (MSD) within the Ministry of Mines and Minerals Development (MMMD) is mandated to ensure that the mines operate within mine sector regulations regarding occupational health and mine safety, and in past practice, served as the primary regulator of the mining sector. The MSD holds among other statutory functions, a responsibility to protect the environment and to control pollution in the areas where prospecting, exploration and mining operations are being carried out. The Environmental Council of Zambia (ECZ), as the overall national environmental protection agency, is the lead agency in enforcing the Environmental Protection and Pollution Control Act (EPPCA), which focuses on environmental protection in general. The ECZ carries out this role by working in cooperation with, and in cases delegating sectoral institutions of government, such as the MSD, to act on its behalf. The evolving roles of MSD and ECZ will need to be carefully articulated in order to facilitate effective implementation of the CEP.

Environmental regulation in the mining sector. The complexity of the mining sector poses challenges for effective regulation, as ECZ must now negotiate with a large number of stakeholders. At the same time, because of agreements with investors, the GRZ will be liable for the cost of any lawsuit against a private mine company, as long as that company operates within the framework of its agreed Environmental Management Plan (EMP). Therefore, over the next 15 to 20 years, the EMPs, as much as existing legislation, will guide environmental performance within the mining sector. The CEP will thus play a crucial role in ensuring that the negotiations of the EMPs benefit from outside independent expertise, and that the EMPs provide an opportunity to both share information with stakeholders at the local level, and to integrate their concerns. At present investor specific EMPs are at various stages of completion and will be integrated into the CEMP process. Responsibility and appropriate budgets for actions identified in the EMP must be clearly allocated and captured in a matrix. The EMP must remain current over the mine life or until
closure, therefore regular updates should be sent to ECZ and MSD. These updates should include new processes, renovations to structures, changes to processes and waste volumes and any changes to responsibilities and budget.

2. Major Environmental and Social Issues in the Copperbelt and Kabwe

The EA presents an evaluation of mining hazards in the Copperbelt and Kabwe from a risk-based perspective, focusing on the impacts on human health, animals and plants. The primary environmental health issue in the Copperbelt mining sector is exposure to sulfur dioxide and particulate emissions in the towns of Mufulira, Kitwe and Chambishi.

Aside from sulfur dioxide, copper is the key element that is found in excessive quantities immediately downstream from mine sites and downwind of smelters in the Copperbelt. Because of the geology of the Kafue River basin, there is little acid rock drainage (ARD), which limits the availability of other elements, such as lead and arsenic, to pose a significant health threat. Kafue River water is generally within World Health Organization (WHO) water quality guidelines for copper. However, water sources closer to mine sites can, in certain instances, exceed WHO limits for copper. Copper levels in streams have been higher than international guidelines for the protection of aquatic fauna, this is because they are more sensitive to copper than humans.

In Kabwe, lead contamination in soil presents an immediate health concern due to high lead contamination within residential areas. Based on the review of existing information by a medical toxicologist, other health issues related to mine pollution are not likely to be significant, and specific recommendations have been provided on those items that require further testing to rule out health effects during the CEMP process. High As and Cadmium concentrations were reported in leachate water in 1996; further work is required to ensure that these metals have not built up in downstream crops or animals.

Analysis and stakeholder consultations carried out as part of this EA raised a number of environmental and social issues affecting the Copperbelt province and the Kabwe region. These issues have been categorized as those directly related to past and present mining activities, and those that may affect the context in which the CEP will be implemented, but that are not directly related to mining. These issues are summarized below and in Table 1.

**Mining Related Issues**

**Environmental:**
- Kabwe health effects of lead contamination, primarily in soil, dust and some food sources,
- Sulfur dioxide emissions from Mufulira, Nkana, Chambishi and Luanshya smelters,
- Siltation into streams;
- Localized accidents as a result of access to unsecured mine sites;
- Physical destruction of habitat.

**Social:**
- Possible resettlement of people currently occupying potentially unsafe areas on ZCCM-IH land.
- Loss of income generating opportunities based on using the sites (scavenging or fishing) versus remedial measures to ensure long-term stability of these sites and to protect users from potential hazards;
- Increases in deforestation, vandalism of mine sites and mine site accidents, with decline in mine security.

- 73 -
Non-Mining Related Issues

Environmental:
- Rapid increase in deforestation and settlement in national forest reserves and watershed areas in the Kafue basin;
- Outdated, poorly maintained sewage treatment plants and direct discharge of sewage into the Kafue River;
- Increased levels of solid waste being disposed within neighborhoods and on ZCCM-IH lands, causing increased air pollution from burning waste and breeding grounds for rats and malaria;
- Theft of PCB-based oil from electricity transformers for use as cooking oil.

Social:
- Increasing tariffs for water, electricity, education, health care and other services felt acutely by groups that have not benefited directly from recent growth in the mining sector, e.g., municipal employees (many of whom have not been paid for many months), public sector and university employees on fixed salaries, residents of Luanshya who are dependent on the now non-functioning mining sector, residents of Kabwe, retrenched miners with few skills, retired miners, and other already vulnerable groups such as widows and those affected by AIDS.
- Overtaxed public health facilities, increased fees and more restricted access to mine hospitals, compounded by a drain of medical personnel reported to have left the country for more lucrative positions within the past year.
- Weak municipal governments unable to effectively collect tax revenues from mining sector, yet needing to augment services.

Table 1: Overview of Mine Facility and Potential Impact

<table>
<thead>
<tr>
<th>Mine Facility</th>
<th>ZCCM-IH Responsibilities Subject to change.</th>
<th>Potential Human Health Impact / People Affected</th>
<th>Potential Ecological Impact</th>
</tr>
</thead>
</table>
| Underground Workings| • Private mine owners are responsible for underground workings in the Copperbelt  
• ZCCM-IH retains responsibility for Kabwe workings | • At least 3,000 squatters currently live on mine land that needs to be assessed for risk from subsidence.  
Degree of potential risk unknown and actual number affected likely to be much less than this. (ZCCM liability)  
• Small number likely affected | • Subsidence and erosion can result in vegetation loss. |
| Open Pit            | • ZCCM-IH has responsibility for several open pits at Nchanga, Nkana  
• ZCCM-IH retains responsibility for Kabwe pit remediation | • Only Nchanga open pit is active and thus level of risk to employees is higher than for the remaining closed pits that generally do not have many people illegally accessing them. Several open pits are not near population centers and thus this risk may be relatively small.  
• However, collapsing pit | • Mine de-watering provides major water input to Kafue River, with significant positive impact during periods of low flow. Copper levels need to be checked before releasing in the Konkola Stream.  
• In Kabwe negative impacts on aquatic ecosystems because water is contaminated by lead and zinc.  
• In Chambishi pumping water out of pit has lowered groundwater table, in Konkola, the wettest mine no such... |
walls could incur into adjacent roadways as at Chingola. Small number likely affected.  

- Small number likely affected.  

- Eroded materials may interfere with drainage facilities and lead to off-site sedimentation.  

- Serious impact to aquatic life due to reduced oxygenation of sediment impacted rivers, suffocation of benthic fauna, and potentially increased metal loads in riverine sediments.  

- Natural revegetation and/or planting programs can be impeded by physical instability of slopes, lack of soil organic matter and, occasionally, phytotoxicity factors.  

- Nkana slag dump effluents are mixed with process plant effluents. Variably low pH, metalliferous waters with little life-sustaining potential. Wider fates of contaminants may be leached from metalliferous stockpiles. 

| Waste Dumps (generic evaluation) | All defunct dumps (approximately 70% total) may fall to ZCCM-IH's responsibility. Defunct overburden dumps at Nchanga, Nkana and most other mines. Some remain undecided. Waste Rock Dumps: Many are undecided in Ndola, Mufulira and elsewhere. New mine companies may want to re-mine these dumps. Slag Stockpiles: ZCCM-IH retains liability only at Kabwe. Ore Stockpiles: ZCCM-IH has claimed responsibility for several ore stockpiles in Nchanga. | Some dumps used for scavenging or agriculture but in the Copperbelt, because copper is not highly toxic, and other potentially toxic substances such as lead and arsenic are present in the ore in small quantities, likely risk from consumption of food grown on dumps is low. | Eroded materials may interfere with drainage facilities and lead to off-site sedimentation. | Secondary risks from use of site for illegal trash dumping, causes rats, mosquito breeding vectors, which residents around TD25 in Kitwe complained of. Uncontrolled trash dumping at TD25 contributed to substantial contamination of stream emerging from site (likely greater contributor of contaminants than the tailings themselves). Most significant dust exposure problems occur around Kabwe dump, where high atmospheric lead, zinc, and cadmium concentrations are recorded. In Mufulira, several people were killed because they were scavenging in the slag stockpile and part of the dump collapsed. | Impacts are primarily a function of dust exposure at Kabwe atmospheric plume paths. Increased atmospheric SO2 emissions affect air quality and health. Increased frequency of respiratory symptoms in smelter plume paths. From SO2, respiratory symptoms, increased.  

| Concentrator | ZCCM-IH retains responsibility for defunct concentrator at Kabwe. None in the Copperbelt. | Little or no health impact. | Impacts are primarily a function of dust exposure at Kabwe atmospheric plume paths. Increased atmospheric SO2 emissions affect air quality and health. Increased frequency of respiratory symptoms in smelter plume paths. From SO2, respiratory symptoms, increased.  

| Smelter (Pyrometallurgical Plant) | Current operation of smelters falls under new mine owners' responsibilities, though ZCCM-IH may be liable for historical. | In Copperbelt atmospheric emissions of SO2 and possibly other volatiles exert a high impact on populations in smelter plume paths. From SO2, respiratory symptoms, increased. | Documented impacts include vegetation 'die-back' from high SO2 loads. In Copperbelt, during SA complaints of inability to garden in back yard registered in immediate vicinity of smelter in Wusakile (Kitwe) and Kankoyo (Mufulira). | Impacts are primarily a function of dust exposure at Kabwe atmospheric plume paths. Increased atmospheric SO2 emissions affect air quality and health. Increased frequency of respiratory symptoms in smelter plume paths. From SO2, respiratory symptoms, increased.  

- Documented impacts include vegetation 'die-back' from high SO2 loads. In Copperbelt, during SA complaints of inability to garden in back yard registered in immediate vicinity of smelter in Wusakile (Kitwe) and Kankoyo (Mufulira).
Environmental damage morbidity from respiratory disease, increased mortality especially from cardiopulmonary disease. Populations affected include:
- Kitwe (Nkana west, Wusakile - up to 53,000 people potentially affected)
- Mufulira (Kankoyo, Kantanshi - up to 75,000 people potentially affected), and Chambishi (data on wind dispersion not available so unknown number of people affected)
- At Kabwe, populations in Kasanda Township are likely to have been in smelter path in the past. Historical impact from lead may be significant.
- Acid corrosion of infrastructure.
- Significant number of people affected.

**Tailings Leach Plant**

| None. |

**Acid Plant**

| ZCCM continues to own SmelterCo., though it is managed by KCM. | Limited human impact Inhalation of sulfur dioxide |

| Sedimentation of surface watercourses, including the Kafue River (Hippo Pool). |
| Acidification and increased metal loads to surface drainage receiving effluents resulting in changes in species composition and loss of sensitive species. |
| Open liming of drainage waters at Chambishi produces severe, localized gypsum precipitation over riverine sediments and aquatic flora. |

**Tailings Facilities**

- **Paddock Dumps**
  - Several defunct tailings sites have fallen under ZCCM-IH responsibility. Some have failed causing siltation in streams (e.g., Luanshya, 33C in Nkana).

| Health impact from drinking contaminated water likely to be low because contaminated drainage systems are not known to be used for drinking (requires more thorough confirmation for |

| Siltation of dambos and watercourses arises due to erosion of poorly consolidated or unvegetated paddocks or collapse of tailings because of poor maintenance -- this can reduce water available downstream. |
| High levels of silt can smother fish |

- **Cross Valley Dumps**
In Luanshya, dams are used for municipal water supply. Broader number downstream users in EMP and because high levels of copper tend to create bad taste in water which discourages consumption. SA site visits confirmed knowledge that streams were either contaminated (not suitable for drinking) or tasted bad so were not used. High reliance on wells or on piped water systems for drinking water. Bioavailability and solubility of metals in tailings is low. Impact on water utilities treatment costs downstream reportedly high because siltation increases cost to treat water, and can reportedly clog water reservoirs and pipes for domestic water users (particularly for Chingola, Mufulira). If mine siltation is found to be the cause, this may impede water access or increase cost to several thousand water consumers. Extent of fish consumption from contaminated tailings lagoons unknown, but KCM EMP noted that there was some health impact from consumption of fish from Lubengele Tailings, but that the nutritional impact of restricting all fishing would outweigh the impact of eating the fish in moderate quantities. Should be assessed further. In some cases there may be physical risk to adjacent houses if area is not stable (possibly with TD25). Tailings dams with water in Konkola have been documented as hosting bilharzia. Informal settlements exist on the margins of dumps (TD26, TD27) in Kitwe, and may be subject to significant eggs and other aquatic life, thus reducing variety and number of fish in streams. However other compounding non-mining factors may be more significant influences (sewage). Reduced aquatic life in tributary streams to the Kafue affects an unknown number of people dependent on fishing. Possible minor decrease in fertility of soil in adjacent area to tailings dam. At Chambishi, ferruginous tailings effluents have caused precipitation of iron on streambeds, and suffocation of benthic fauna.
dusting exposure.
- Older Nkana paddocks are used for cultivation. Heavy metal exposure through crop contamination warrants investigation, though likely risk to health in Copperbelt is low because of ore composition. In Kabwe no known cultivation on tailings, though EMP should assess if there is any cultivation adjacent to tailings as composition of ore does pose higher health risk from plants absorbing metals.

### Mine & Process Waste Water

- Dewatering responsibilities have been transferred largely to the private sector, except at Kabwe.
- Mine water serves as source for municipal water supply in several towns providing potentially very significant health benefit to thousands of water consumers through increased access to piped water. However, high concentrations of suspended solids increase cost of treatment.
- Better co-ordination between mine companies and utilities can lead to more precise treatment, thus reducing costs. Currently occurring with AHC-MMS.
- Occasional ochre (iron oxide) precipitation and suffocation of aquatic flora and benthic fauna where mine waters discharge to surface water bodies.
- Increased turbidity (suspended solids) resulting in alterations to composition of aquatic flora and fauna and usually decreased diversity
- Effects on riverine ecology and fisheries
- Effects of subsidence on surface resources
- Effects on surface water resources
- Effects on groundwater resources

### 3. Stakeholder Perspectives

A series of consultations were held with residents, local officials and community groups in the Copperbelt area. The majority of residents and community workers consulted had limited understanding of mine pollution, and generally did not rank this as a priority concern. This perspective may be due in part to lack of public information disseminated on mine pollution. There is no legal requirement for mining companies to share environmental data with local government or the public, and apparently no system for warning residents when there are excessive emissions, or overflows from tailings dams. The dissemination of environmental information to communities, and the establishment of information and warning networks to downstream and downwind communities in a format that local population can understand should be encouraged in the EMPs.

A series of consultations were held with residents, local officials and community groups in the Copperbelt area. The majority of residents and community workers consulted had a limited understanding of mine pollution, and generally did not rank this as a priority concern. One exception to this trend is with residents living in close proximity to smelters (the residents of Kankoyo in Mufulira and Wusakile in Kitwe were vocal), who were concerned about sulfur dioxide emissions. This perspective may be due in part to lack of public information disseminated on mine pollution. There is no legal requirement for mining companies to
share environmental data with local government or the public, and apparently no system for warning residents when there are excessive emissions, or overflows from tailings dams. The dissemination of environmental information to communities, and the establishment of information and warning networks to downstream and downwind communities in a format that local population can understand should be encouraged in the EMPs.

4. Issues to be addressed through the CEP

The EMP/CEMP

The CEP's design assumes that the model of an investor EMP and a counterpart EMP by ZCCM-IH will be applied to all investment groups. The EMPs prepared by ZCCM-IH are to be matched to the investor EMPs for each site, to ensure that all environmental issues are included and that there is concurrence between the two EMPs on who is responsible for what issues. The project's design assumes that the respective EMPs will reflect the results of consultations between investors and ZCCM-IH. It also assumes that the investor and counterpart EMPs will be reviewed and approved concurrently by ECZ and by the Mines Safety Department (MSD), the latter as the delegated authorizing agency for handling environmental issues related to mining licenses, under the Environmental Protection and Pollution Control Act (EPPCA) and the Mines and Mineral Act of 1995.

The CEMP itself will need to devote adequate attention to the issues posing the greatest threat to people and to ecosystems, and should also address emergency response plans, procedures for safe handling of toxic substances, and public communication and outreach by mine companies to downstream and downwind residents. The CEMP will go beyond the site specific EMPs prepared by investors and by ZCCM-IH, to look at cumulative and downstream impacts from mining. The CEMP process will be a vehicle to communicate findings to a broad spectrum of stakeholders in each town and for residents and others to voice their concerns with regard to specific rehabilitation measures. The responsible parties must be clearly defined and an ongoing monitoring program must be designed to ensure that the CEMP is working effectively. A tentative schedule of work is presented in Annex [13 A].

Rehabilitation of Mine Sites

An overview of the issues in rehabilitation of mine sites that could be considered for financing under the EMF is presented in Table 2.

A first draft of the criteria for the selection of sites to be rehabilitated was prepared during project appraisal (Annex 13). Some potential considerations include selecting sites that offer the maximum economic benefit if rehabilitated, or focusing on sites posing the greatest threat to human health, the stability of the site and potential for subsidence, and to the ecosystem in general. Several factors characterizing mining in the Copperbelt and Kabwe (relatively similar ores from site to site, large number of sites to be assessed, focus on copper and lead mining) suggest that a simplified qualitative ranking model for site selection would offer benefits in terms of increased transparency to a wide stakeholder audience and reduced delays before rehabilitation starts.

The challenges needing to be addressed in the process that will govern rehabilitation of sites under the CEP are:

- The long-term sustainability of tailings facilities that are frequently used for agriculture, scavenging, vandalism and deforestation, and all other activities that can jeopardize long-term stability and have the potential to reverse efforts to stabilize sites through planting vegetation/tree cover.
- The low capacity for ongoing maintenance by the municipal institutions to whom management will likely fall in the long-term.
The lack of security personnel at sites, a situation that will likely continue. Rehabilitation solutions need to be as low maintenance as possible in light of the limited capacity and resources of those institutions (municipal governments) that will likely take over the sites once they have been rehabilitated.

Safeguard Compliance and Participatory Planning Process

Rehabilitation of mine sites in the Copperbelt, particularly those near population centers, will require close coordination with those using the site and with stakeholders who would eventually be expected to take over the site. This EA has made recommendations on the composition of a proposed project steering committee, which could include both local government and NGOs as well as relevant government agencies.

As an environmental rehabilitation program, the CEP is intended to improve environmental conditions, not exacerbate them. However, because the specific investments to be funded under the EMF cannot be specified in detail at this stage, the project will need to define standard procedures for:

- Evaluating the social and environmental impact of specific sub-project proposals to ensure compliance with World Bank safeguard policies and to ensure that the proposed rehabilitation does not cause negative environmental effects either within the site or downstream/downwind of the site.
- Consulting with the affected public and stakeholders.
- Estimating the cost-benefit of different rehabilitation options proposed for specific sites.
- Ensuring that the type of rehabilitation proposed is cost-effective, technically sound, and sustainable in terms of the level of long-term maintenance required.

This EA has already identified some of the types of activities that could be considered for funding under the EMF and the areas where rehabilitation may require more careful scrutiny, prior World Bank review and additional expertise (for example, with the expansion of the medical and physical lead rehabilitation program in Kabwe, with some select sites where resettlement may arise, in the event of archeological sites being affected, or where sites such as dams that may be unstable and are near population centers). Other types of projects (replanting, vegetative cover of sites remote from human populations for example) pose comparatively lower social or environmental risks, and may require a more streamlined evaluation and approval process. However, because the rehabilitation and decommissioning of sites is a relatively new activity for ZCCM-IH and ECZ, requiring skills in new areas, the Bank may want to consider prior approval of the first set of remediation plans to ensure that the process is working smoothly. The World Bank would also need to establish mechanisms for evaluation of how well the process was working. A manual of procedures, to be agreed on by the World Bank, ZCCM-IH, and ECZ, could be developed which would outline the process, content, and review procedures for the site management plans, including specific trigger questions regarding Bank safeguards.

ZCCM-IH will need assistance under the CEP to develop a land policy governing the management and allocation of the large tracts of land it has retained. Other issues to be addressed carefully include health problems in Kabwe, and resettlement of squatters on ZCCM-IH or private mine lands that are not considered safe for habitation (over 3,000 residents are estimated to live on land that requires a safety assessment). This situation could represent a substantial, though currently unquantified cost to the CEP.
Kabwe Site

Given the sensitivity of the lead rehabilitation program in Kabwe, external review is proposed for any changes to the existing program. Expertise should be retained in mine site rehabilitation, medical toxicology and risk communications. In addition, more extensive testing is required to understand the extent and distribution of contamination. It would be prudent to opt for census testing of blood, at least in areas with evidence of contamination at levels that could warrant medical intervention. This recommendation could have significant implications for the program cost. Given the magnitude of the lead contamination in Kabwe, the project team should consider forming a Kabwe task force for ongoing rehabilitation, which would include health authorities, NGOs, education representatives, local government and mines.

No physicians trained in toxicology or occupational health reside in Zambia. Since one component of Kabwe’s rehabilitation program is likely to be increased medical treatment, it is crucial that counsel be sought from an outside professional toxicologist, preferably experienced with remediation and in public health in a developing country setting.

Several technical options exist for lead protection, but a more complete analysis of the viability and effectiveness of these options in light of the current context needs to be explored with residents. Actions to improve hygiene and reduce lead dust in homes are likely to produce the most immediate benefits.

Risks

The physical risks associated with rehabilitation of mine sites in the Copperbelt are modest because the materials at the sites, with the exception of limited stocks of radioactive substances, are not highly toxic. Where engineered works are adopted, they should be applied in a pragmatic fashion to manage discharges at a reasonable cost, without the need for more than passive care maintenance and infrequent monitoring. The engineered works described in Part II (Section 7) of the EA are in common use at mines throughout the world and hence, the risk of failure, aside from inappropriate engineering and applications is minimal.

Large-scale removal or transport of contaminated materials that could pose risks to the public or ecosystems is not envisaged.

Effectively controlling exposure to lead in Kabwe requires behavioral change on the part of residents. Thus, at Kabwe the project should adequately appraise support needed by health care authorities, develop a careful risk communication strategy and co-ordinate, possibly through a task force, with health care, municipal, mines, NGOs and other key stakeholders.

5. Alternatives to the CEP

An analysis of alternatives to the design and implementation plan for the CEP was undertaken as a component of the EA process. The non-intervention option is not considered viable. From a World Bank perspective, the institution has provided financial support for minerals sector reform in Zambia for a decade.

The proposed CEP structure draws upon experience from a number of ongoing, or previously executed World Bank programs in the minerals sector, for example in Ecuador, Bolivia and Argentina. The concurrent process of task identification and institutional capacity building has proved effective in all such instances.

Finally, the only other alternative to the current CEP structure would be for GRZ to seek grant-funding sources (the CEP is a concessional long-term credit which must be repaid in hard currency) from other donors. Given the magnitude of the clean-up required in Kabwe and in the Copperbelt, it is recommended that the GRZ seek such funding sources to complement the CEP and to minimize the future debt burden on the country. The funding mechanism within the project may facilitate such supplemental financing.
6. Summary Recommendations

1) Definition of responsibilities. Clear definition of responsibilities among ECZ, MSD and ZCCM-IH with regard to regulation and roles in CEP implementation is required for successful CEP implementation. Responsibility for the implementation of rehabilitation measures relating to historical environmental liabilities lies with ZCCM-IH. Measures relating to active plant and facilities are the responsibility of private sector mine operators. Monitoring and enforcement of all such actions is the responsibility of the ECZ, the MSD and other regulatory bodies, as prescribed under Zambia’s mining and environmental legislation.

2) Prioritization of issues. ZCCM-IH, private sector mine operators, and regulatory authorities will need to form a consensus regarding priority environmental issues to be addressed by their respective site-specific EMPs, and under the CEMP. Major areas of expenditure will likely include the monitoring and control of atmospheric emissions, control of sediment loads, improved water quality and the lead rehabilitation program at Kabwe.

3) Environmental Mitigation Facility. The Environmental Mitigation Facility (EMF) of the CEP is the project’s major component. ZCCM-IH liabilities may, on the basis of existing rehabilitation cost estimates, potentially exceed the EMF budget. Expenditures should therefore be focused towards priority impacts, as identified in this EA, and subsequently under the CEMP. A risk assessment approach should also be considered.

4) Institutional Capacity. The regulatory agencies, ECZ and MSD, have basic mandates and technical competency, but require an organizational focus and training to enable them to adequately discharge their functions in CEP implementation. ZCCM-IH will need to bolster its capacity in community liaison functions, legal expertise, and toxicology/risk assessment communication in order to carry out its post-privatization obligations effectively. Training for all of the above institutions in risk assessment and site rehabilitation would be important. The issue of incentives to retain qualified staff will also need to be further evaluated in an effort to decrease the staff turnover at ECZ and MSD.

5) World Bank Safeguard Policies. Because activities to be funded under the EMF cannot be specified in detail prior to the establishment of the fund, the setting of priorities and the fuller investigation and selection of remedial measures, the EMF will need to put in place a process for environmental and social safeguards review in order to ensure compliance when applicable with WB Safeguard Policies, including OP 4.01, Environmental Assessment, OP 4.12, Involuntary Resettlement, OP 4.37, Dam Safety, OP 4.09, Pest Management, and OP 11.03, Management of Cultural Property. The triggering of other safeguard policies, e.g. Natural Habitats, cannot be ruled out, but seems less likely, based on the information gathered for he CEP EA. The screening and review process will include the participation and consultation of stakeholders through various vehicles like a project steering committee with wide stakeholder representation (including NGOs and local government) to ensure adequate screening and consensus among stakeholders.

Remedial activities undertaken by the EMF will be screened for safeguards compliance, in addition to the environmental assessment requirements of GRZ. Those projects that trigger Bank safeguard policies would necessitate a more detailed environmental and social evaluation, careful third-party review and assistance, as well as prior approval by the World Bank. A manual of procedures could detail the specific triggers for such review.

Thus, the EMF will be required to establish procedures for 1) screening each proposed activity to determine which safeguard policies are triggered; 2) carrying out environmental assessments, including effects on cultural property; 3) preparing resettlement action plans, dam safety plans, pest management plans; and 4) consulting with the affected publics and NGOs and disclosing safeguard documents. The Bank will need to assist the EMF in developing the capacity to make these determinations and carrying out the
work in coordination with the ECZ and the Bank. In addition, the Bank will need to develop a mechanism for monitoring the process.

Table 2: Mine Facilities and Environmental Rehabilitation

<table>
<thead>
<tr>
<th>Mine Facility</th>
<th>Potential Impact on Health and Ecology</th>
<th>Potential Environmental Changes to Site Over Time</th>
<th>Options for Rehabilitation / Land uses</th>
<th>Community Management Issues</th>
</tr>
</thead>
</table>
| Underground Workings  | · Localized hazard to squatters on subsidence area (possibly AMCO in Kitwe)  
                         · Health: low to none  
                         · Ecology: low to none | · Subsidence and collapse of workings  
                         · Discharge of mine drainage water  
                         · Loss or partial loss of land use | · Removal of chemicals and other hazardous materials  
                         · Seal off from surface entry workings  
                         · Delineate areas unsafe for human habitation and usage  
                         · Monitoring subsidence effects on ponding and stream flows; maintain stream flows and alignments, if necessary. | · Signs to keep people from settling on unsafe areas  
                         · Locate buildings out side of subsidence zone  
                         · Manage agriculture activities  
                         · Discussion with key stakeholders with regard to land allocation to ensure they do not allocate land that is not safe |
| Open Pits             | · Health: localized hazard for those illegally accessing area if pit is unstable  
                         · Ecology: limited environment for flora and fauna.  
                         · Visual Environment: pit may be unsightly, consumes land that could be used for other purposes | · Stability of the pit walls  
                         · Collapsing pits may affect adjacent roadways, though impact on population not likely to be high because of distance from population centers.  
                         · Potential break back (cracking and settlement around rim of pit), raveling and instability of pit walls, and hydrogeological problems associated with the development of pit lakes. | · Evaluation of the zone of settlement or potential instability behind rim of pit (unsafe areas closed to public)  
                         · Not practical to reprofile unstable pit slopes  
                         · Hydrologic forecast of long term water levels and water quality; prepare plan for utilization of pit lake for recreation and possible aquaculture.  
                         · Where feasible, develop a beach area for recreational access; prepare access trails and vegetate flatter areas. | · Signs to keep people from settling on unsafe areas.  
                         · Community involved in management of in pit lake as a reserve and recreational site.  
                         · Discussion with key stakeholders with regard to land allocation to ensure they do not allocate land that is not safe |
| Waste Rock dumps      | · Health: low to none  
                         · Visual Environment: cannot establish more than sparse vegetation and consumes land that could be used for other purposes. | · Possible increased metals (copper) in runoff to streams though types of metals are relatively benign. Can reduce number of fish. Minor siltation to streams  
                         · Because they tend to | · May vegetate slopes where feasible; i.e., where sufficient soil is present in rock interstices  
                         · Assessment of long-term mineralogical and | · Signs to keep people from settling on unsafe areas.  
                         · In some cases there may be physical risk if area is not stable.  
                         · Limited for land use; unproductive for |
<table>
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<tr>
<th>Stockpile Type</th>
<th>Health: low to none</th>
<th>Ecology: minor siltation to streams</th>
<th>Visual Environment: should support vegetation</th>
<th>Change in original land use (productivity)</th>
<th>Disruption of surface drainage.</th>
<th>Implementation of siltation reduction measures</th>
<th>Drainage improvements to minimize slope gullying and down-catchment siltation</th>
<th>Should naturally revegetate, or can be planted or seeded with local species.</th>
<th>Community education to ensure that new vegetation/trees are not cut down.</th>
<th>Employment of community members to carry out plantings.</th>
<th>Planting species not used for charcoal or firewood.</th>
<th>Explore with community sustainable ways of using the site.</th>
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<td><strong>Overburden Dump</strong></td>
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<td><strong>Slag Stockpiles</strong></td>
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<tr>
<td><strong>Ore Stockpiles</strong></td>
<td>Increased heavy metals, acidity, or pollution. In Copperbelt heavy metals not likely to be highly toxic.</td>
<td>Health: Low to None – localized issue for those</td>
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- Health: low to none - localized issue for those living near stockpiles and illegally accessing site.
- Ecology: some increased metals runoff to streams
- Visual Environment: sparse to no vegetation.
- Air – minor dust to adjacent communities
- Water – siltation and heavy metals contamination during rainy season
- Stockpiles are stable and resistant to erosion.
- Limited changes over time.
- Long term impact only if ore is not processed.
- Temporary stockpiles awaiting processing.
- Check leachate for heavy metals if stored for more than one year.
- Minor if ore is processed.
<table>
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<tr>
<th>Site Type</th>
<th>Issues</th>
<th>Consequences</th>
<th>Recommendations</th>
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</table>
| Concentrator | - High suspended solids loads  
- Effects of high metal discharges on surface water quality | Temporary impact during mine operations.  
- Decommissioning of all infrastructure  
- Closure plans to include restitution of drainage ways and revegetation. | Monitor water quality and limit any agriculture and water extraction adjacent to site as appropriate. |
| Smelter (Pyrometallurgical Plant) | - Health: High – exposure to air-borne SO2, and potentially to accumulated metals deposited on plants and soil in downwind areas. SO2 produces impact while smelter is operational, but deposits of metals in soils can last after smelter is closed.  
- Ecology: In immediate vicinity residents report that plants do not grow well  
- Potential for increased quantities of production may lead to increases in SO2 unless sufficient improvements are undertaken at smelters | Decommissioning of all infrastructure  
- Closure plans to include restitution of drainage ways and revegetation.  
- Represents a priority issue to be addressed under the EMP/CEMP with private mine companies | Through EMPs, mine companies should be encouraged to warn residents to take positive measures when there are times of very high SO2 levels.  
- Communities need an accessible avenue for complaint when emissions levels are high. |
| Tailings Leach and Acid Plant | - Potential for release of acidic water.  
- Sediment discharge to watershed; siltation and metals contamination during rainy season. | Temporary impacts during plant operations.  
- Decommissioning of all infrastructure  
- Closure plans to include restitution of drainage ways and revegetation. | Through EMPs, mine companies should be encouraged to implement warning system for downstream users not to drink water when effluent levels surge above normal, to develop networks of downstream users who they could notify |
| Tailings Facilities: Cross Valley Dumps S44 | - Health: generally low impact (to be confirmed through further testing in EMP/CEMP)  
- Ecology: impact on aquatic life and water available downstream likely high but other compounding non-mining factors may be more significant | Long-term stability of the embankments  
- Discharge water quality and loading to receiving environment  
- Potential for major spills if not designed or constructed properly. | Analysis of capacity of spillway to convey major flood events (e.g. 1 in 1000 years)  
- Dam break analysis in event of failure  
- Upgrade spillway as appropriate for closure; seal off decant  
- Restrict habitation in floodway area below dam. | Slope failures at several tailings dams linked directly to vandalism and community use of the site  
- Community education to ensure that new vegetation/trees are not cut down and to gain agreement on |
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<tr>
<td>(e.g. sewage). Possible minor impact on fertility of soil in adjacent area to tailings dam. Visual Environment: large tracts of land may remain unvegetated, dusty and unused.</td>
<td>Establish vegetative cover - may have potential for forestry or cash crop if metal uptake or deep root damage to the tailing capping material are not a problem.</td>
<td>Possible minor impact on fertility of soil in adjacent area to tailings dam.</td>
<td>Establish vegetative cover - may have potential for forestry or cash crop if metal uptake or deep root damage to the tailing capping material are not a problem.</td>
</tr>
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</table>

**Tailings Facilities:**

**Paddock DUMP**

S55 Tend to be older, less engineered impoundments that consist of ring dykes formed by depositing the coarser sand fraction of the tailings, separated by the action of spigots and cyclones.

- Health: impact low
- Ecology: minor impact on aquatic life and water available downstream. Possible minor impact on fertility of soil in adjacent area to tailing dump.
- Visual Environment: large tracts of land may remain unvegetated, dusty and unused
- Smothering of valley if tailing spill occurs.

**Mine and Process Waste Water**

- Increased turbidity (suspended solids) makes treatment of municipal water more difficult and expensive
- At areas where metals content is high (Chingola) reduces fish and plant life in riverine

- In several towns, water pumped from mine provides source of potable water. In Chililabombwe and Nchanga, provides significant amount of water to Kafue.
- Sediment load (may be

- Temporary impacts during mine operations.
- Hydrology and water quality in long term will tend to revert to preexisting conditions

- Better coordination between mine companies and utilities can lead to improved municipal water treatment, reduced costs. Currently occurring with AHC-MMS and
<table>
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<tr>
<th>Hazardous wastes:</th>
<th>Health: Low impact as long as precautions to secure PCBs from theft are taken and to ensure they are not accidentally released during transport or disposal. Ecology: low and limited to immediate area if leaking into soil and groundwater</th>
<th>If security of site is not maintained, there is risk of theft or leakage</th>
<th>Dispose of PCB and radioactive wastes in secure sites and eventually eliminate in accordance with POP convention. Limit occupational exposure to radionuclides</th>
<th>Appropriate safeguards to protect disposal sites from unauthorized entry and vandalism</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCBs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radionuclides</td>
<td>Health: Low to general population, unknown risk to underground mine workers Ecology: Low</td>
<td>Excessive exposure of workers to radionuclides can lead to respiratory disease and lung cancer</td>
<td></td>
<td></td>
</tr>
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<td></td>
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</tbody>
</table>
I. Introduction

Copper mining is an inextricable part of Zambia’s twentieth century economic history and will very likely continue to be the prime motor of economic growth for a good part of the twenty-first. Prior to privatization, Zambia Consolidated Copper Mines, Limited (ZCCM) and its predecessor mining companies operated copper mines mainly and some lead and zinc mines for well over 80 years. ZCCM itself resulted from the consolidation in 1982 of Nchanga Consolidated Copper Mines and Roan Copper Mines. There is no doubt that during this period, mining operations had environmental consequences, many of which can only be described as negative and harmful. Thus, when the Government of the Republic of Zambia (GRZ) decided to privatize ZCCM by unbundling the mining and other operating assets, and selling them to qualified international, private-sector investors, GRZ inevitably was faced with the issue of what to do with the historical environmental legacy. This issue was not accorded equal importance by all prospective investors. Environmental liabilities and how to deal with them were accorded more importance and received more attention in the case of the older assets and those in which more renowned and higher profile international investors were involved. Actually, reaching agreement on how to treat the environmental liabilities was critical to reaching sale agreements for some of ZCCM’s mining assets. This was especially true in those cases where international investors, such as Anglo American Company (AAC), were associated with multilateral/bilateral institutions, such as the International Finance Corporation (IFC) and the Commonwealth Development Corporation (CDC), who formed the Konkola Copper Mines (KCM) Consortium that bought the most important package of ZCCM mining assets. KCM reached agreement with GRZ and ZCCM on an Interim Environmental Management Plan (IEMP), which was supposed to be the basis for preparing a final Environmental Management Plan (EMP). The final EMP for the assets bought by KCM has been prepared and approved by all concerned parties. EMPs for the other sold assets still need to be prepared, negotiated and finalized.

Reaching final agreement to sell the mining assets and having a credible commitment to deal with the environmental issues was critical to completing the privatization of ZCCM, especially with KCM. To meet the investors’ need for a credible assurance, the GRZ sought help from the World Bank, and the Bank agreed to help the Government and ZCCM in this regard. Hence, the genesis of the proposed Copperbelt Environment Project (CEP), which is meant to provide ZCCM-IH and the Government with the means of fulfilling their environmental commitments vis-à-vis all the new investors, not just KCM, who were buying ZCCM’s mining assets. However, during the preparation of the proposed CEP, it became evident that the CEP must also help ZCCM-IH fulfill its environmental obligations under existing Zambian environmental regulations. Some of these obligations would be of a very long-term nature. Specifically, the proposed project will provide through the Environmental Management Facility (EMF) the means to help GRZ and ZCCM-IH meet their commitments in terms of: i) undertaking mitigatory environmental actions that they are responsible for, and ii) preparing a Consolidated Environmental Management Plan (CEMP) that integrates investor EMFs and ZCCM-IH’s and addresses any gaps. The EMF will provide funding to cover the costs of mitigation actions, the cost of preparing the CEMP, as well as staffing, expertise and know-how to manage these activities.

Below is a brief description of the objectives, policies, procedures, management, and financing of the EMF. This proposal has been incorporated into the Implementation Manual for the Project.
II. Objective and Policies of the EMF

A. Objectives of the EMF

The main objectives of the EMF are to help GRZ and ZCCM-IH address the environmental problems that are the result of past mining operations and to fulfill the permanent obligations of ZCCM-IH under existing Zambian environmental laws and regulations. It does so by helping to define the environmental problems and by financing the costs of their mitigation, including the costs of overseeing the implementation of priority mitigation measures. The environmental problems either:

1. are located in properties that were sold to investors under the condition that ZCCM-IH would assume the responsibility for the remediation of historical damage;
2. are found outside the properties that were sold to investors, and are incumbent on ZCCM-IH; or
3. arise from past mining operations, are not incumbent on ZCCM-IH or on an investor, and thus now rest with GRZ by default.

The mitigation measures are in some instances identified in broad terms in environmental management plans, such as the one agreed with KCM, or are still to be identified and agreed with the other buyers, such as Mopani Copper Mines (MCM). They also include measures identified in the mine closure plans prepared by ZCCM in late 1997, in compliance with the provisions of the new Mines and Minerals Act, 1995, and the associated Mining Environmental Regulations. The detailed design of the mitigation measures will be carried out during the preparation of environmental management plans and of the CEMP, which would be undertaken by qualified advisors recruited with financing being provided under the proposed CEP.

B. The Policies of the EMF

The task of dealing with the environmental legacy of ZCCM’s mining operations is difficult and costly. It is imperative, therefore, that the Government and ZCCM-IH be clear, not only about the objectives of the mitigation program, but also about the policies and procedures that will be followed in implementing the environmental mitigation program, because the agreed objectives, policies and procedures will determine the costs and benefits of the latter. The proposed policies that will be applied to the mitigation measures financed by the EMF can be briefly described as follows:

Health and Environmental priorities. The measures that will have the highest priority for financing by the EMF would be those that address widespread public health problems or damage to ecological functions. Criteria for classifying the problems will be prepared to guide the EMF decision-making process. The system for classifying environmental problems and for establishing their priority ranking will have to take into account the amount of risk and the relationship of costs to expected benefits. A preliminary description of this system is found in Annex 13.

The other measures to be financed out of the EMF will be related to the contractual obligations of the Government and ZCCM-IH vis-à-vis the buyers of ZCCM assets. The highest priority will be given to actions with the earliest impending deadlines, since default by GRZ or ZCCM-IH on these obligations would endanger the progress being made on revitalizing the Zambian copper industry. Such defaults would give the new mining companies an excuse to default on their own commitments, particularly at a time when the copper industry is facing world recession and very low copper prices. Finally, compliance with the requirements of applicable Zambian environmental laws will also need to be taken into account.

Financing policies. Decisions on eligibility for financing from the EMF and the terms and conditions that will apply to the funding will be based on who has assumed responsibility for the remedial measures and the sources of funding. As currently conceived, the EMF will have two windows: i)
mitigation measures that are the responsibility of ZCCM-IH, which is majority owned by but has financial independence from Government, ii) mitigation measures the responsibility for which has been assumed by the Government. Since IDA funds can only be secured by the Government because of their concessional nature, GRZ will pass EMF funding for the first window to ZCCM-IH on commercial or market terms. ZCCM-IH will manage the second window on behalf of the Government, against a management fee to be determined. Payments for personal compensation for damages, even if decided upon by the courts, will not be eligible for funding from the EMF.

Based on current information, it is likely that the aggregate cost of the mitigation measures eligible for EMF funding will far exceed the funds currently being made available through the EMF. The EMF, therefore, will have to ration the resources to ensure that the highest priority mitigation measures are funded during the five-year period of the project. To facilitate the decision-making process, the EMF will fund the preparation of an inventory of environmental management and mitigation tasks, and the preparation of a pipeline of mitigation sub-projects that takes into account the priorities set for the EMF. This pipeline would classify the measures into groups that correspond to the priority groups.

**Operating policies.** Except for the monitoring and follow-up of compliance with sales agreements and applicable Zambian laws, the activities that will be eligible for financing out of the resources of the EMF will in principle be contracted out. ZCCM-IH and the body set up to manage the EMF will not themselves directly undertake environmental mitigation or management measures.

**Procurement policies.** All goods and services funded through the EMF will be procured on a competitive basis. Whether this implies local or international competition will depend upon the size and nature of the procurement being made, the requirements of the donors and the availability of an adequate number of suppliers.

The above-described policies will be incorporated into a Policy Statement and formally adopted by the Government and ZCCM-IH to govern the activities of the EMF. This Policy Statement should be included as a specific document that should be approved by the Government to ensure interagency agreement to its provisions.

**III. Organization, Management and Administration of the EMF**

**A. Organization and Management**

The funds available through the EMF will not be sufficient to address all of the environmental liabilities of GRZ or ZCCM-IH. Therefore, it is critically important for the success of the proposed project that management of the EMF follow the normal business principles of efficiency, of adherence to budget constraints, and of good foresight expressed in terms of a rigorous, but also a flexible business plan.

Moreover, the measures funded by the EMF are of concern to a wide array of stakeholders, including the inhabitants of the mine townships and other communities on the Copperbelt, ZCCM-IH and its remaining private sector shareholders, the new mine owners and investors, and the Government. It is critical for the success of the EMF to take into account the views and interests of these stakeholders. For this purpose, the Ministry of Finance and National Planning (MoFNP) is establishing an autonomous body with objectives, policies and procedures that are approved by the Government and by the Board of ZCCM-IH.

The EMF will be governed by a Steering Committee (EMF-SC) and supported by a Secretariat. The EMF Steering Committee will be entrusted with the following main responsibilities:

1) ensuring that the program of activities that will be carried out under the EMF is consistent with the EMF objectives and the policies approved by GRZ and ZCCM-IH and agreed with the donors,
2) providing policy guidance to those involved in the preparation and implementation of mitigation measures;
3) approving the specific proposals for all the mitigation and remedial activities to be financed by the EMF, and
4) overseeing the activities of the EMF Secretariat.

The EMF Steering Committee will also propose to the appropriate authorities changes to the Policy Statement, if any are needed. These changes will have to be acceptable to IDA and the other donors of funds, if any.

The EMF Steering Committee will consist of the Secretary to the Treasury as Chairman, and, as members, the Permanent Secretaries of the Ministries of Environment, Local Government and Mines and Mineral Development, together with the General Manager of ZCCM-IH, and the representatives of the Environmental Council of Zambia (ECZ), the Mineworkers Union of Zambia (MUZ), the Chamber of Commerce and Industry, Chamber of Mines, and an active/prominent member of non-governmental organizations or civil society.

The EMF Secretariat will consist of a manager, an accountant and support staff. The Secretariat and its staff will be accountable to the EMF Steering Committee. The Secretariat will ensure that all activities that are undertaken under the EMF are implemented efficiently and in accordance with all the applicable agreements with the investors, GRZ, donors and contractors. The resource position of the EMF will be constantly reviewed by the Secretariat to determine if there is a resource gap or shortage. If so, this together with the estimate of the resources needed to implement the work program would be the basis on which the resource requirements of the EMF would be estimated. This in turn would be the basis on which GRZ and ZCCM-IH would develop a resource mobilization strategy.

At the start of the EMF program, the EMF-SC will meet as frequently as needed, perhaps monthly to ensure an effective start for the implementation of the EMF program. Subsequently, the EMF-SC will meet as frequently as necessary to ensure the continuity of EMF operations. After an initial learning period, the EMF-SC could, if it chooses, delegate its approval authority for smaller mitigation measures, as follows: i) to a sub-committee of its members, preferably all residing on the Copperbelt for sub-projects costing between US$ 100,000 and US$ 500,000; and ii) to the Manager of the EMF Secretariat for sub-projects costing less than US$ 100,000.

The EMF Secretariat must know its resource position on a continuing basis: i) how much is available from ZCCM-IH’s own resources, from donors and from GRZ; ii) how much is committed, disbursed and undisbursed; iii) how much is available for the administrative expenses of the Secretariat, of the Steering Committee, and for advisory support to the Secretariat or Steering Committee; and, iv) how much is available for new mitigation and remediation sub-projects. A “Resource Position Statement” will be included in the Implementation Manual as a tool to help the Secretariat manage its resources. The EMF Secretariat will prepare and keep separate accounts for the EMF.

ZCCM-IH has set up an Environmental Coordination Unit (ZECU) that will oversee the implementation of mitigation measures. The ZECU oversaw during project preparation the activities that were started under the PHRD Grant and the PPF advance. The ZECU will be responsible for procuring the goods, works and services required by these measures. ZECU will have its own staff and resources adequate to carry out its mandate. The EMF will fund technical assistance and advisory services to complement the skills/services available in-house.

B. Procedures of the EMF

The Pipeline of Environmental Sub-projects. The EMF Secretariat with the assistance of ZECU will prepare soon after project startup a work program including a pipeline of sub-projects. The work program will aim
to achieve the objectives set for the EMF and will reflect the priorities that were discussed above. The pipeline of sub-projects should be based upon, and be consistent with, the Consolidated Environmental Management Plan when that is ready and approved, and with the investor EMPs and the ZCCM-IH counterpart EMPs.

The ZECU is in a good position to immediately start preparing an inventory of the environmental liabilities that will likely require attention based on available data. ZCCM-IH already has a considerable amount of environmental information, in part as a result of the environmental work done to fulfill the new licensing requirements under the new Mines and Minerals Act (1995), and in part because of the attention that was given to environmental issues during the privatization process. Further information on environmental problems will be gathered and analyzed during the CEMP process. All of this information should be presented in a form that facilitates decision-making, taking into account the relative priorities.

The pipeline of projects should include at least three parts or sections, as mentioned earlier in the section regarding the objectives of the EMF:

(i) **Contractual environmental obligations.** This section will have two sub-categories, the first one would list the environmental mitigation measures that ZCCM-IH has committed itself to undertake; and the second sub-category would list the environmental mitigation measures and commitments that the investors have already committed themselves to undertake, including those that they are looking at, but an agreement on which has not been reached with ZCCM-IH and/or GRZ.

(ii) **Statutory environmental obligations.** This section will include the environmental mitigation measures that ZCCM-IH has to undertake because the applicable laws of Zambia require them. Early discussions should take place between GRZ and ZCCM-IH on whether a separate sub-category that lists the environmental mitigation projects and commitments that the investors have committed themselves to undertake because of statutory requirements should be added to the pipeline. These discussions should investigate whether to include the projects that the investors are looking at, but an agreement on which has not been reached with ZCCM-IH and/or GRZ. The objective should be to determine as early as possible if ZCCM-IH and the EMF and its PMU have any role to play; and

(iii) **Other environmental obligations.** This section will include those environmental mitigation measures that are the responsibility of the Government.

**Sub-Project Cycle.** Access to the resources of the EMF to cover the costs of mitigation measure - let us call them as sub-projects - would be initiated on the basis of an application that fully justifies the assistance required for a particular mitigation or remediation measure. The following steps are proposed for sub-project preparation and approval:

1. All applications for EMF funding are submitted to the EMF Secretariat.
2. The EMF Secretariat passes the applications on to EMF Steering Committee. The Steering Committee screens each application for conformity with EMF objectives, and gives it a priority rating.
3. Once an applications is cleared, the EMF Secretariat passes it on to ZECU for development as a sub-project proposal. ZECU identified actions required for compliance with Zambia's environmental regulations, as well as World Bank safeguard policies, including measures to ensure the consultation and participation of stakeholders.
4. ZECU submits the sub-project proposal to the EMF Secretariat, which reviews it for conformity with project procedures, as detailed in the Project Implementation Manual. If necessary, the Secretariat employs consultants to provide an independent opinion.
5. The EMF Secretariat submits the sub-project proposal and the review brief to the EMF Steering Committee, which approves or rejects the proposal.
6. If the sub-project is approved, the EMF Secretariat will, for those sub-projects not implemented for
the account of ZCCM-IH, prepare a legal agreement to be concluded with the applicant. This agreement would incorporate all the provisions necessary to record the rights and obligations of the EMF and the applicant.

7. The EMF Secretariat then informs ZECU to proceed the implementation of the approved sub-projects.

8. ZECU will initiate the recruitment of consultants and contractors and supervise implementation.

Sub-project Application. Each application would be a document that sets out the environmental problem requiring attention, the justification for the remedial action in terms of impact on the health and safety of the population and the environment, and the eligibility for funding from the EMF. Since the EMF has two windows - one for the account of ZCCM-IH and the other for the account of the Government - the application should identify which window is the appropriate one. It should also indicate the chosen remediation strategy, the alternatives that were considered and discarded, an estimate of costs and benefits, and a proposed implementation timetable. The application should be standardized as much as possible and kept simple and relatively short for the smaller environmental problems. They should be accompanied by all available studies and data that support the proposed measures.

Standard application forms should be designed for each of three categories of sub-projects.

- Small and relatively simple sub-projects, where information requirements are limited, the justification for intervention is straightforward, eligibility for funding from the EMF is evident, the costs are relatively low, say under US$ 100,000, and the financing package would be easy to assemble.
- Mid-size sub-projects costing between US$ 100,000 and US$ 500,000. The outline of the application form for this middle category would be similar to that for the small projects but would address the topics in more depth.
- Large (total costs of US$ 500,000 or more) and relatively complex sub-projects that deal with complicated contamination situations. In such cases, defining the health and environmental impacts would require time-consuming and costly assessments, the justification for intervention would need to be supported by special studies and analysis, and the eligibility for funding from the EMF would need to be proven.

The EMF Secretariat must develop checklists, consisting of questions/topics that need to be covered in each section of the application that would draw on up-to-date experience in this field should be prepared to define the scope of what needs to be done to apply to the EMF and to guide the applicants in preparing their applications to the EMF.

Sub-project Approval. At the beginning of EMF implementation, the EMF Steering Committee will have to specifically approve and authorize funding for all requests to the EMF. After an initial period during which the EMF Steering Committee and the EMF Secretariat will have gained experience, the Steering Committee could decide to delegate the responsibility for approving sub-projects to a sub-committee of its members for the mid-size sub-project category, and to the Manager of the EMF Secretariat for the small-size sub-project category. The Steering Committee will ratify and confirm these decisions in due course.

The role to be played by IDA in processing EMF sub-projects will likely evolve over time. At the beginning of implementation, it will be necessary for IDA to be heavily involved in the sub-project approval process to ensure that the objectives, policies and procedures of the EMF are being adhered to and that the EMF Steering Committee and the EMF Secretariat have gained the proper experience. Thus, IDA's non-objection will be a condition for sub-project implementation, and should be obtained by the EMF Secretariat before ZECU is notified that a sub-project has been approved.

After the EMF Steering Committee and the EMF Secretariat have competently and successfully handled a number of the small and medium-size requests for EMF assistance (i.e., those requests that are below US$
500,000 in terms of estimated total cost of the mitigatory measures), it is proposed that IDA forsake the right of prior review of requests for sub-projects costing less than US$ 500,000 and limit its follow-up to an ex-post review of the Steering Committee's decisions. IDA will then retain the right to authorize access to EMF resources only. The ex-post review essentially implies that IDA would verify that the approved sub-projects are fully documented, are eligible for financing, are consistent with the objectives of the EMF, as agreed under the CEP and with the agreements between GRZ, ZCCM-IH and IDA. Specifically, it is proposed that:

a) the free-limit sub-project approval limit be set at US$ 500,000 or less;
b) the free-limit approval authority be granted to: i) a sub-committee of the EMF Steering Committee after the Committee has submitted to IDA for approval five requests for EMF assistance or sub-projects, each with a total cost is US$ 100,000 or more, but less than US$ 500,000, and ii) to the Manager of the EMF Secretariat for sub-projects costing less than US$ 100,000. It is also proposed that this limit (US$ 100,000) be the same as the prior review threshold for procurement, and of which at least two are of medium size (i.e., total costs between US$ 100,000 and US$ 500,000); and
c) the aggregate amount approved for free-limit sub-projects be capped at US$ 3.0 million. All requests to the EMF that exceed the free limit will always be subject to specific approval by the Steering Committee and IDA. A more detailed manual on sub-project approval will be prepared and agreed prior to CEP effectiveness.

Follow-up of Sub-project Implementation. Once a sub-project has been approved and all agreements with contractors have been finalized, the role of ZECU and of the EMF Secretariat will be limited to the follow-up of implementation. The nature and size of the sub-project will determine the scope and depth of the follow up. In some instances, the EMF Secretariat will require the support of short-term consultants or advisors, and funds will be set aside under the EMF for this purpose. Feedback on implementation progress and the lessons learned will be systematically incorporated in the preparation of subsequent sub-projects. A manual for implementation follow-up will be prepared and agreed prior to CEP effectiveness.
The main objective of the EMF is to finance the costs of priority environmental mitigation measures resulting from ZCCM-IH’s past operations on properties that remain with ZCCM-IH, and/or agreed measures with investors who have bought ZCCM-IH mining assets. The measures that will be given the highest priority for financing by the EMF would be those impacts that will lead to or be associated with widespread health problems and/or environmental damage. It is likely that the number of mitigation measures that will need to be taken with funding from the EMF will far exceed the resources available. Therefore a prioritization system needs to be established to allow issues to be addressed as identified. Eligibility for EMF grants are based on a prioritization environmental and social issues depending on the level of risk reduction and cost effectiveness of the proposed work.

The EMF could be used to address both the source of the impact and the area of impact. Eligibility to the EMF would depend on the issue having its origin in the past operations of ZCCM-IH and is not designed to cover all environmental issues of the Government of Zambia. The EMF will be used for environmental mitigation measures and is not intended to provide compensation. The EMF is also expected to be exempt from court judgments aimed at using the EMF funds to address environmental issues not approved by the EMF. That is not to say these issues cannot be addressed, however the funding cannot come from the EMF but must be obtained from other sources.

The final selection criteria, methodology and prioritization of issues will occur as part of the CEMP. However as some activities will need to commence prior to the completion of the CEMP a preliminary system of ranking priorities is required. The final selection criteria will follow a similar methodology. The final determination of the selection criteria will need to include a process of consultation with stakeholders including community and local government representatives, as well as industry, representative NGOs, ZCCM and Government regulatory bodies. It is recognized that the perception of what is a significant risk issue may differ between stakeholders and a more inclusive approach can strengthen the risk evaluation criteria and its usefulness.

A preliminary selection criteria was determined at a workshop of key stakeholders from ZCCM-IH, Government (MSD and ECZ) and the Chamber of Mines. The selection criteria were then applied to all known issues in an attempt to rank these issues in terms of their priority. The general approach to ranking of issues and the results of the preliminary workshop are presented in this annex. The listing of issues and their priority is not final, but provides an initial indication of priorities and highlights issues requiring immediate attention.

**Risk Based Approach**

It is proposed that a system categorizing issues in terms of risk be used to establish priority. Risk will be based on the potential impact of the issue and the likelihood of these impacts occurring. That is risk is a function of likelihood and size of impact. The impact of greatest concern is any potential impact on human health or environmental damage.

The appropriateness of measures to address the impact will also be evaluated in terms of the cost benefit (that is reduction in risk) of these measures. For example complete rehabilitation of overburden dumps may not be appropriate given the high cost of this activity and the high priority of other measures. Instead
mitigating measures to reduce the impact of the overburden dumps to the environment, such as a bund wall to contain siltation run off from the dumps, may be the preferred measure.

The risk and priority can be summarized in the diagram below. The higher the impact, and the higher the likelihood this impact will occur, the higher the risk.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High Risk</td>
<td>Very High</td>
</tr>
<tr>
<td>High Risk</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>Medium Risk</td>
<td>Low Risk</td>
</tr>
<tr>
<td>Low Risk</td>
<td>Very Low Risk</td>
</tr>
</tbody>
</table>

For example, under this structure the priority for funding could be summarized as follows:

<table>
<thead>
<tr>
<th>Priority Category</th>
<th>Risk</th>
<th>Action</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very High</td>
<td>Immediate Funding</td>
<td>Accelerate process of site investigation and measures to address issue.</td>
</tr>
<tr>
<td>2</td>
<td>High</td>
<td>Immediate Funding</td>
<td>Accelerate process of site investigation and measures to address issue.</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
<td>To be funded. Timing to take account of other high priority actions.</td>
<td>Complete EMP for this issue.</td>
</tr>
<tr>
<td>4</td>
<td>Low</td>
<td>Funding to be assessed depending on other priorities being addressed and available funds.</td>
<td>Complete EMP for this issue.</td>
</tr>
<tr>
<td>5</td>
<td>Very Low</td>
<td>Funding unlikely</td>
<td>Complete EMP for this issue.</td>
</tr>
</tbody>
</table>
Preliminary Workshop on Selection Criteria and Ranking of Priorities

This following outlines the process taken in prioritizing the initial list of Environmental and Social Issues identified by the key stakeholders (ZCCM-IH, ECZ, MSD and the Chamber of Mines) at a workshop in Luanshya on March 20, 2002. The World Bank team compiled the initial list of issues after a detailed debriefing by ZCCM-IH staff and a five-day site visit. Participants during the discussion added other issues to the list.

The Prioritization Process

A qualitative risk assessment was conducted during the meeting because the group felt there was insufficient quantitative data. This approach utilizes visual observations and experience to make subjective or intuitive decisions. The qualitative approach is suitable for identifying high-risk issues so mitigation measures can start before more quantitative data is collected. A more quantitative risk analysis can be undertaken after the proposed CEMP when an extensive database is accumulated allowing for more deductive decisions.

Before the prioritization process started the team identified a list of values and standards to be observed throughout the prioritization process, Table 1. These standards and values reflect a cross section of cultural and social values. At this level of assessment they are not intended to make judgements or decisions for any particular community. Effectively this type of qualitative assessment is biased by the participants, therefore the larger the representation of a community the more truly representative is the process of that communities values and standards.

Table 1: Values and Standards

<table>
<thead>
<tr>
<th>Order</th>
<th>Values</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Human Life</td>
<td>0 loss of human life</td>
</tr>
<tr>
<td>2</td>
<td>Human Productivity</td>
<td>2 to 4 lost work days / year</td>
</tr>
<tr>
<td>3</td>
<td>Human Quality of Life</td>
<td>20 unwell days / year</td>
</tr>
<tr>
<td>4</td>
<td>Agriculture and Fishery</td>
<td>20% loss of income</td>
</tr>
<tr>
<td>5</td>
<td>Plant and Animal</td>
<td>5% loss of species</td>
</tr>
<tr>
<td>6</td>
<td>Habitat / Natural Resources</td>
<td>20% loss of habitat</td>
</tr>
</tbody>
</table>

Qualitative Risk Assessment

Environmental and social risk is a function of the impact size by the likelihood of that event occurring. Table 2 shows a simple three by three matrix to assess risk of a given environmental or social issue. In this table the assessor determines how severe the impact from a particular event (or issue) will be. For example a tailing dam failing in the center of a town is likely to have a severe (or high) impact whilst a tailing dam failing in the middle of a desert will have a low impact. The size of the impact can also be captured by this parameter, using the same example a small (swimming pool size) tailing dam failing in the center of town will have a low impact compared to a large tailing dam.

Secondly the assessor determines how likely it is for an event to occur. For example a poorly built or flooded tailing dam has a high likelihood of occurring (that is the dam failing) whilst a well constructed and maintained dam has a low likelihood of occurring.
Table 2: Risk Assessment

<table>
<thead>
<tr>
<th>High Impact</th>
<th>Medium</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Impact</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Low Impact</td>
<td>Very Low</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Low Likelihood</td>
<td>Moderate Likelihood</td>
<td>Low Likelihood</td>
<td></td>
</tr>
</tbody>
</table>

**Task Prioritization**

The final step in the prioritization process is to determine the urgency of an action or task to address an environmental or social issue. Whilst likelihood captures the probability of something to happen, it does not adequately account for the timing of the event. Table 3 provides a five by three matrix, which can be used for listing priorities in numerical order of execution. That is a priority 1 task is the first action taken, priority 2 is next and so on. For the EMF we arbitrarily allocate project that are required to commence within the next six months (before the CEMP) as very urgently six to twelve months as urgent and more than twelve months (after the CEMP) as not urgent.

Table 3: Task Prioritization Matrix

| Very High Risk | 3 | 2 | 1 |
| High Risk | 4 | 3 | 2 |
| Medium Risk | 5 | 4 | 3 |
| Low Risk | 6 | 5 | 4 |
| Very Low Risk | 7 | 6 | 5 |
| Not urgent | Urgent | Very Urgent |
| Time frame | > 12 months | 6 to 12 months | < 6 months |

This prioritization process helps the PMU and the steering committee identify projects and allocate resource in a timely manner. A priority 1 task will attract immediate funding and accelerate the process of site investigation, project planning and implementation. It may also serve as an elimination tool that is if insufficient funds or resources are available within a given time low priority tasks may be postponed until further funding or resources are identified.

**Methodology**

The team followed the following steps to produce a table of impacts, allocate priority, identify possible actions to remediate the impacts, estimate the cost of mitigation and assess the benefits.

1. Identify Issues – Environmental, Social
2. Identify Components (of Issues)
3. Identify Impact (Consequences)
4. Identify Likelihood
5. Evaluate Size of Impact vs Standard
6. Prioritize Impacts
7. List Options of Remediation
8. Estimate Cost of Remediation
9. Based on Resources Available and Standards Required Select List of Priority Activities
10. List Benefits of the Activities
11. Cost/Benefit Analysis
<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Likelihood</th>
<th>Size of Impact</th>
<th>Priority Category</th>
<th>Possible Actions</th>
<th>Costs ($US'000)</th>
<th>Benefits Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kabwe</td>
<td>Lead Contamination</td>
<td>Serious Health impacts, Reduced cognitive development in children.</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Education, Agricultural practices, dust suppression, soil dilution, contaminated soil removal, lead blood level testing, medical treatment, nutritional supplements.</td>
<td>S 1,870</td>
<td>Reduced medical costs, improved productivity, increased life expectancy.</td>
</tr>
<tr>
<td>Kabwe</td>
<td>Buildings</td>
<td>Safety</td>
<td>Low</td>
<td>High</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kabwe</td>
<td>Sanitation</td>
<td>Health</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Scoping study for water born problems</td>
<td>S 20</td>
<td>Reduced medical costs, improved productivity, increased life expectancy.</td>
</tr>
<tr>
<td>Kabwe</td>
<td>Cd, As and Hg (information gap)</td>
<td>Health</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Monitor for Cadmium</td>
<td>S 10</td>
<td>Increased life expectancy.</td>
</tr>
<tr>
<td>Kabwe</td>
<td>Slag Dump 57 Tailing Dam</td>
<td>Safety</td>
<td>Med</td>
<td>Med</td>
<td>3</td>
<td>Reprofiling, Underground water monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Konkola</td>
<td>Kakosa Tailing Dam</td>
<td>Erosion, Siltation to Kafue (via Kakosa Stream), Dust</td>
<td>Low</td>
<td>High</td>
<td>3</td>
<td>Strengthening of dam walls, revegetation.</td>
<td></td>
<td>Reduced risk of siltation to Kafue, reduced dust to communities</td>
</tr>
<tr>
<td>Konkola</td>
<td>High Grade Tailing</td>
<td>Siltation to Kakosa</td>
<td>Low</td>
<td>Low</td>
<td>5</td>
<td>Remove tailing or stabilize, revegetate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Konkola</td>
<td>Hippo pool</td>
<td>Loss of habitat to native wildlife (Hippos), Heavy siltation, impacted by upstream siltation.</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Reduced upstream siltation, remove build up of silt from area, monitor water quality of flora and fauna to determine suitability of habitat for wildlife (hippos).</td>
<td></td>
<td>Wildlife Cannot be addressed until source of siltation managed</td>
</tr>
<tr>
<td>Nchanga</td>
<td>Overburden Dump OD19, OD18</td>
<td>Siltation</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Reduce siltation e.g. Bund walls</td>
<td>W 1350 S 150</td>
<td>Water Quality</td>
</tr>
<tr>
<td>Nchanga</td>
<td>Chingola Open Pit C</td>
<td>Stability, Safety, Pipe Erosion.</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Restrict access, assess stability, forecast water quality</td>
<td>W 5</td>
<td>Improve Safety</td>
</tr>
<tr>
<td>Nchanga</td>
<td>Fitula Dam and Pit</td>
<td>Stability, Erosion</td>
<td>Low</td>
<td>Low</td>
<td>5</td>
<td>Revegetation, assess stability</td>
<td></td>
<td>Improve safety and reduce erosion.</td>
</tr>
<tr>
<td>Nchanga</td>
<td>OD 11</td>
<td>Siltation</td>
<td>Low</td>
<td>Low</td>
<td>5</td>
<td>Reduce siltation e.g. Bund walls</td>
<td></td>
<td>Water Quality</td>
</tr>
<tr>
<td>Nchanga</td>
<td>Mimbula Open Pit</td>
<td>Stability, Safety</td>
<td>Low</td>
<td>Med</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nchanga</td>
<td>Mimbula OD's</td>
<td>Silt to local area</td>
<td>Low</td>
<td>Low</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Tailing Dam 25 (Central Kitwe)</td>
<td>Erosion, exposed tailing</td>
<td>Med</td>
<td>Low</td>
<td>4</td>
<td>But maintenance required. Revegetation, control human activity on dam</td>
<td>S 50</td>
<td>Water Quality, Safety, Reduce Dust.</td>
</tr>
<tr>
<td>Nkana</td>
<td>TD25</td>
<td>Malaria if drains not</td>
<td>Low</td>
<td>High</td>
<td>3</td>
<td></td>
<td></td>
<td>Less disease</td>
</tr>
<tr>
<td>Location</td>
<td>Maintenance maintained</td>
<td>Status</td>
<td>Status</td>
<td>Priority</td>
<td>Action</td>
<td>Cost</td>
<td>Impact</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Stability of TD 26/27 (Domestic Dump)</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Maintenance</td>
<td>S 30</td>
<td>Human Life</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Leachate Water Quality of TD 26/27 (Domestic Dump)</td>
<td>Med</td>
<td>Med</td>
<td>3</td>
<td>Monitoring water quality</td>
<td>W 30</td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Windborn erosion of TD 26/27 (Domestic Dump)</td>
<td>High</td>
<td>Med</td>
<td>2</td>
<td>Scrap Recovery</td>
<td>S 10</td>
<td>Improve Safety</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Water quality of Scrap Yard</td>
<td>Med</td>
<td>Med</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Soil Contamination of Scrap Yard</td>
<td>Med</td>
<td>Med</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Water quality of Concentrate Storage Pond</td>
<td>High</td>
<td>Low</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Stability, Risk of Failure of TD 33C</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Stabilize dam walls, re-profiling of dam surface.</td>
<td></td>
<td>Reduce risk of failure</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Impact on Water Quality and surrounding Ecology of TD 33C</td>
<td>Med</td>
<td>High</td>
<td>1</td>
<td>Rev egetation of surface and dam walls.</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Windborn erosion of TD 33C</td>
<td>Med</td>
<td>High</td>
<td>1</td>
<td>Analyze impact of dust on health.</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Stability (Decants vandalized)</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Repair decant or spillway, included</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Erosion, siltation of TD 33C</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Rev egetation of surface and dam walls.</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Stability of TD 37, 40</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Armoring bund wall, included</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Erosion of TD 37, 40</td>
<td>Low</td>
<td>High</td>
<td>3</td>
<td>Rev egetation of surface and dam walls.</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Erosion of TD 38, 39</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Rev egetation of surface and dam walls.</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Stability of Tailing Pipeline Spillage</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Repair decant or spillway, included</td>
<td></td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Water Quality, Dust Damage to Surrounding Plant Life of Tailing Pipeline Spillage</td>
<td>Med</td>
<td>High</td>
<td>2</td>
<td>Remove and/or Rehabilitate, included</td>
<td>S 10</td>
<td>Water Quality, Reduced Ecological Impact</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Contaminated soil of PCB and Radiation Storage in Kalulushi</td>
<td>High</td>
<td>Med</td>
<td>2</td>
<td>Remove soil ship to Finland</td>
<td>W 175</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>Soil contamination of No 1 Cobalt Plant</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Liability to be determined.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>No 2 Acid Plant</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Remove structure and dispose of asbestos appropriately</td>
<td>W 300</td>
<td>Health</td>
<td></td>
</tr>
<tr>
<td>Nkana</td>
<td>PCBs</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Remove and dispose (In process using LRP funds)</td>
<td></td>
<td>Health, Reduced Ecological Impact</td>
<td></td>
</tr>
<tr>
<td>Mufubira</td>
<td>Kankoyo Township SO2 Emissions with serious health impacts and ecological damage.</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Medical health risk assessment</td>
<td>S 10</td>
<td>Health, Reduced Ecological Impact</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Area Type</td>
<td>Factors Affecting</td>
<td>Risk Level</td>
<td>Action Taken</td>
<td>Cost Estimate</td>
<td>Impact Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>--------------</td>
<td>---------------</td>
<td>----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mufulira</td>
<td>Air Quality</td>
<td>Dust</td>
<td>Med</td>
<td>High</td>
<td>2 Revegetation</td>
<td>S 100 W 2,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erosion</td>
<td>Low</td>
<td>Low</td>
<td>5</td>
<td>Included Water Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mufulira</td>
<td>Stability, Water Quality</td>
<td>Safety of Underground workings, Town Water Supply</td>
<td>High</td>
<td>High</td>
<td>1 Stabilization, Rehabilitation</td>
<td>Included Safety, Water Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mufulira</td>
<td>Exposed Tailing, Water Quality, Safety (above underground workings)</td>
<td></td>
<td></td>
<td></td>
<td>Rehabilitation, Containment</td>
<td>Included Safety, Water Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mufulira</td>
<td>Closed Shafts Safety</td>
<td></td>
<td>Low</td>
<td>High</td>
<td>3 Seal Shafts, Remove Unstable Structures</td>
<td>Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luanshya</td>
<td>Smelter Safety</td>
<td></td>
<td>Low</td>
<td>High</td>
<td>3 Decommission and clean up and rehabilitation. (not ZCCM issue, contribution of CEP to be determined)</td>
<td>Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luanshya</td>
<td>Soil and Water Contamination</td>
<td></td>
<td>Med</td>
<td>Med</td>
<td>3 As above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ndola</td>
<td>Soil and Water Contamination</td>
<td></td>
<td>High</td>
<td>High</td>
<td>1 Collect groundwater samples and check</td>
<td>S 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ndola</td>
<td>Safety</td>
<td></td>
<td>High</td>
<td>Low</td>
<td>3 Decommission and cleanup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luanshya</td>
<td>Sedimentation, Water Quality, Could cause dam erosion of dam walls.</td>
<td></td>
<td>High</td>
<td>High</td>
<td>1 Dredging of River</td>
<td>W1,500 Water quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luanshya</td>
<td>Dam stability (gullies being formed and drains blocked). Water management (spillway to be commissioned to draw water from</td>
<td></td>
<td>Low</td>
<td>High</td>
<td>3 Repair walls. Complete spillway. (note actively used by RAMCZ (in Receivership)</td>
<td>Safety, Livelihood, Water Quality.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 101 -
Risk of dam breach with water and flooding of underground mine.

Note: Luanshya and Ndola Copper Refinery are privately held assets and not ZCCM-IH or GRZ liabilities at this time. Possible inclusion in the CEP is to be determined.
Additional Annex 14: Urgent Environmental Actions Funded by ZCCM's Labor Reduction Program (LRP)

ZAMBIA: Copperbelt Environment Project

Given the urgent need to deal with some of the environmental mitigation measures and the speed and potential availability of funding from various sources (e.g., ZCCM's own funds, the IDA Project Preparation Facility [PPF] advance, other donors), following discussions with GRZ and ZCCM, it was concluded that the fastest course of action is to amend the Subsidiary Loan Agreement for financing ZCCM's Labor Reduction Program (LRP). Approximately $9.0 million of LRP funds have been allocated for these issues. Some of the priority measures that will be funded by the LRP savings include the following activities:

- Implementation of the Resettlement Action Plan (RAP) at Konkola
- Demolition and removal of defunct facilities at Nchanga, Konkola and Nampundwe, and the removal of scrap material
- Removal and disposal of PCBs
- Stabilization of Nkana tailings dam 33C
- Rehabilitation of Kansanshi mine

Implementation of Resettlement Action Plan. KCM proposes to utilize the existing Lubengele Tailings Dam at Konkola Mine for tailings disposal. The height of this tailings dam will have to be increased by 10 m over a period of 10-20 years, in order to accommodate the tailings from future operations. This will lead to the inundation of surrounding lands including approximately 10% of Kawama Township on the eastern shore of the tailings dam, the whole of Ming'omba Village on the north western shore and part of the adjacent Momba Farms area. A draft resettlement Action Plan (RAP) has been compiled for KCM to govern the further planning and implementation of the resettlement of affected households. Resettlement will affect 750 individuals, mostly subsistence farmers possessing low standards of education and few formal business skills.

The LRP funding addressed outstanding issues, including: i) completion of the official valuation survey, ii) establishment of a Resettlement Working Group and appointment of implementation agents, iii) planning of the new settlements, iv) preparation of detailed cost schedules, v) halting settlement in affected areas, vi) establishment of a community liaison structure, vii) establishment of dispute/grievance procedures, viii) finalization of the site selection process for Ming'omba, ix) construction of new settlements, x) physical relocation of affected households, xi) destruction of old settlements once this has been achieved.

Furthermore, the RAP will include a Social Development Plan focusing on i) assistance with the establishment of a new cemetery at Kawama, ii) business skills development, iii) upgrading of water supply, roads and clinic in Kawama, iv) provision of water supply to Kawama School, v) provision of boreholes and header tanks at the new Kawama and Ming'omba sites, vi) construction of new buildings using local input, vii) extension of Kasumbalesa Primary School, viii) provision of seed and fertilizer to Ming'omba households, ix) provision of implements and secondment of agricultural officers to the new Kawama and Ming'omba sites.

As of February 2002 the RAP was close to completion.

Removal of abandoned facilities at Nchanga, Konkola and Nampundwe Mines. The Nchanga, Konkola and Nampundwe mines were sold to KCM by ZCCM in 2000. As part of its commitments to the purchaser, ZCCM agreed to remove scrap and redundant materials. These facilities include, among others, the Old Power Station boilerhouse, high grade leach plant, cyanide plant and lime plant. Costs of removal and clean up are significant. Removal of major facilities has commenced.
Removal and disposal of Polychlorinated biphenyls (PCB's). Mining activities use electrical equipment which frequently contain PCB oil in power capacitors. An inventory undertaken by ZCCM in 1995 identified over 100 tons of PCB waste from past mining operations that require immediate disposal. Exposure to PCBs is known to have adverse health impacts and represent a carcinogenic risk to humans. Approximately 30 tons of PCB equipment and PCB oil are stored in various sites. Of this about 13.5 tons are currently stored in a shed in Nkana, where there is significant leakage to the floor and side walls. In addition the PCBs have contaminated approximately 70 tons of soil, bricks, and other material that must be disposed of in the same manner as the other PCBs. PCB wastes require disposal in high temperature incinerators.

The project would: i) remove and clean up stored PCB equipment and PCB oil at Konkola, Nchanga, Nkana, Mufulira and Kabwe ii) pack PCB waste in safe containers, iii) clean up and decontaminate all sites, iv) transport PCBs to a disposal site, v) dispose of PCB waste.

Stabilization of Tailings Dam 33c. Remedial work has been carried out on Tailings Dam 33c (one of the Nkana south complex of dumps) to ensure that the stability of the dam is not compromised by rainwater. The dam has failed in the past and breach of the dam would release polluted waters directly into the Chibuluma river and from there into the Kafue river and negatively affect the banks of the Chibuluma, which are used by local populations.

The LRP funds initially funded the cost of stabilizing the dam, including: i) excavating run-off containment basins around the decants, ii) re-profiling of dam surface contours to redirect the run-off to the decants, iii) re-profiling of the steep dam slopes to conform to a gradient of 1:3, iv) erecting a bundwall along the dam peripheral boundary, v) capping of dam toe with waste rock to stop erosion into the environment, vi) re-vegetating the dam plateau and slopes with grass and trees, vii) installing 10 peripheral surface decants.

LRP funds also financed a long-term plan to improve dam stability in preparation for its closure. This required: i) dozing off the tailings mounds, ii) building bundwalls on the western side of the dam, iii) applying manure to the slopes, iv) planting grass and trees, v) in-filling breaches with tailings and covering slopes with waste rock, vi) assessing the downstream impacts of dam failure and drawing up remediation plans in the case of a breach.

Rehabilitation of Kansanshi Mine. Kansanshi Mine was sold to Cyprus Amax in 1997 and ZCCM entered into a Small Scale Mining Agreement to continue its activities. ZCCM is required to reclaim and remediate lands disturbed by its activities under this agreement. The property was sold to First Quantum in 2001. LRP funds provide funding to fulfill ZCCM's obligations to the investor aimed to ensure: i) the protection of public health and safety, ii) reduction or prevention of environmental degradation, and iii) productive use of the mining license similar to its original use or an acceptable alternative.

Mining by ZCCM stopped in January 1998 and rehabilitation and decommissioning activities, estimated at USS 750,000, started in June 1998. Significant progress has been made including the demolition of structures, removal of concrete slabs and ground leveling. However due to cash flow constraints, the remote location of the mine and poor access road conditions have caused delays and costs have exceeded expectations.

Actual expenditure to March 2000 is $785,000 and a further $740,000 was estimated to be required to complete the work. Activities include construction of a perimeter silt trap around waste dumps, capping of dam surface with topsoil, waste removal and protection of archeological sites.
The extensive mining and metallurgical operations of the copper mines have produced huge amounts of waste rocks from underground and open pit mines, tailings and slagheaps from concentrators and smelters. Waste rock dumps and tailings dams occupy an estimated area of over 10,000 hectares on the copperbelt. These have created sources of contamination which affect the surface water (and in some cases, groundwater), air and soil. Tailings, waste rock, underground and open pit mine workings, waste water ponds, landfills and smelters are the principal sources of pollution on the copperbelt. Acid and heavy metal leachate from the tailings dams contaminate local soils and can infiltrate into the ground water. The mining operations cause land stability problems due to subsidence and open pits.

Air pollution is as a result of air emissions of sulphur dioxide from the smelters at Nkana mine in Kitwe, Mufulira mine and Luanshya mine, and others sources are dust blown from the fine tailings, transport, handling and processing of ore. The smelting operations having been emitting between 300,000 to 700,000 tonnes per annum of sulphur dioxide. The variation has been dependent on the production levels. The effect of this sulphur dioxide on human biology is not yet known but it is believed that it could have the effect acidification or increase in sulphate in the Kafue River.

Mining uses forestry products in particular timbers for underground support. The privatisation of the mining industry has left people without formal employment. These have had to settle in forestry areas. Large forested areas are being cleared for these new settlements. The use of wood fuel in these areas and most urban centres are contributing to deforestation and hence watershed degradation.

The forestry plantations on the copperbelt are protected for solely supplying timber to the mining community. However the depletion of forestry resources have been observed on the source of the Kafue River which is a major water resource for the urban centres of Zambia. Retrenchments and loss of employment has led to people shifting to illegal settlements which has put pressure on forestry resources. Sustainable management of these vital forestry reserves is urgently needed to prevent water losses into the Kafue River.

The tailings dams are by far the biggest source of soil contamination. Pre 1970, ring dyke tailings dams or side valley dams were the most common type of waste disposal facility used. These impoundments were constructed by spigotting total tailings from a slurry delivery pipeline running around the impoundment. The advantage of these methods was that the construction could be done close to the mine site on a level ground at a reasonable cost. There was very little consideration given to the environmental impact of the impoundment as they were usually located near rivers. In the case of failure, then the tailings would just flow in the river channel and no regard was given to the impact that would arise. The legacy of those early years can be seen around the copperbelt towns where these ring dyke dams have been surrounded by urban development. The dam slopes are highly eroded and vegetation on the dam walls is scarce. The top of the dams is however well vegetated with indigenous grass and acacia.

There has now been a shift from ring dyke impoundments to valley dams. The situation now is that each mine has one major valley dam and in each case the tailings dam can be developed to provide additional storage to the end of the life of the mine. The total monthly tailings disposal at all the copper mines is
approximately 2.2 million dry tonnes. The table II.1 below gives a distribution of tailings dams at the Copper mines.

The Kafue River before it enters the mining area is in its natural state. In this region the water quality is characterised by low suspended solids, turbidity and alkalinity. The water hardness varies from soft to moderately hard. The river is also low in nutrients like nitrates and phosphates. This trend is however reversed by the time the river passes the Machiya ferry and Itezhi-tezhi. The river is seen to have gone through some natural purification after leaving the mining area. The TDS composition of the river reflects the nature of the activities used in controlling releases from the process and as such comprises sulphate, calcium, magnesium and other hardness constituents formed by the addition of lime to control pH of such releases to precipitate the heavy metals. The addition of lime has lead to increase of sulphates in the river systems that have proved difficult to handle.

<table>
<thead>
<tr>
<th>Mine</th>
<th>Tailings Dam</th>
<th>Monthly Deposition Dry tonnes $x10^3$</th>
<th>Deposition as at 01/04/93 Dry Tonnes $x10^4$</th>
<th>Final Storage Capacity Dry Tonnes $x10^4$</th>
<th>Final Dam Wall height (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nchanga</td>
<td>Muntimpia</td>
<td>1.300</td>
<td>167</td>
<td>781</td>
<td>84</td>
</tr>
<tr>
<td>Konkola</td>
<td>Lubengele</td>
<td>0.180</td>
<td>53</td>
<td>500</td>
<td>54</td>
</tr>
<tr>
<td>Mufulira</td>
<td>TD11</td>
<td>0.260</td>
<td>26</td>
<td>100</td>
<td>34</td>
</tr>
<tr>
<td>Luanshya</td>
<td>Musi</td>
<td>0.230</td>
<td>95</td>
<td>150</td>
<td>47</td>
</tr>
<tr>
<td>Nkana</td>
<td>Mindola 15A</td>
<td>0.245</td>
<td>76</td>
<td>181</td>
<td>32</td>
</tr>
<tr>
<td>Chambishi</td>
<td>Musakashi</td>
<td>0.017</td>
<td>0.406</td>
<td>15</td>
<td>28</td>
</tr>
</tbody>
</table>

Table II.1: Tailings disposal at the copper mines

Sources: ZCCM Limited

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Above ZCCM 1990</th>
<th>Below ZCCM 1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Mean</td>
<td>Maxima</td>
</tr>
<tr>
<td>TSS (Total Soluble Solids)</td>
<td>2.4</td>
<td>2.74</td>
</tr>
<tr>
<td>Sulphate</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Copper</td>
<td>0.02</td>
<td>0.031</td>
</tr>
</tbody>
</table>

Table II.2: Kafue river water quality upstream and down stream of ZCCM
The Kafue River that drains the entire copperbelt mining districts feels the impact of these tailings dams. The effect of the mining activities within the catchment of the river is noticeable in the build up of total dissolved solids from Chililabombwe (Konkola) to Kitwe. The total dissolved solids (TDS) between January and April are low and increase at the end of the dry season as the flow rates of the rivers diminish. The water quality within the ZCCM areas has very limited options for production of drinking water, livestock, irrigation and fishery development. The Kafue River water quality upstream and downstream of ZCCM has been shown in main document.

II.2 Konkola Mine, Chililabombwe Municipality

Konkola Mine is an underground mine opened in 1957 situated in the town of Chililabombwe and has the highest discharge of water from its workings. The ore is treated at the plant concentrator. The main source of pollution from the mine is water pollution arising from heavy metals and solids from the tailings dam. Air pollution is not a major problem at the mine. The ongoing costs of monitoring these and lesser impacts, with a view to ensuring compliance with relevant legislation is estimated at US$130,000 per year.

II.2.1 Water

Konkola Mines is located at the upstream of the Kafue river which is main river draining the whole of the copperbelt. Before the Kafue enters this mining district is in its natural state. In this region, the water quality characterised by low suspended solids, turbidity and alkalinity. The water hardness varies from soft to moderately hard. The river is also low in nitrates and phosphates.

The total dissolved solids after Konkola averages between 200 - 300 ppm. These TDS come from tailings dams and from underground water. The mine at this stage contributes about 300,000 m³/day of water pumped from underground workings into the Kafue River. This is about 4/5 the total pumped from the other divisions. Here it is expected to mine below the aquifer in future, with a subsequent drop in the volume of water to about 280,000 m³/day. This will lead to higher pollution levels and seasonal water shortages downstream of the Kafue River.

Aquatic surveys during the dry season indicate that mining activities have an adverse effect in the surrounding rivers. The inadequate monitoring of the potable water quality and sewage effluents that are high in coliform count compounds this.

II.2.2 Air

Air pollution is not a major problem at this mine due to the absence of a smelter. The main source of air pollution are emissions from the concentrator dryer and dust off the tailings dumps. There are no studies that document the quantity and distribution of dust and other emissions at Konkola.

II.2.3 Soil

Soil contamination is mainly from heavy metals, ground subsidence and soils around the metallurgical plants that are contaminated with process chemicals.

II.3 Nchanga Mines, Chingola Municipality

The Nchanga Mines is the largest producer of copper and cobalt from the Nchanga Open Pit and Underground mine opened in 1957 and 1946 respectively situated in the town of Chingola. The metallurgical process comprise of a concentrator facility plus leaching of tailings from this facility to extract copper from the oxide species remaining in the tailings. Final production of copper is achieved through solvent extraction facilities and plating in the electro winning plant. The ongoing costs of monitoring these and lesser impacts, with a view to ensuring compliance with relevant legislation is
estimated at US$380 000 per year.

II.2.1 Water

The operation at Nchanga experiences the most serious case of effluent pollution of suspended solids and heavy metals from the Pollution Control Dam into the Chingola and Mushishima stream; and discharge of solids in the Muntimpa Dam. Losses from the mine are virtually in the form of spillage from the tailings leach plant (TLP). This runs into the Chingola stream and to the Kafue River. Almost 500 tpm of copper is present in these losses. Serious excursions have occurred every 18 months or so, with losses of organic materials about every three years, although the latter area satisfactorily neutralised and precipitate with lime. Of the spillage problems, about 10% comes from design faults and about 90% from maintenance failure.

Spillage from the concentrator is relatively small compared to the TLP and losses discharge to the Nchanga stream. Concentrator tailings are sent to the main tailings dam on the Muntimpa stream. The allowable effluent level from the dam is 0.5 ppm. At these times the discharge is stopped until the outlet level is acceptable.

At Nchanga Mines the process is treating about 750,000 tonnes of material per month consuming 600 tonnes of sulphuric acid per day. The normal environmental monitoring regimes that have been set up include 2 hourly monitoring of strategic streams within the close proximity of the plant and constant pH monitoring; strategic points more remote from the site are monitored on daily basis. The normal release of routine process material is through the Muntimpa dam. This dam was commissioned in 1978 and by 1993 had approximately 167 million dry tonnes with a maximum capacity of 781 million tonnes at height of 87 metres.

Routine monitoring of its overflow principally for pH, sulphate, copper, and cobalt is the key factor in attempting to control the quality of the recipient Muntimpa stream and Mwambashi river from which Kalulushi and Garneton draw their water. The discharge from Muntimpa dam can be controlled by stop log system and attempts are made at the end of the dry season to hold back the flow as much as possible when the flow in Mwambashi River is very low.

There are occasions when the pump or line failures do not permit the use of the Muntimpa dam and material is pumped to an emergency dam or allowed to flow down the Chingola stream to a Pollution Control dam (PCD) where solids should be retained.

The PCD was constructed to last 3 to 4 years before reclamation was necessary and to retain up to 500 tpd of solids for that period from the tailings leach plant (TLP). It was also designed to catch erosion from closed dams and associated discharge during reclamation. Once the dam was full, it was to be reclaimed.

The dam was equipped with decant tower and spillway, the former to allow material to be impounded up to 1277.5 m level and spillway was set at 1278 m. The crest of the dam was designed to be 1280 m. The spillway discharged into a shallow valley which then joins the Mushishima stream. It was hoped that the spillway would only be used infrequently in times of flood. Deposition within the dam was to be controlled by raising the decant tower. It was envisaged that solids would be deposited from the point of entry and eventually the size of the lake would reduce around the decant tower until in times of high flow the discharge would not be of sufficient clarity. This should be the first indicator that reclamation should be considered during the next dry season by lowering the decant until solids were drawn into the pipe. The tailings would then be pumped back to the plant for reprocessing.
This facility constructed in 1985 proved inadequate to cope with unexpected run off of solids from overburden dumps. The PCD was inoperational after a few months as the whole system was choked with solids, mostly from the overburden dumps. Attempts at reclamation failed.

Eventually as part of a wider scheme to control the suspended solids reporting to the Kafue river, it was proposed to install sufficient pumping capacity in the Chingola stream to divert the entire flow into an exhausted open pit (Nchanga Open Pit E). The pit would take between 6 to 12 months to fill with slurry and in excess of 20 years to fill with solid. the overflow from the pit would flow into the Mushishima stream. With almost all the flow of water into the PCD eliminated, the process of reclamation would be made easier. Overburden run off has been successfully eliminated by digging a drainage channel around the base of the dump and is being dug out on annual basis.

Sulphate removal has remained a major problem. Sulphate concentrations in the overflow of the spill way has been recorded to range from 1471 mg/l to 2041 mg/l in 1992. The pH is kept very alkaline to ensure complete precipitation of heavy metals in wastewaters.

II.2.2 Water Pollution Control

The average monthly figures of the overflow into the Chingola stream is as follows:

<table>
<thead>
<tr>
<th>FLOWRATE m(^3) PER HOUR</th>
<th>SUSPENDED SOLIDS -TPM (Total Particular Matter)</th>
<th>COPPER IN SOLIDS &amp; SOLUTION TPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2606</td>
<td>32807</td>
<td>515</td>
</tr>
</tbody>
</table>

In August 1994, Nchanga commissioned a pump station on the Chingola stream to deliver the plant spillage back into the plant for reprocessing or into a 12.3 million m3 worked out open pit. This had a marked beneficial effect on the quality of the Mushishima stream. Unfortunately, problems developed with this pumping arrangement and its use has been suspended. The cost of this installation was estimated to about US$2.3 million. This amount of money was expected to be offset against the assumption that most of the 500 tonnes per month of copper lost over the past years would be recovered.

Temporary unsuccessful measures had been put in place in 1986 and 1987 with interim methods of reclamation by: mechanical means using front end loaders and labour; a small raft containing submersible "flygt" pumps feeding a centrifugal pump; and a large raft containing a large submersible pump feeding a centrifugal pump. By 1991 spillage and run off from this site had pushed a beach under the Chililabombwe road bridge necessitating the continued use of mechanical equipment to prevent flooding of the Chililabombwe main road.
The main sources of pollution were identified as the TLP main drain, High Grade Leach Plant- tank houses main drain and Muntimpa lime plant drain. In addition to these, other sources in outlying areas were the reclamation sites, overburden dumps, tailings lines and dams. The flow rates are given here below:

<table>
<thead>
<tr>
<th></th>
<th>FLOWRATE m³ PER HOUR</th>
<th>SUSPENDED SOLIDS - TPM</th>
<th>COPPER IN SOLIDS &amp; SOLUTION TPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total of In Plan Drains</td>
<td>1727</td>
<td>24 455</td>
<td>528</td>
</tr>
<tr>
<td>Chingola Stream downstream</td>
<td>2606</td>
<td>32 807</td>
<td>515</td>
</tr>
<tr>
<td>Implied sources from outlying areas</td>
<td>879</td>
<td>8352</td>
<td>*</td>
</tr>
</tbody>
</table>

It must be borne in mind that these are average monthly figures and do not indicate the worst conditions. The strategy to control this pollution is to control the in-plant spillage and the outlying spillage. No attempts was made to cater for the storms.

**TLP Main Drain**

The control strategy for the TLP main drain was to control pre-leach thickener overflow, reclaim water reservoir overflow, leaking water lines, overflow of pre-leach agitators, spillage from leach pachucas, spillage from acid duty thickeners, spillage from S.X. areas (has high concentrations of copper, acid and oils) and spillage from the central spillage control ponds.

**Muntimpa Lime Plant Drain**

The control of the Muntimpa Lime plant Drain is to control run-off during storms from the dam, lime plant spillage, effluent thickener overflow and Muntimpa pachucas and pump station.

**Outlying Spillage**

The control of outlying spillage from the Muntimpa tailings lines, tailings dams reclamation and storm run off (controlled by erecting a bund wall of waste rock).

This gives an indication of the effort in trying to control and reclaim the pollution of the Kafue River from the Nchanga mines operations. However, to contain spillage from the Muntimpa tailings line failures and to act as a back up for in plant spillage, a pumping system on the Chingola stream itself, downstream of the plant area and upstream of the PCD is proposed. This was to control the flow to the PCD and enable reclamation to be maximised. In close proximity are three worked out pits; Chingola B - volume of 7.9 million m³; Chingola C - volume of 26.4 million m³ and Chingola E - volume of 12.3 million m³ with a combined storage of 63 million cubic meters of solids to outlast the foreseeable operations of Nchanga. The estimated cost of pumping from the Chingola stream is **US$ 0.69 million**. This was for the acquisition of 300/350 mm slurry pumps, fluid drives, 200 mm slurry pumps, 2 x 500/250 mm pipeline flanges and fasteners.

**II.2.5 Air**

Windage and associated air pollution is not major problem at Nchanga tailings impoundments. Hence air monitoring has not been carried out at Nchanga. Windage is controlled at Muntimpa dam by frequently
moving the cyclones along the dam wall and keeping the deposited tailings wet, depositional densities maximised and air pollution reduced. Nitrates from blasting operations at the Nchanga Open Pit (NOP) which can use about 150 tonnes of explosives per blast are major source of air pollution whose effect has not been quantified. The blast in addition cause massive noise and dust pollution.

II.2.6 Soil

The tailings at Nchanga are pumped a distance of 8.5 Km from the tailings leach plant (TLP) to the Muntimpa Tailings Dam. Muntimpa Dam was commissioned in 1978 and by April 1993 had approximately 167 million dry tonnes, the dam wall having risen to about 47 metres high. The final height of the dam wall is planned for 87 metres that will create a final storage capacity of 781 million dry tonnes. At this storage, the surface area of the dam will be approximately 14.5 km2. Gulley erosion is one the biggest problem in the dam wall contaminating the surrounding soils.

The largest waste rock dump is from the Nchanga Open Pit and this dump has been polluting the surrounding environment with silt and heavy metals. Soil contamination comes in mainly from the eroded materials from tailings dam walls and the massive waste rock dump around the NOP. The silt from the waste rock has covered a huge area behind the open pit and this is washed into the Kafue River. The mine has now placed bund wall around the waste dump to reduce the transportation of eroded material.

Little rehabilitation work has been carried out on the rehabilitation of the old ring dyke dumps. At Nchanga these are being recovered and dumps like the TD1, 2, and 4 have been reclaimed. Most these ring dyke dumps upper surfaces have revegetated naturally but viewed from the side, the walls are bare and deeply gullied. Two possibilities are being considered by ZCCM to control the side wall erosion by; establishing a pollution control bund wall using waste rock a certain distance from the toe of the dam wall. The slope will then be mechanically profiled, compacted and topsoil applied. This operation taking place during the wet season avoid wind erosion. This method is considered expensive. The second alternative is to construct the bund wall and encourage the slope to erode. This method will take a good number of years to achieve results but is more attractive to the ZCCM due to its low cost.

II.3.0 Mufulira Mines, Mufulira Municipality

Mufulira Mines has one large underground mine which started in 1933. Metallurgical operations include a concentrator, a smelter and a refinery. The principal environmental impacts at Mufulira are SO2 emissions from the smelter and occasional exceedences of suspended or dissolved solids. The ongoing costs of monitoring these and lesser impacts, with a view to ensuring compliance with relevant legislation is estimated at US$520 000 per year including licence fees and penalties.

II.3.1 Water

The smelting of concentrates, followed by electro-refining poses little problems with respect to containment of pollutants, but in the roasted/leaching electro-winning plants, the continuous input of sulphuric acid for leaching or formation of sulphates by roasting requires constant disposal of this soluble species.

The liquors used in the processes contain hydrogen, copper and cobalt anions associated with the sulphate anion. The copper and cobalt are recovered in the electro winning process by plating on to the blanks or starting sheets. The discharges of the waste or spillage from plants in question are controlled by the addition of lime to achieve complete precipitation.

The problem of water quality at Mufulira is not as glaring as that of Nchanga. The waste water quality discharged into the Kafue River is monitored on the Kitwe road. The streams that serve as monitoring points of the water quality effluent are:
II.3.2  Air

The smelter at Mufulira is a toll smelter and treats concentrates from various mines other than ZCCM mines. This smelter has no sulphur capturing facility and all the emissions are discharged into the atmosphere. Damage to vegetation has occurred downwind west of the smelter in Kankoyo Township with an effect on residents of this place. The quantities emitted from this smelter are not known but is estimated at about 140,000 tpa. The amount of sulphur emissions indicates that during the rainy season, there is a possibility of acid rain. There is currently no mitigation measures applied at the smelter. However pressure arising from the introduction of Statutory Instrument no. 119 of 1994 issued by the Minister of Mines and Minerals Development which specifies that only 30% of the total sulphur fed to a copper smelter could be emitted through the stack, the balance has to be captured. Any emissions above this limit attracts a levy, which increases five fold for fugitive emissions. The Environmental Council of Zambia has also introduced ambient air quality limits given in Table II.4 below.

Mufulira has tried to modify the stack to improve dispersion but to little success. Sulphur capture technologies will have to be put in place to control these emissions.

II.3.3  Soil

Soil contamination in this area is due to the SO2 fallouts and particulate emissions from the smelter. The tailings dams at Mufulira have been lined with waste rock on the dam walls to prevent soil erosion and encourage natural revegetation to take place. Garden refuse is being used to vegetate the upper surfaces of the dumps. On tailings dump, refuse dumping has been going on for some years and windage has been eliminated in areas where dumping has taken place. Caving areas are fenced off and warning signs placed around the area.

II.3  Nkana Mines, City of Kitwe

Nkana Mines began operations in 1931. Copper and cobalt are produced at the mines. The mines consist of a number of mining operations: Mindola, Central Shaft, South Orebody and Chibuluma mines. Chambishi mine is on care and maintenance. The metallurgical plants consist of concentrators, cobalt plants, a smelter and a refinery, plus sulphuric acid producing facilities. Nkana Mines run the Chambishi Cobalt plant. The principal environmental impacts are the SO2 emissions from the smelter and occasional exceedences of alkaline pH or dissolved metals from the plant area. The ongoing costs of monitoring these and lesser impacts, with a view to ensuring compliance with relevant legislation is estimated at US$330 000 per year.

II.4.1  Water

The smelting of concentrates, followed by electro-refining poses little problems with respect to containment of pollutants, but in the roasting/leaching electro-winning plants, the continuous input of sulphuric acid for leaching or formation of sulphates by roasting requires constant disposal of this soluble species.

The liquors used in the processes contain hydrogen, copper and cobalt anions associated with the sulphate anion. The copper and cobalt are recovered in the electro winning process by plating on to the blanks or starting sheets. The discharges of the waste or spillage from plants in question are controlled by the addition of lime to achieve complete precipitation.

At Chambishi the waste is discharged through a dam on the Musakashi stream, which flows into the Kafue River and at Nkana the waste water, is discharged through the Uchi stream to the Kafue. The main problem affecting water quality are the high sulphate levels from the roaster plants. Studies on the removal/reduction of sulphates are currently centred on Chambishi where the flow rates of the stream are
considerably less. The process under active consideration is based on the reduction of sulphate with anaerobic bacteria. The bacteria are contained in various manure.

II.4.2 Air

The predominant wind direction of the Copperbelt is from West to East. The major pollutants of ZCCM are the particulate emissions and sulphur dioxide arising from roasting and smelting operations. The most conspicuous pollutant from ZCCM is sulphur dioxide from smelting and roasting operations. This pollution source is mainly from Nkana and Mufulira Mines. There is a localised effect of sulphur dioxide found on the copperbelt in Kitwe and Mufulira where vegetation to the west of the smelter is non existence. Monitoring results outside plant boundaries show that the concentrations of SO2 occasionally exceed the recommended levels (600 \(\mu g/m^3\) hourly or 200 \(\mu g/m^3\) daily) given by the World Health Organisation (WHO).

As thermal inversion layers never persist for more than a few hours, the meteorological conditions of the Copperbelt are favourable to disperse and dilute the stack emissions in the ambient air. It is however not yet established of the actual quantities, dispersion patterns and fate of these emissions. It has however been estimated that ZCCM produces well over 280,000 tonnes per year of sulphur dioxide to the atmosphere. About 132,000 tpa of SO2 is recovered and converted into sulphuric acid. But ZCCM has been mining pyrite at Nampundwe for roasting to produce sulphuric acid.

Monitoring of the SO2 is carried out at two places in the plant area and in town to give 24 hour averages. Excursions of much less than this period are therefore undetected.

The problems of other gaseous emissions arise from the Cobalt plants tank houses at Nkana and Chambishi, which emit acid mists containing cobalt. Regular sampling by ZCCM has indicated limits of 1 mg/cu.m of acid mist and 0.5 mg/cu.m cobalt. Local excursions above this limit occur though rarely recorded due to the intermittent sampling periods.

In December 1994, a meteorological station monitoring wind speed, wind direction, temperature, air pressure and solar radiation was commissioned. Four sulphur dioxide monitoring stations, using hydrogen peroxide bubblers, scattered around the smelter were commissioned in July 1995. The main objective of this equipment is to collect data that will be used to the dispersion of sulphur dioxide, and to determine the areas affected by this gas emission. A major rehabilitation of the Nkana Smelter has been in progress and it is expected to improve the sulphur capture from the furnace gases, and converting it into sulphuric acid in the four acid plants.

ZCCM has in the past enjoyed protection under the Smoke Damage Prohibition Act of 1964 that provided immunity against prosecution for air pollution. This Act has now been repealed. The Minister of Mines has issued a statutory instrument 119 of 1994 and Minerals Development, which specifies that only 30% of the total sulphur fed to a copper smelter, could be emitted through the stack, the balance has to be captured. Any emissions above this limit attracts a levy, which increases five fold for fugitive emissions. The Environmental Council of Zambia has also introduced ambient air quality limits given in Table II.4. These statutory requirements are meant to conserve the sulphur resources by putting pressure on the ZCCM smelters to improve their sulphur capture technology. There is need to assess the impact of air emissions on the health of residents in Wusakile township, vegetation and surficial soils.
Table II.4 Guidelines for Ambient Air Pollutants

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>REFERENCE TIME</th>
<th>AVERAGE GUIDELINE LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphur dioxide (SO(_2))</td>
<td>10 minutes</td>
<td>500g/m(^3)</td>
</tr>
<tr>
<td></td>
<td>1 hour</td>
<td>350g/m(^3)</td>
</tr>
<tr>
<td>Sulphur dioxide (SO(_2)) in combination of soot, Total Suspended Particles Thoracic Particles TSP(_1) and TSP(_2)</td>
<td>SO</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td>50g/m(^3)</td>
</tr>
<tr>
<td>Soot</td>
<td>24 hours</td>
<td>120g/m(^3)</td>
</tr>
<tr>
<td>TSP(_1)</td>
<td>6 months</td>
<td>50g/m(^3)</td>
</tr>
<tr>
<td>TSP(_2)</td>
<td>24 hours</td>
<td>120g/m(^3)</td>
</tr>
<tr>
<td>PM</td>
<td>24 hours</td>
<td>70g/m(^3)</td>
</tr>
<tr>
<td>Respiratory particulate matter PM(<em>{10}) and PM(</em>{2.5})</td>
<td>PM(_{10})</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td>30g/m(^3)</td>
</tr>
<tr>
<td>Oxides of nitrogen (NO(_x)) as nitrogen dioxide (CO(_2))</td>
<td>1 hour</td>
<td>400g/m(^3)</td>
</tr>
<tr>
<td></td>
<td>24 hours</td>
<td>150g/m(^3)</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>15 minutes</td>
<td>100g/m(^3)</td>
</tr>
<tr>
<td></td>
<td>30 minutes</td>
<td>60g/m(^3)</td>
</tr>
<tr>
<td></td>
<td>1 hour</td>
<td>30g/m(^3)</td>
</tr>
<tr>
<td></td>
<td>8 hours</td>
<td>10mg/m(^3)</td>
</tr>
</tbody>
</table>

Source: WHO
The cobalt plant uses plastic balls in the tank house cells to minimise the acid mist generation and Dowfax is used to reduce the acid mist in the copper cells.
II.4.3 Air Pollution Control

A major rehabilitation work has been undergoing to improve the sulphur capture from the furnace gases, and conversion to into sulphuric acid. The problem of sulphur capture at Nkana is attributed to the low grade of the smelter gases. It is technically feasible to fix over 95% of sulphur in a non-ferrous smelter, and gases with as low as 2% SO2 can in theory be used as acid plant feedstock. In practice this is uneconomic as the acid plant equipment has to be sized for the full gas stream. Reverberatory gases typically run at between 0.5 and 1.5% SO2 while the associated converters running on air produce intermittent streams that can reach peaks of 8%. However for much of the time the latter evolve relatively little gas, and this again complicates acid plant design. The use of oxygen in the smelting processes enhances the value of the off-gases by full or partial elimination of nitrogen dilution, making sulphuric acid production economically attractive.

The Nkana smelter has converted one of the furnaces to an oxyfuel fired from a conventional reverberatory furnace. The amount gas emissions are expected to be reduced with the addition of a Teniente Converter along with modifications to the gas hoods. The converter was commissioned in 1994. This has increased the production of sulphur dioxide 35 to 40% in the off-gases. This has in turn improved the production of sulphuric acid to about 700 tonnes per day. The program is to convert all the converters to Teniente converters. However 15% of the converter-gases will continue to be emitted. This is expected to eliminate the anomaly in the system, which is that despite the vast emissions of SO2, sulphuric acid is produced at the site by roasting pyrites railed from Nampundwe mine, near Lusaka.

The problems at the acid plant are ageing equipment, which needs a lot of maintenance and rehabilitation due to corrosion. The acid produced here is used at the Nchanga TLP and due to operational problems, this demand is not met and the gases are emitted into the air.

II.4.4 Soil

Soil contamination is from the SO2 and particulate emission fall outs which are loaded heavy metals and high sulphate levels which could cause acidification of soils. The sulphate levels in the Kafue river have increased over the years and it appears that there is slight increase in pH from 5.6 to 8.1. A detailed assessment of the extent of soil contamination in the plant area will be required, at some stage, to assist in the development of the rehabilitation and decommissioning plan.

II.5 Luanshya and Baluba Mines, Luanshya Municipality

The Roan Antelope Mining Corporation operates the Luanshya and Baluba mines under the Binani Group of Companies from India. The Binani group acquired the Luanshya and Baluba mines under the privatisation of ZCCM mines in 1997. Luanshya started production in 1931, whilst Baluba came into production in 1973. The ore at Baluba is cobaltiferous. The operation metallurgical plant consists of a concentrator, a smelter (now closed) and are planning to open a new open pit. The ongoing costs of monitoring these and lesser impacts, with a view to ensuring compliance with relevant legislation is estimated at US$280 000 per year.

II.5.1 Water

Water quality is not a major problem at Luanshya and Baluba Mines except from the exceedences of suspended solids or total copper in the effluents from the plant area and tailings dams into the Luanshya.
II.5.2 Air

The closure of the smelter has resulted in the problem of air pollution being reduced. However, the new owners are planning to reopen the smelter and the problem of SO2 will arise. It is expected that the new owners will employ the best available smelter techniques to capture the sulphur emissions as they have planned to open an open pit of refractory ore, which shall be recovered by heap leaching using sulphuric acid.

II.5.3 Soil

Soil contamination arises from the gully erosion of old ring type dumps. Luanshya also uses garden refuse to vegetate the upper surface of dumps. Garden refuse is being used to promote revegetation of the surface of the dumps. Soil contamination will be a major concern from the heap leaching operations.

II.6 Final Deposition of Pollutants

Significant heavy metal losses of copper and cobalt to the Kafue river occur in form of dissolved and suspended solids. Concentration of dissolved solids varies significantly throughout the region and generally increase in the downstream direction of the river. This parameter can be used as a conservative tracer of water mixing in the region and distribution of pollutants along the stream bed. Suspended solids increase at the stream junctions and the concentration of copper and other metals in the river has been found to be between <0.3 \text{ ?m/ml} and <0.05 \text{ ?m/ml} at the upper boundary of the river. Concentration of copper in sediments has been found to be very high at about 0.5 - 2 \text{ wt\%} and only 0.03 \text{ wt\%} at the upper boundary. The net flow of copper transported by suspended solids is about 2-3 tonnes per day.
Assuming that the winning tender is awarded in April the following tentative time frame for completing the CEMP is presented. For strategic reasons this proposed schedule will not depend on the receipt of the final private investor EMPs nor the counterpart EMP.

<table>
<thead>
<tr>
<th>2003</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
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<th>May</th>
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<td>Reviewing (completed) EMP</td>
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<tr>
<td>Reviewing completed counterpart EMP</td>
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<tr>
<td>Signing of Final CEMP</td>
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</table>
1. Closure Planning

Mine Waste Survey Parameters

During the field visit in March 2002 it was evident that basic information on mine waste management at the Copperbelt and Kabwe mining centers, was insufficient or unavailable. In order to prepare for closure planning further information will be required, for instance, auger sampling of waste containment and applying geophysical methods is necessary for modeling these deposits, sometimes occupying more than 4 km²/each and their potential spill footprint. The lack of availability and reliability of statistics on both mine waste generation and its disposal practices can be seen as an impediment to identifying the best management options, setting of priorities and assessing the effectiveness of regional policy actions.

It is recommended that the minimum data and information required for closure planning be collected and carefully filed for each structure particularly dams and dumps as presented below should.

A. Administrative information
   1. Owner/changes
   2. Location/maps 1:20,000 including topography, land use, industrial structures, # inhabitants
   3. Products and By-products
   4. Process technology flow sheets
   5. Mining operations
   6. Year production commenced
   7. Current production capacity
   8. Current production rate

B. Spoil (overburden, interburden, gangue) disposal practice
   1. Method of disposal
   2. Footprint/volume
   3. Sulfides and other mineralogy
   4. Oxidation
   5. Erosion
   6. Provision of sediment traps
   7. Stability record
   8. Management practices
   9. Potential risks

C. Tailings disposal practice
   1. Type/s of disposal/ID
   2. Number of impoundments
   3. Footprint/volume
   4. Impoundment type
5. Embankment type
6. Embankment height
7. Solids % in slurry/particle size distribution
8. pH of slurry
9. Sulfides in solids
10. Delivery system
11. Discharge system
12. Decant system
13. Supernatant recycling
14. Discharge to environment
15. Erosion protection on outslopes
16. Diversion of upstream drainage
17. Provision of spillway
18. Stability record (including subsidence)
19. Management practices (monitoring, emergency plans)
20. Potential risks

Inclusion of maps, drawings, and historical data and information on changes in materials and practices may be of crucial value. Comprehensive information is of use even for many generations coming.

2. Selection Criteria and Prioritization for the EMF

The selection criteria and prioritization for the EMF is detailed in Annex 13. A preliminary prioritization of known issues has been made using the following methodology. The final selection criteria will be designed during the CEMP and is expected to follow similar principles to those outlined in Annex 13.

3. Closure and Long-Term Stability of Tailings Dams

Serious dam failures and other major non-planned releases from tailings dams have taken place within the past ten years in many mining districts worldwide including the serious incidents of e.g., Baia Mare in Romania (2000), Los Frailes in Spain (1998), Pinto Valley in Arizona, USA (1997) and Marinduque in the Philippines. Active tailing dams are much 5 to 15 times more prone to major breaching and failures than properly closed and monitored facilities.

Under proper dam operation, tailing solids are separated from the liquid slurry (process waste). As a result of liquid reclamation, the dam is essentially a stockpile for solids with as little liquids as possible. Tailing settlement, consolidation, and drainage occur throughout the operation and for some time after. Through successful reclamation, not much maintenance or repairs should be needed. No specific strategy option or design of tailing dam would be entirely safe under all conditions.

3.1 Why do tailing dams fail?

The main difference between conventional water storage dams and tailings dams is that the latter are built over long periods and require very long-term solutions to be physically and chemically stable. Our observations of tailing dams in the Copperbelt and Kabwe highlight the following important considerations that may lead to tailing dams failure:

- Over long periods, even if the original design parameters are sound, they may have become compromised by changes in ownership (after privatization), in management, spent materials, wall raising technologies.
- Best available technology (BAT) and/or enough competent engineering and independent review
have not been used. Not enough synergic collaboration between specialists in site selection, geotechnical engineering, economical analysis and government regulators.

- No single, competent person has been given the responsibility of being in charge of the facility.
- Lenders, governments, insurance companies and local communities rarely provide effective oversight.
- Companies and local administrations frequently fail to ensure effective risk assessment and emergency planning.

3.2 Failure statistics

Based on about 3,500 active tailings dams worldwide it is estimated that the annual frequency of major failures is approximately 1/1,000 and of minor failures 1:100. An another systematic survey of failures roughly indicates that of the each 100 failures, 90% involved active dams and only 10% involved inactive dams despite the vastly greater number of the latter ones. For active dams, slope stability and seepage are by far the most common triggers. Practically one only cause, flood overtopping, explains all inactive dam incidences. In principle tailings dams are designed to retain material that is initially discharged into the dam as slurry.

3.3 Long-term safety issues

Safeguarding the long-term stability of dams, further to Probable Maximum Flood (PMF) or Maximum Credible Earthquake (MCE) the following areas should be considered:

- **cumulative damage** from repeated incidences of extreme events, progressive processes like internal erosion, insufficient maintenance (very often encountered at Copperbelt)
- **climate change**: long-term changes. Southern/Central Africa, permanent submergence requires sufficient water, even during continued droughts
- **geological hazards**: karst collapses, geomorphologic processes, filling of drainage facilities with alluvial deposition (all to be considered at Copperbelt)
- **biological effects**: root penetration (should be considered once entirely vegetated)

PMF is a very important factor within Copperbelt’s climate zone. In many parts of the world, for instance the cumulative precipitation of 3-month rainy seasons may annually fluctuate within the extremes of 50% to 200% of the long-term average precipitation i.e. around 700 mm. “Long-term” climate statistics cover less than 100 years in the Copperbelt.

The floor to the Copperbelt sediments is part of an extensive and stable Archean Shield with granites and gneisses; some seismic activity is possible but major earthquakes over M7 are unlikely.

3.4 Portfolio Risk

In risk analysis, “portfolio” risk is that which accrues collectively over some inventory of individual risks. It is a function of magnitudes, size of inventory and duration (“exposure period”). The annual probability of failure for active or permanently submerged, properly designed dams is generally estimated at 1/10,000 while for reclaimed, dry closure dams, the probability of large-scale flow diminishes to practically zero, or closest to “walk-away” objective.

The table below illustrates portfolio failure risks (using Bernoulli’s binomial theorem) for dry closure and for permanently submerged closure differ (developed from Wick, S G, MEM, Vol. 10, No. 1, 2002). The assumptions made could apply to a small country that applies strict environmental standards. By basing the calculation on the following table:
TABLE 1. Portfolio failure risks for illustration of two risk levels.

<table>
<thead>
<tr>
<th>Annual Failure Probability</th>
<th>Option of closure strategy</th>
<th># active dams at T=1000 years</th>
<th># failures expected at T=1000 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (p=90%, years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/10,000</td>
<td>Dry closure 1900</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Permanent submerge 190</td>
<td>1212</td>
<td>13</td>
</tr>
<tr>
<td>1/1000</td>
<td>Dry closure 1900</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Permanent submerge 60</td>
<td>12</td>
<td>115</td>
</tr>
</tbody>
</table>

Assumptions: 12 mines at all times during 1000 years, 10-year mine life, one tailing dam per mine. Annual failure probability of 1/10,000 requires excellent design and maintenance of tailing facilities such as in northern EU countries. The higher probability of 1/1000 may approach the case in eastern European countries. Time (p=90) in years for 90% chance for at least one failure, column 4 (number of dams which contain surface water at 1000 years of operation), column 5 (number of failures expected during the 1000 years of operation).

To simplify, systematic variations like cumulative damage and climate changes (see below) are ignored and assumed that probability values remain constant over time. This assumption certainly would not apply to the real cases at Copperbelt.

Table 1 shows, that with the given conditions, the portfolio risk or the number of expected failures of dry dams is 1 to 12 per millennium, with the most demanding standards. In contrast, the portfolio risk is 13 to 115 failures for 1212 permanently submerged dams, which would never be tolerated. Portfolio risk at 1/1000-safety level is also strongly affected by the number of dams. Therefore portfolio risks for such mining districts as the Copperbelt with much more mining activity than the assumed 12 mines at any given time with only one dam per mine, will be seriously magnified unless the dam safety could be clearly improved. The Bernoulli method assumes that there are no common-cause failure modes and that no cascade effects occur. In the Copperbelt common-cause failures, cascades and cumulative damage can be expected which again serves to magnify portfolio risks.

3.5 The Copperbelt Case

In 1997 major breaching took place at Nkana’s tailings dam TD 33c. Another dam, TD 27 with municipal waste dump built on the tailings also breached but was fortunately saved by TD 26 aside. During the last rainy season of 2001/2002, when the precipitation was only 130% of the normal, dams at Luanshya and other mining districts lost much of their engineered structures and a number of serious gullies appeared with thousands of cubic meters of material losses, still in need of repair.

A one in a 100-years extreme event would be much more serious than what took place in 1997. One such event was described to the assessors that occurred a few years ago when a serious dam failure killed more than 100 underground miners in Mufulira. Minimizing the portfolio risk of failures in the Copperbelt in high-risk tailing dams is required to avoid disasters for settlements, underground mines and nature. The following suggestions will contribute towards reducing the risk of a serious tailing dam failure:

1) Undertake a risk assessment and develop a repair and closure program for, Nkana’s TD 33c, Luanshya’s Chonga TD and Musi TD, and Mufulira’s TD 3/8, (see priorities matrix in Annex 13).
2) Risk management should be systematically adapted for tailing dam design and operations should involve Risk-Based Alternatives (RBA) Evaluation:
   - Identify the areas and accepted risk levels
   - Evaluate alternatives for meeting accepted risk levels
   - Monitor the selected alternatives
   - Modify existing structures as necessary

As an immediate measure one or two TDs (to be carefully selected) should be targeted for strict systematic management. Using the lessons learned under the Copperbelt conditions, tailor the management practices for the remaining TDs for CEP’s duration.

3) Dam safety must consider extreme conditions (such as the maximum 24-hour rainfall or maximum rain-period for a 1 in 100 year event). In the Copperbelt it was observed that:
   - Water management must be improved from the present level: for extreme storm flow the spillways do not provide enough safety. Better alternatives include diversion of upstream runoff, increasing pond capacity, embankment freeboard, pump-back systems, etc.
   - Emergency Preparedness: Flood areas must be modeled and considered in future land-use planning, risk and emergency communication with settlements must be organized in advance, early warning, emergency action plans for preventing and mitigation of losses of life and structure, training of staff and citizens living in high-risk areas be organized

3.6 Safety of dams – Operational Policies and Procedures of World Bank and Zambia

Many tailings dams at Copperbelt operations may be considered “Small Dams” (WB Operational Policy OP 4.37/Oct. 2001). However there are also a number of other tailings dams, which are over 10 m and up to 35 m in height and have the potential of causing extensive downstream losses of human lives and structures. These dams obviously should be categorized as “Existing Large Dams”. Hence, in the case of even remediation, the Bank procedure (BP 4.37, Annex A) may require that all or some of the following plans are prepared and approved:
   - Construction (reclaiming works) supervision and quality assurance
   - Instrumentation for monitoring
   - Operation and maintenance (O&M)
   - Emergency preparedness (see above)

In addition:

1) The requirements placed by the dam safety regulations of Zambia must be included.
2) The Bank’s policies and procedures for works involved within the CEP must be checked with the Director, Rural Development (RDV). Acceptability of previous assessments and recommendations of improvement must be confirmed.

4. Reclamation plan for closure: Risk-Based Alternative Evaluation

Critical decisions have to be made over all phases of an impoundment with respect to (1) environmental performance, (2) social performance and (3) financial performance. Decisions impact a range of stakeholders including the owners, public authorities, financial institutions and citizens.
The evaluation phase of a decision process must be systematic, credible, transparent, defendable, address uncertainties, and allow broad stakeholder participation.

For a mining project commonly used evaluation methods are semi-quantitative such as Multiple Account Analyses (MAA), Matrix Evaluation, Potential Problem Analysis Risk Matrix, or Cost-Benefit Analyses. For tailings impoundments management and their closure, one of the more holistic and quantitative methods is the Risk-Based Alternative Evaluation (RBA) based on “Triple Bottom Line Risk Management” (ref. Bowden, A R & Lane M R, John Wiley & Sons Inc., 2001). The RBA consist of three stages, after identifying a list of design alternatives:

1) Identify risks of not meeting the design objectives (technical/environmental, social and financial Risk Issues)
2) Evaluate risks using probabilistic methods (direct or costs of secondary consequences, with uncertainties). Use graphs.
3) Evaluate alternatives based on the results, including a Cost-Benefit Analysis

A typical RBA matrix sheet may be as follows, say for the closure of

**Chonga TD at Luanshya**

* Alternative 0 (Zero Alternative, “do nothing”, no reclamation works considered) (risk issues identified and analyzed just as for A and other alternatives)
* Alternative A

<table>
<thead>
<tr>
<th>Implementation Cost (NPV, US$)</th>
<th>Risk Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Component 1</td>
<td></td>
</tr>
<tr>
<td>Likely (CL 50%): 2.0 M</td>
<td>#1</td>
</tr>
<tr>
<td>Conservative (CL 95%): 3.1 M</td>
<td>#2</td>
</tr>
<tr>
<td>Design Components 2, 3, 4,...</td>
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<tr>
<td></td>
<td>#3</td>
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<td>#4</td>
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</tbody>
</table>

* Alternative B, C, D,...

Based on RBA results simple graphs are often produced for easy analyses of:

* Variation of risk costs for alternatives with a degree of uncertainty
* Implementation and risk costs of alternatives with a degree of uncertainty
* Cost-benefit: reduction in risk cost compared to the Zero Alternative vs. conservative implementation costs in excess of Zero Alternative

In case of closure for an arbitrary case the identified information gaps to be settled may involve, for instance:

**Dam seepage and groundwater impact**

* No formal predictive, long-term seepage model available →
* Formal assessment of leachates Cu and Co contents required

**Land use**

* Settlements carry on and are allowed to expand on potentially impacted areas →
* Re-assess Land Contamination Act at end of mine life
Underground interaction

- Long-term subsidence and loss of dam integrity ->
- Noted. Closure design will consider

By focusing on the consequences of the risks, the RBA method allows for the design alternatives to be revised, if needed, to lower certain risks to acceptable levels and in return develop a more appropriate design alternative. It is easy to identify critical data gaps during the process. Once the uncertainties are brought to acceptable levels for the stakeholders, a simple cost-benefit analysis would assist in the selection of the most appropriate alternative.

For closure alternatives it is advisable to apply this or other holistic assessment method to identify best practices for dams closure.
Additional Annex 18: Draft CEP Participation and Communications Strategy
ZAMBIA: Copperbelt Environment Project

The CEP deals not only with the one-time physical remediation of mine sites, but with the longer-term sustainability of this remediation. Accordingly, the project contains a significant community and communications component. ZCCM-IH staffing will need to reflect the need for specialized expertise in communications and management of community programs on an ongoing basis. Participation and communication will be involved at the following stages of the project.

1. During Project Preparation

Consultations regarding the CEP project started with extensive consultations on the Social Assessment and with the disclosure of the EA to a wide audience (see Annex 11).

2. During Project Implementation

   At the regional and national level:

   A. Participation

Regional and national level stakeholders will participate in the CEP through the Steering Committee which is currently composed of representatives of:

- Ministry of Finance and National Planning
- Ministry of Tourism and Natural Resources
- Ministry of Mines and Minerals Development
- Ministry of Local Government and Housing
- Chamber of Mines
- NGOs
- ECZ
- ZCCM-IH
- Ministry of Health

While the project Steering Committee may have local government representation through the Ministry of Local Government and Housing, the EMF Steering Committee would need to invite to specific meetings local government representatives of specific towns for which projects are being considered. In addition, the EMF Steering Committee would need to include as permanent members local government representatives of towns with significant works; these representatives should be consulted on how they want to best organize such representation (whether by electing a member among themselves or rotating attendance for example). In addition to the one NGO currently represented (Citizens for a Better Environment), the EMF Steering Committee should also include, at least on a rotating basis, representatives of a community-based NGO given the importance of the community component to the project’s sustainability.

Terms of reference for the Steering Committee will need to be developed by the project preparation team. In addition to its role in the selection and final approval of EMF projects, some of the potential tasks for the Committee could include:

1. Gain consensus on EMP/CEMP
2. Develop transparent understanding of the criteria for site selection under the EMF
3. Co-ordinate decisions on plans for specific sites
4. Overview of social and environmental sub-project screening under EMF

The Steering Committee should have access to a panel of experts to review project proposals as required. This panel should include highly experienced specialists in:

- community development
- risk communication
- geotechnical engineering
- mine site rehabilitation
- medical toxicology
- forestry
- other specialists as necessary

B. Communications

During project preparation, the project will have been publicized by both ZCCM-IH and by the Ministry delegated by the Steering Committee in national newspapers, radio and possibly television. The project message should clearly explain the project’s focus on remediation and not on compensation. Given the potential for international media attention to this project, it would also be advisable to issue a press release early on to the international press as well.

In addition, it is imperative that the project management team provide a transparent presentation of the criteria used for site selection under the EMF and disseminate these criteria to the stakeholders in the Copperbelt. This is particularly important as residents may assume that the project’s primary objective is to cater to investor interests rather than interests of public health and safety (though these may overlap). Therefore, the project team is encouraged to publish the criteria used for selecting EMF sub-projects in regional newspapers, in radio, and during any town-specific meetings on the project.

At the Sub-Project Level Under the EMF

A. Participation

Although the CEP Implementation Manual has not yet been completed, it is expected that the procedures for project preparation and review under the EMF include community participation and consultation as a core element of this process. Such participation is essential to the project’s exit strategy for the following reasons:

- Several sites will require some minimal long-term maintenance (drain cleaning, preventing deforestation of revegetated areas, etc.) that would eventually become the responsibility of the organization or individual who takes over the site. If the site reverts to local government, capacity for even minimal maintenance is low. Therefore, the project would need to explore the possibility of encouraging interested parties to help with maintenance (for example, a group of downstream farmers and fishermen may find it to their benefit to clean drains of a tailings dam to prevent siltation in the streams they use) and to refrain from vandalism of the site.

- The cause of instability of many sites is poverty driven vandalism and only by working to prevent the cause of this vandalism will there be a chance for this to be reduced.

- Revegetation will only be effective if incentives are created for communities to refrain from cutting this vegetation down.
- Economic problems in the region point to the increasing importance of employment generation. The use of community labor and labor-intensive methods should be prioritized.
- Community members and stakeholders may have innovative ideas for solving some of the community-driven problems at sites (vandalism, accidents, deforestation)

Therefore, for each sub-project a project document, or project brief should be completed. Key stakeholders (local government, leaders or community associations in the vicinity of the site, others as appropriate) should sign off on the project brief showing that they have read the brief and agree to any obligations they may have for the site. The project brief could include among other things the following types of steps (see section on Implementation Manual for full list of what is in the project brief):

1) Present and discuss alternatives that were considered for site rehabilitation and present the results of a simplified cost/benefit model of the different alternatives. More than one rehabilitation option should have been considered (including a simple, lowest cost option) and some review of the potential to achieve the same objective using local labour versus more sophisticated, capital intensive approaches should be included;
2) Identify the current use of the site (numbers of people, nature of use), and explain how the site rehabilitation might affect those using the site;
3) Define the proposed end use for the site based on consultations/brainstorming and information sharing with those using the site, particularly if the site is being marked for closure;
4) Outline any community education components for those around and currently using the site, or any other community proposals that a group requires assistance in developing for presentation to ZAMSIF;
5) Identify opportunities for community labor in rehabilitation;
6) Define how the site will be maintained (if required) so that it does not pose a danger in the future, and specify who will maintain the site in the short, medium, and long-term;
7) Present proposals for how this long-term maintenance would be handled after site closure (for sites that are being closed), and how the project would contribute to this plan;
8) Consult with stakeholders at the site regarding which of the considered options is most appropriate, and on other options that may be available to address the problems at the site. List those who specifically had been consulted in the process of formulating the plan, record the outcome/feedback from these consultations and state how these were addressed in design, and agree on who would represent a given group or community; and,
9) Screen the sub-projects for any negative social or environmental impact, assess whether any World Bank or Zambian safeguards are triggered. Explain any potential negative environmental impacts (including any destruction of known archaeological sites) associated with the various options for rehabilitation, or indicate how such a negative impact would be avoided (particularly important for sites involving the movement of hazardous materials such as lead dust in Kabwe, PCBs or radionuclides, dam safety).

B. Communication/Disclosure

The project proposal/project brief should be displayed in the town concerned according to Zambian regulations (Statutory Instrument 28 of the EPPCA). Comments should be sought from all interested and affected parties on the project brief (NGOs, residents, community members near the site, local government).

For sub-projects triggering Bank or Zambian safeguard policies (dam safety, resettlement, cultural property, etc.), further disclosure and consultation may be required as outlined in Zambian regulation and World Bank Operational Directives.
Under the EMP/CEMP

The EMP and CEMP provide a key forum for education of communities in the Copperbelt and Kabwe about the presence and impact of mine pollution.

During Preparation of EMP/CEMP Terms of Reference

According to Zambian regulations on projects requiring an EIS (as opposed to a project brief), the developer (ZCCM-IH) needs to ensure that the public’s views are taken into account in preparing the Terms of Reference for the EIS. ZCCM-IH would need to ensure that the terms of reference for the CEMP include adequate coverage of those issues of most concern to the population (such as air pollution from sulfur dioxide).

Also according to the regulation, the developer needs to organise a meeting with community-based organisations, local authorities, government agencies and affected parties to determine the scope of the TORs. In this case, ZCCM-IH could potentially call upon parties in the steering committee – assuming that an adequate range of local authorities and community based organisations are represented – to carry out this function.

During Drafting of the EMP/CEMP

During preparation, the EMP/CEMP team should be instructed to obtain feedback from the local level on priorities in the EMP/CEMP. This could take the form of a workshop in several municipalities to:

1) present summary information on the analysis of mine pollution to date and on specific sites and the threat they do or do not pose to health, ecology;
2) inform about proposed solutions/actions;
3) raise awareness about the CEP; and,
4) seek feedback on the EMP proposed.

During Review of the EMP/CEMP

Once a revised draft EMP is available, ZCCM-IH should:

- Distribute a brief summary of the relevant conclusions on mine pollution and sites to each town’s local authorities, including clear explanations of what is known about the impact of different types of pollutants on people, animals, and vegetation and including a presentation of the specific sites in each town. This would also provide an opportunity to discuss the social issues that affect the site and serve to introduce the concept of a site management plan. Full documents should be available if requested.
- Distribute the EMPs/CEMP to key stakeholders who may consult with their own constituents (this can include NGOs working in affected communities, universities, think tanks, key government agencies such as the WRAP Kafue pilot group, the Ministry of Agriculture, and others currently on the core and expanded steering committee) at least 20 days prior to any consultative meetings
- Advertise document availability and all planned meetings as specified in SI 28 of the EPPCA
- Display the EMPs/CEMP document in public places in each town for at least fifteen days.
- Organise meetings in the Copperbelt to gather views of key stakeholders on the EMP after the EMPs/CEMP has been available for at least 20 days. At a minimum, meetings should be held in those towns most likely to be affected by agreements contained in the EMPs (for example, Chambishi, Kitwe, Mufulira, Chingola, Luanshya)
- Organise a meeting in Kabwe to gather views of key stakeholders on the EMP after it has been available for at least 20 days.
Experience with KCM’s EMP suggests that the simple task of distributing and getting timely feedback on long and complex documents is a daunting one. The following lessons emerged:

1) It will be important to make the CEMP/EMPs available on CD-ROM and via the web (for the international, NGO, professional scientific and academic audience).

2) It will be important to have brief, simple summaries by town for a more focused audience to absorb (town specific stakeholders).

3) ZCCM-IH will likely require a neutral and skilled facilitator to organise meetings, ensure adequate distribution, record statements and provide feedback. One of the important roles of a facilitator is to ensure that participants receive an equal opportunity to express themselves in a forum they would be comfortable in. Thus, a facilitator can ensure that specific individuals/groups do not so dominate a discussion that others who may be less timid are never heard from by seeking views in a variety of forums or by moderating the discussion. A facilitator can also serve to translate into and from local languages; many people may have a capacity to express themselves in English, but may be more comfortable and more likely to speak up if they also have the option of speaking in local languages.

4) Those who are not available to come to meetings should be permitted to submit written comments.

5) Meetings should be scheduled with sufficient advance notice to participants.

In cases where the EMPs outlines a significant health impact that the population is not already aware of, there may need to be additional briefing meetings within specific towns and organisations working at the community level to adequately answer questions and to reduce anxiety.

It is likely that ZCCM-IH will require short-term assistance with the process of dissemination and consultation. Specific skills to be sought include neutral facilitation (including in local languages), document production, and internet or web page expertise.

**Support to ECZ for EMP/CEMP Review**

Given the importance of the EMP to future mine environment management in Zambia, and given the new role that ECZ must play in critically reviewing this, it will be important to bolster ECZ’s technical capacity to review the EMPs. With regard to the disclosure function, some of this support may be in the form of facilitation consultants to ensure adequate stakeholder consultation on the EMPs.

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1 One of the important roles of a facilitator is to ensure that participants receive an equal opportunity to express themselves in a forum they would be comfortable in. Thus, a facilitator can ensure that specific individuals/groups do not so dominate a discussion that others who may be less timid are never heard from by seeking views in a variety of forums or by moderating the discussion. A facilitator can also serve to translate into and from local languages; many people may have a capacity to express themselves in English, but may be more comfortable and more likely to speak up if they also have the option of speaking in local languages.
Additional Annex 19: Public Consultation and Zambian Environmental Review of the CEP EA and CEP Investments

ZAMBIA: Copperbelt Environment Project

1. Environmental Review

According to Zambian Statutory Instrument 28 (SI28) of the Environmental Protection and Pollution Control Act, projects are grouped into two broad categories – those that are not expected to have a major impact on the environment and thus only require project briefs, and those that are expected to have a major impact on the environment and thus require full environmental impact statements and review by the Environmental Council of Zambia (ECZ). Projects which involve resettlement are automatically grouped into the latter category.

As a project with a fund, rather than fully defined specific investments, the ECZ has determined that the CEP Environmental Assessment does not constitute an Environmental Impact Statement, but that specific investments under the CEP will require compliance with Zambian regulations regarding Environmental Impact Statements and Environmental Management Plans, including compliance with disclosure policies. Specifically, ECZ plans to provide environmental review to:

- The ZCCM-IH Counterpart Environmental Management Plans.
- The revised Kabwe Closure and Decommissioning Plan which will constitute an EMP for Kabwe.

In addition, if specific Zambian safeguards were triggered (dam safety, resettlement) by specific investments, additional ECZ review of the specific sub-project would be required. Although not required by Zambian law, World Bank safeguard requirements will demand an environmental and safeguard review of specific sub-projects as part of the analysis of the sub-projects (project brief).

2. Disclosure Requirements

With regard to disclosure of the CEP EA, the project preparation team has determined to follow the principles of SI28 regarding disclosure, even though this is not required by Zambian law. Such thorough disclosure also forms part of the communications and participation strategy for the CEP.

The main components of SI28, together with the actions taken and planned by both ECZ and ZCCM-IH are summarized below.

<table>
<thead>
<tr>
<th>Regulatory Requirements</th>
<th>Actions Taken</th>
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<tbody>
<tr>
<td>Public Consultations</td>
<td>ZCCM-IH</td>
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<tr>
<td>The regulation requires public consultation both on the terms of reference of the environmental impact statement and on the actual statement, as follows:</td>
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<td>“To ensure that public views are taken into account during the preparation of the terms of reference, the developer shall organize a public consultation process, involving Government agencies, local authorities, non-governmental and community-based organizations and interested and affected parties, to help determine the scope of work to be done in the conduct of the environmental impact assessment and in preparation of the environmental impact statement.”</td>
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<tr>
<td>ZCCM-IH commissioned consultations with stakeholders (list of consulted people attached) during the scoping mission of the social assessment for the CEP (May, 2001). Based on feedback on the issues of most concern to stakeholders, the terms of reference for the EA were revised, and additional work was carried out under the EA to reflect the concerns of interested and affected parties.</td>
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</table>
**Consultations of affected communities**
The regulation also requires that the developer of the project shall take all measures necessary to seek the views of the people in the communities which will be affected by the project, including:

- a) Publicizing the intended project, its effects and benefits in the mass media, in a language understood by the community, for a period of not less than fifteen days and subsequently at regular intervals throughout the process; and,
- b) After the expiration of the period of fifteen days, referred to in paragraph (a), hold meetings with the affected community in order to present information on the project and obtain the views of those consulted.

**Distribution of the Environmental Impact Statement**
Once the environmental impact statement has been drafted and sent to the ECZ, the ECZ shall:

- a) Distribute copies of the environmental impact statement to relevant ministries, local government units, parastatals, non-governmental and community-based organizations, interested and affected parties;

**ZCCM-IH**
The social assessment component of the EA carried out extensive consultations on the project with stakeholders at the local level (list attached).

ZCCM-IH publicized and held a “Stakeholder Participation Seminar” on 18 December 2001 in Kitwe with regional stakeholders to receive feedback on the proposed project (list of attendees is available upon request from ZCCM-IH, but included NGOs, University, Private Sector, Mine Companies, Local Government).

In Kabwe, ZCCM-IH has held a first stakeholder meeting on 15 January, 2002 to discuss the CEP project (list of attendees also available upon request). This was followed by a meeting with neighborhood level leaders to further discuss the project on 26 March 2002.

Questions and concerns raised by participants were recorded.

**Actions to Be Taken by CEP Steering Committee**
The CEP Steering Committee determined that a public (television and/or newspaper) statement on the project would be undertaken by the Government agency determined most appropriate. At the same time, the EA document would be presented to cabinet. The best estimate of the timing for this announcement was end-April or May, 2002.

**Disclosure of the Environmental Impact Statement**
ZCCM-IH has distributed the EA to a wide variety of stakeholders including:
- NGOs
- Local Governments
- University representatives

**ECZ**
ECZ distributed the EA on Feb. 18 with a request for written comments to:
- Director of Environmental Planning, MTENR
- Director, National Water and Sanitation Council
- Director MSD
- P.S., Ministry of Local Government and Housing
- Director, National Heritage Conservation Commission
- Director, Department of Water Affairs
- Chief Executive Director, Energy Regulation Board
- Director, Forestry Department

**Notification of disclosure**
ZCCM-IH has placed advertisements stating the availability and request for comments on the EA on the following dates:

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<th>ZCCM-IH</th>
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<tr>
<td>The EA has been placed on display at civic centers in Chililabombwe, Chingola, Kalulushi, Mfulira, Kitwe, Luanshya, Ndola, Kabwe and at the World Bank in Lusaka since February 13, 2002 until April 12, 2002 or later if extended.</td>
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radio, detailing the place and time where copies of an environmental impact statement are available for inspection and the procedures for submitting comments."


**Public hearings**

The ECZ may organize or cause to be organized public meetings in the locality of the proposed project. Comments on the environmental impact statement can be received by the ECZ within twenty days of the last date of notification in national newspapers, radio. This period can be extended by 15 days if particularly sensitive issues have arisen during the public consultation, or if there are logistical problems in the consultation process. Following this, the Council may have a public hearing on the comments.

| ZCCM-IH |
| As part of EA disclosure, ZCCM-IH will distribute town-specific summaries of the EA, as well as a description of the CEP to local government and hold meetings in each town with key stakeholders to receive their views on the EA and on the project. The tentative schedule for such meetings is presented below: |
| April 1, 2002 Kalulushi |
| April 12, 2002 Chililabombwe |
| April 16, 2002 Ndola |
| April 17, 2002 Mufulira |
| April 18, 2002 Luanshya |
| April 19, 2002 Kitwe |
| April 22, 2002 Chingola |
| April 24, 2002 Kabwe |
Community Consultations, SA Team

- Sustainable Agriculture Association, Staff Copperbelt Technology Assessment Site, Lukoshi (downstream of Chambishi Metals Musakashi dam), 10 July 2001
- Mwaiseni Informal settlement on the Uchi downstream of the TD26/TD27 and the Nkana Mine, 16 July, 2001
- Residents of Squatter settlement (Kandabwe) in Nkana MLA, 7 July, 2001
- Scrap metal scavengers on dump between OB5 and OB6, from Chiwempala neighborhood, Nchanga-Chingola, 9 July, 2001
- Farmers living adjacent to Fitula Open Pit, Nchanga Mine, 9 July, 2001
- Scavengers (three groups – coal miners, pyrite miners, metal scavengers) Uchi Cross Valley Tailings Dump (TD27), 4 July 2001
- Residents/cultivators using Kitwe Slimes Dam (TD25), 4 July, 2001
- Medical personnel adjacent to Kitwe Slimes Dam (TD25), 4 July, 2001
- Farmers and farm owner, Supreme Farms in Luto, downstream of TD33c on Chibuluma Stream, 14 July, 2001
- Emerald miners, Kafue River, downstream of Nchanga, Konkola and Nkana mines where the majority of mine effluent enters the river, 20 July, 2001
- Resident Development Committee and farmers, Mulenga Compound, downstream of Nkana mine area on the Wusakile stream, 7 July, 2001
- Farmers using sewage irrigation, Ndeke Compound on Wusakile stream, 7 July, 2001
- Sugar Cane Grower on Nchanga mine site, Chingola, 9 July, 2001
- Housewives, Kankoyo township, Mufulira, 8 May, 2001
- Ward Chairman and local activist, Wusakile township, Kitwe, 9 May, 2001
- Fishermen on Mindola Dam in Kitwe, 17 July, 2001
- Fishermen on Makoma Dam in Luanshya, 5 July 2001
- Community group using raw sewage for irrigation in Mufulira, 3 July 2001
- Medical Staff at Wusakile Mine Hospital, 9 May 2001
- Chowa Regional Development Committee members, Kabwe, 12 July 2001
- Katondo residents, Kabwe, 12 July 2001
- NGOs (Oxfam, World Vision, PUSH, Catholics for Environmental Justice and Peace, Advocacy for Environmental Restoration), varied dates in May and July 2001
- Universities and think tanks (University of Zambia, Copperbelt University, National Institute for Scientific and Technological Research), varied dates in May and July 2001
**Individual Interviews (informal, open ended): SA Team**

Interviews took place between May 3 – 15 and June 29 - July 21 2001

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<tr>
<th>Name</th>
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<tr>
<td>Dr. Jewette H. Masinja</td>
<td>Permanent Secretary</td>
<td>Ministry of Env. &amp; Natural Resources</td>
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<tr>
<td>Christopher Chileshe</td>
<td>Senior Hydrologist</td>
<td>Department of Water Affairs (Lusaka)</td>
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<tr>
<td>P. Kimena</td>
<td>Deputy Director</td>
<td>Department of Infrastructure &amp; Support Serv.</td>
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<tr>
<td>Chiseke Mutale</td>
<td>Program Director</td>
<td>Ministry Local Government and Housing</td>
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<tr>
<td>Greenwell Mukwavi</td>
<td>Co-ordinator</td>
<td>Environmental Support Programme</td>
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<tr>
<td>Christopher Sinyinza</td>
<td>District Environmental Facilitator, ESP</td>
<td>Pilot Environment Fund - Environment Support</td>
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<tr>
<td>Edward Mwale</td>
<td>Operations Coordinator</td>
<td>Program - Ministry of Env. &amp; Natural Resources</td>
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<tr>
<td>Martha Linyando</td>
<td>Acting Director, Planning Unit</td>
<td>Ministry of Community Development and Social</td>
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<tr>
<td>F. Nyirenda</td>
<td>Environmental Health Specialist</td>
<td>Central Board of Health</td>
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<tr>
<td>Manengu Musambo</td>
<td>Health Economist</td>
<td>World Health Organization</td>
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<td>Provincial Health Board - Central Province</td>
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<td>Provincial Forestry Office, Ndola</td>
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### Local Level Interviews

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<tr>
<th>Name</th>
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<tr>
<td>Charles C. Mwandila</td>
<td>Director of Administration</td>
<td>Mufulira Municipal Council</td>
</tr>
<tr>
<td>Ali D. Simwinga</td>
<td>Town Clerk</td>
<td>Chililabombwe City Council</td>
</tr>
<tr>
<td>Promise C. Kaminsa</td>
<td>Deputy Director of Public Health</td>
<td>Chililabombwe City Council</td>
</tr>
<tr>
<td>Her Honor the Mayor and members of the Chililabombwe City Council</td>
<td>Deputy Director Administration</td>
<td>Chililabombwe City Council</td>
</tr>
<tr>
<td>Peter Banda</td>
<td>Town Clerk</td>
<td>Luanshya Municipal Council</td>
</tr>
<tr>
<td>A. Mwanakalunga</td>
<td>Director of Health</td>
<td>Chingola District Health Board</td>
</tr>
<tr>
<td>Dr. J.C. Bwalya</td>
<td>Director of Administration</td>
<td>Chingola District Health Board</td>
</tr>
<tr>
<td>Felix Mubiana</td>
<td>Manager - Administration</td>
<td>Chingola District Health Board</td>
</tr>
<tr>
<td>Swithin Hamweene</td>
<td>Chief Health Inspector</td>
<td>Kabwe Municipal Council</td>
</tr>
<tr>
<td>Dr. Davies Musonda</td>
<td>Town Clerk</td>
<td>Kabwe Municipal Council</td>
</tr>
<tr>
<td>J.B. Mumbi</td>
<td>Director, Engineering Services</td>
<td>Kabwe Municipal Council</td>
</tr>
<tr>
<td>Mr. Kambole</td>
<td>Chief Settlement Officer</td>
<td>Kabwe Municipal Council</td>
</tr>
<tr>
<td>Mr. Chiila</td>
<td>Director of Housing and Social Services</td>
<td>Kabwe Municipal Council</td>
</tr>
<tr>
<td>Dr. Sewya</td>
<td>Director</td>
<td>District Health Board, Kabwe</td>
</tr>
<tr>
<td>Vivian C. Chiloti</td>
<td>Occupational Health Nurse</td>
<td>Kabwe Mine Site</td>
</tr>
<tr>
<td>Dr. Dixon Suya</td>
<td>Maternity Project</td>
<td>Ndola City Council</td>
</tr>
<tr>
<td>Exildah Rose Samp</td>
<td>Accountant</td>
<td>Kabwe</td>
</tr>
<tr>
<td>Patrick Katoti</td>
<td>District Director of Health</td>
<td>Wusakile Township</td>
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<tr>
<td>Michael Kafula</td>
<td>Acting Manager, Planning</td>
<td>Kitwe Health Management Team</td>
</tr>
<tr>
<td>Mary Sieba</td>
<td>Maternity Project</td>
<td>Kitwe Health Management Team</td>
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<tr>
<td>Mary Mubila</td>
<td>Youth Friendly Coordinator</td>
<td>Kitwe Health Management Team</td>
</tr>
<tr>
<td>Florence Wkingamina</td>
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<tr>
<td>Luquendo Munda</td>
<td>Staff</td>
<td>Wusakile Hospital</td>
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<tr>
<td>S. M. Mubiana</td>
<td>Managing Director</td>
<td>Nkana Water and Sewerage</td>
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<tr>
<td>A. Mwaba</td>
<td>Deputy Director of Engineering</td>
<td>Kafuba Water and Sewerage</td>
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<tr>
<td>Richard Soko</td>
<td>Managing Director</td>
<td>Kafuba Water and Sewerage</td>
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<tr>
<td>George Mukosai</td>
<td>Director of Engineering</td>
<td>Mulonga Water and Sewer</td>
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<tr>
<td>Mr. Sinbeye</td>
<td>Director - Occupation Health and Safety</td>
<td>Mines Workers Union of Zambia</td>
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<tr>
<td>Mavuto E. Gondwe</td>
<td>Manager</td>
<td>AHC-MMS</td>
</tr>
<tr>
<td>T.C. Chanda</td>
<td>Technical Manager</td>
<td>Saur International (with AHC-MMS)</td>
</tr>
<tr>
<td>Tusn Kriek</td>
<td>Director - Research</td>
<td>Mine Workers Union of Zambia</td>
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<tr>
<td>Charles Muchimba</td>
<td>Senior Agricultural Assistant</td>
<td>Knight Piesold Engineering - Kitwe</td>
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<tr>
<td>David Daka</td>
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<td>Ministry of Agriculture</td>
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### Mines

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<tr>
<th>Name</th>
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<tr>
<td>Alexie Mpishi</td>
<td>Environmental Services Officer</td>
<td>Mopani Copper Mines</td>
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<tr>
<td>Mathew Mwale</td>
<td>Senior Environmental Officer</td>
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<tr>
<td>Vincent Chalwe</td>
<td>Environmental Coordinator</td>
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<tr>
<td>Martin L. Matindo</td>
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<tr>
<td>T. Kapalasha</td>
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<tr>
<td>Wilson Manda</td>
<td>Assistant Concentrator Superintendent</td>
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<td>N.S. Phiri</td>
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<tr>
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<tr>
<td>Grace Mikunga</td>
<td>Public and Corporate Affairs Officer</td>
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<td>Martin Matindo</td>
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<td>Theo Hacking</td>
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<td>Jiang Xiaolu</td>
<td>General Manager</td>
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<td>Fred Mwendabai</td>
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<td>Lubinda wa Lubinda</td>
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<td>Joseph Chishimba</td>
<td>Accident Prevention Officer</td>
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<td>Red Cross Society of Zambia - Wusakile</td>
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<tr>
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<td>Kenneth Mun</td>
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<tr>
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A. General

The proposed project brings together the regulatory bodies and the industry to achieve the set objectives. These actors, each of which will have financial and legal responsibilities towards the environmental protection and clean-up, will implement two components which consist of:

(i) implementation of priority environmental and social mitigation measures and preparation of the Consolidated Environmental Management Plan; and
(ii) strengthening the regulatory and institutional frameworks to improve compliance of the mining sector with environmental regulations and environmental management plans (EMPs).

Capacity building for GRZ for adequate monitoring of the CEMP and other EMPs prepared by other private investors.

In order to finance, manage, and sustain the first component, the borrower has established a funding mechanism, the Environmental management Facility (EMF), under the Ministry of Finance. This facility comprises US$ 36 million from the proposed credit. In future, the EMF may be extended through funds from other sources for environmental protection and clean-up activities. Some historical liabilities are the responsibility of ZCCM-IH and some are the responsibility of GRZ. For the mitigation of ZCCM-IH liabilities, the EMF will provide financing to ZCCM-IH on terms and conditions comparable to commercial lending. For the mitigation of GRZ liabilities, ZCCM-IH will be provided a grant by GRZ including a management fee for their services.

The second component of the project will be managed by the Environmental Council of Zambia (ECZ) Agency. The Agency is a statutory body established by an Act of Parliament under the Environment Protection and Pollution Control Act of 1990 (CAP 204) and governed by an independent Council.

B. Financial Management Responsibility

Component one

The EMF Steering Committee and its Secretariat will be responsible for the financial management of the first component of the Project. The EMF Steering Committee and Secretariat will be established prior to negotiations. An accredited Financial Management Specialist has to perform a financial management assessment before the project is declared effective. The EMF Steering Committee, through the EMF Secretariat Accountant, will ensure that the financial management and reporting procedures for the facility are not only acceptable to the Government, IDA and any other Cooperating Partners, but also to ensure that these functions are carried out as prescribed on a day-to-day basis.

The principal objective of the Project’s Financial Management System (FMS) will be to support management in their deployment of resources to ensure economy, efficiency and effectiveness in the delivery of outputs required to achieve desired outcomes. Specifically, the FMS must be capable of producing timely, understandable, relevant and reliable financial information that will enable management to plan, implement, monitor and appraise the Project’s overall progress towards the achievement of its objectives. It should also provide transparent and adequate accountability to all stakeholders on the use of the project resources.
One Special Account to be controlled by the EMF Secretariat at the Ministry of Finance and National Planning, will service this Component. Details and modalities for accessing the funds, control over, and the use of the Special Account (Special Account A), and the relation between the EMF and ZCCM-IH will be spelled-out in a subsidiary loan agreement, acceptable to IDA. However, a brief description of how it is expected to operate follows.

For the funds transferred to ZCCM-IH for the preparation and implementation of sub-project proposals after authorisation by the EMF Steering Committee, consistent with the terms of the agreement, ZCCM-IH will open separate ledgers and bank accounts so that at all times the funds and transactions of the project are traceable and expenditures are clearly identifiable. In order to further mitigate the risk of misuse of funds, with respect to fiduciary oversight and ensuring that the funds are used for the intended purpose and with economy and efficiency, monitoring and independent supervisory arrangements by EMF Secretariat and IDA are envisaged.

ZCCM-IH has established an Environmental Coordination Unit (ZECU), with staff from the previous Environmental Affairs Department of ZCCM-IH seconded to ZECU. The ZCCM-IH Technical Investments Manager, based at the company’s Kitwe offices, heads ZECU, and consequently has overall responsibility for the project, including finances. More specifically however, in ZECU, the finance section of the project is led by a Project Accountant, also based at the firm’s offices in Kitwe. The Project Accountant operates under the dual supervision of the ZECU Manager, as well as the Finance and Investments Manager at ZCCM-IH head office in Lusaka. The financial management capacity of ZECU has been assessed as adequate.

Component Two

The second component of the project will be the responsibility of the ECZ. This is a stand alone body set up to be the regulatory authority on environmental issues in Zambia in general, not only the Copperbelt. It will therefore have its own systems, staff and a separate Special Account in US dollars. As an exception to the “one project one audit” rule, the ECZ component will be audited separately from EMF and the audit report submitted to the Government and the Bank. A Financial Management Assessment for ECZ has been done and found satisfactory provided the conditions agreed in the action plan are implemented by date of effectiveness.

C. Financial Management Action Plan

Key features of the financial management arrangements include:

- Identification and installation of a suitable FMS for the EMF.
- Preparation of a Project’s Financial Procedures Manual for the two components.
- Recruitment of the relevant accounting staff for the EMF.
- Training of relevant staff respectively in the operation of the EMF financial system, of ZCCM-IH’s new accounting software, AccPac (which is still to be installed) and of ECZ’s Pastel accounting package.
- Customizing (where necessary) the accounting software to meet the specific reporting requirements of the World Bank (which may be additional to GRZ’s normal requirements), such as:
  * Monthly bank reconciliation statements;
  * Monthly cash flow management / forecasting reports;
  * Monthly Status of Funds reports;
  * Quarterly Financial Monitoring Reports (FMRs).
- The preparation of budgeting according to existing GRZ guidelines.
• The preparation of Project Financial Statements in compliance with International Accounting Standards.
• The production of annual external audit, on terms of reference acceptable to the Bank.
• Regular comparison by the EMF Secretariat of the physical progress of sub-projects funded by the EMF with reported expenditures.
• An accredited Bank financial management specialist will make a final assessment of the readiness and capability of the EMF to produce FMRs before the credit can be declared effective.

**Country Issues**

Zambia has not had a Country Financial Accountability Assessment. However, from the preliminary work under the PEMFAR and from the SOE and procurement ex-post reviews, there are indications of the country's fiduciary risk. The World Bank's experience with the borrower, assesses the risk to be relatively high. This is manifested in an underdeveloped accounting profession, adverse SOE/Ex-Post procurement reviews, late submission of annual audit reports and adverse financial management related comments in reports to management by external auditors.

However, with the mitigating measures envisaged, the Project Risk is considered moderate for the following reasons:

• A qualified Financial Management Consultant will be engaged to help with the identification, installation and implementation of a strong Financial Management system at EMF.
• The other implementing agencies controlling most of funds are not government departments, and have well-structured finance departments.
• The implementing agencies will retain the services of a Financial Management Consultant to prepare a Financial Procedures Manual specific to project activities.
• All relevant implementing agency staff will receive training on the efficient use of the Financial Management system (at EMF), AccPac (at ZCCM - IH) and Pastel accounting (at ECZ) software.
• The budgeting system will follow an already established system (what GRZ and the agencies have already been using).
• Adequately qualified accountants and support staff will be recruited for the agencies involved in the implementation.
• Monthly bank reconciliation will be prepared and independently approved.
• Monthly Cash Flow Management and quarterly FMRs will be produced.
• Variances will be examined and remedial action will be taken in a timely manner.
• Fixed Assets and Contracts Registers will be operated and regularly updated in accordance with existing policies.
• Project Financial Statements will be prepared in compliance with International Accounting Standards.
• Project activities will be regularly reviewed by an M&E department to be established.
• Regular Bank supervision missions will be conducted, including SOE reviews and timely follow-up of management letter issues.
• An annual external audit will be undertaken on TORs acceptable to the Bank by relevantly qualified and experienced auditors. IFAC Auditing Standards will be followed and audit reports will be submitted to the Bank within 6 months after the year-end.

Thus the project financial management risk is assessed as moderate on condition all the above can be made to happen in practice. A strong Bank supervision team should supervise the project at least three times a year during the first two years.
Conditions for Negotiation

Project Implementation Manual finalized, including the procurement and financial management procedures for both components. Draft agreements ready for the on lending to ZCCM-IH, grant to ECZ and Management Contract for GRZ liabilities.

Conditions for Credit Effectiveness

- Establish the EMF
- Establish the PMU for EMF.
- Appoint the Steering and Technical Committee members
- EMF and ECZ Project Agreements with IDA ready
- The FMS installed and operational for EMF component of the project.
- Financial Procedures Manual for both components developed and adopted.
- Recruitment of relevant accounting staff for the EMF, PMU.
- Appointment of an assistant accountant at ECZ and ZCCM-IH.
- Counterpart Funds and Special Accounts opened; World Bank advised of authorized bank signatories/specimen signatures.
- Qualified external auditors acceptable to IDA appointed on approved terms of reference.

Financial Covenants

- The borrower will maintain or cause to be maintained adequate accounting records for both Special Accounts to show the operations of the project.
- Have accounts audited by independent auditors acceptable to IDA, using appropriate audit standards.
- Submit the audit reports for each year to IDA within 6 months of the year end
- Maintain adequate records for those expenditures claimed under SOE and get the same included in the annual audit and the report includes a separate opinion on the use of SOE.
- Produce and submit quarterly FMRs within forty five days after the end of each quarter.

Staffing

Key accounting staff have to be appointed at the EMF and additional staff at ECZ and ZCCM-IH. The accountant at ZECU must be trained to use ZCCM-IH’s new accounting software, AccPac. Similarly, accounting staff at ECZ must be trained the use the Pastel accounting software. Therefore, training on the use of AccPac, Pastel and the new FM system for the EMF will be required. This will be in addition to training on Bank project related accounting and reporting (e.g. Special Accounts, Disbursements, SOEs, Special Commitments, Procurement, etc.). On-the-job training will be necessary.

Accounting System/Financial Procedures/Internal Audit

A financial Management Systems Consultant will be required to assist with identification and installation of a Financial Management System at the EMF Secretariat. ZCCM-IH has already engaged a consultant to train its staff on the new accounting software. A Financial Management Consultant was recruited during project preparation to prepare the Project’s Financial Procedures Manual (FPM) for both components. This will be necessary to tailor current ZCCM-IH and ECZ procedures to the specific needs of the project.

ZCCM-IH and ECZ do not have Internal Audit departments. Once the project is operational, the need for this will have to be reviewed. In the mean time, it is proposed that physical audits of progress be left in the hands of a Monitoring and Evaluation (M&E) department, to be established.
Planning and Budgeting

ECZ Counterpart funding will come out of the Council's regular income. Existing methods of planning and budgeting for GRZ (EMF) and ECZ will be used for the project funds. The Project Accountants (EMF, ZCCM-IH and ECZ), in consultation with the Manager PMU Procurement, Monitoring Manager and the Environmental Manager and the Chief Accountant (ECZ) in consultation with the Project Coordinator, Environment Inspectors and the Director, will be responsible for preparing their respective project components Consolidated Quarterly/Annual, work plans and Cash Flow Forecast in line with generally accepted accounting practice.

Government Accounting - Cash Versus Accruals Bases

The CEP will operate a cash accounting system. Thus, for the period of the project, Project funds will be accounted for on a cash basis.

Procurement of Goods, Works and Services

Procurement procedures will be documented in a Procurement Procedures Manual (PPM). World Bank and Government procurement regulations will be observed. The Project Accountants and support staff must be conversant with those procedures, as internal control issues and the incurring of liabilities on behalf of the Project will be matters of concern to the financial management function. A Procurement Management Report, showing procurement status and contract commitments, will be prepared quarterly as part of the monitoring reports.

Banking Activities - Flow Of Funds

The project has 2 components with a total of US$ 40 million for the project split as follows:

- Environmental Management Facility (EMF), including the Consolidated Environmental Management Plan (CEMP) - US$ 36 million.
- Strengthening the Environmental Regulatory Framework (under the Environmental Council of Zambia) - US$ 4 million.

It has been agreed that the project will maintain 2 Special Accounts in a Commercial Bank acceptable to IDA as follows:

- **Special Account A** in US dollars, which will exclusively service the EMF component of the project. The Special Account will be maintained by EMF Secretariat based in Lusaka at the Ministry of Finance. The modalities and details of operations of the Special Account will be discussed and finalized during negotiations.
- **Special Account B** in US dollars for use by the Environmental Council of Zambia. Activities under this component will be funded in accordance with a financing formula, to be agreed, which incorporates a counterpart contribution from the ECZ.

Project Accounts: Three Kwacha denominated project accounts will be opened and maintained in Commercial banks, on terms and conditions acceptable to IDA to hold counterpart funds by EMF, ZCCM-IH and ECZ. Separate books of accounts for these bank accounts will be maintained.

Bank account signing arrangements will allow for two panel signatories. All bank accounts will be reconciled monthly. Full detailed accounting and control procedures will be documented in the FPM.
**Withdrawals/Disbursements**

The government and the Bank have agreed that the project disbursement will be transaction based. The Bank requires that before project implementation begins, both the EMF Secretariat and ECZ are capable of producing quarterly Financial Monitoring Reports (FMRs). The format and content of these reports will be discussed before negotiations and agreed upon during negotiations.

**Fixed Assets/Civil Works/Consultants**

Control procedures will be documented in the FPM. A Fixed Assets Register will be prepared, regularly updated and checked. Regarding Capital Work in Progress, controls will be established to ensure that payments are made only for certified work (including physical verification). A Contracts Register will be maintained for all contracts with consultants. A Procurement Management Report, showing procurement status and contract commitments, will be prepared quarterly.

**Financial Reporting (Monthly and Quarterly/Annually)**

- Monthly Cash Reporting.
- Monthly bank reconciliation will be prepared and independently approved.
- Quarterly FMRs
- Audited annual financial statements.
- Variances will be examined and remedial action will be taken in a timely manner.

**External Audits**

An annual external audit will be undertaken, one for component one and Special Account A (under EMF) and one for the component two and Special Account B (under ECZ), on TORs acceptable to the Bank by relevantly qualified and experienced auditors acceptable to the Bank. IFAC Auditing Standards will be followed and audit reports will be submitted to the Bank within 6 months after the year-end.

Besides expressing a primary opinion on the financial statements in compliance with International Auditing Standards (IFAC), the auditors must include a separate paragraph commenting on the accuracy and propriety of expenditures withdrawn under SOE procedures and the extent to which these can be relied upon as a basis for loan disbursements. Regarding the Special Accounts, the auditors will also be expected to form an opinion as to the degree of compliance with Bank procedures and the closing balance at the year-end. Additionally, the auditors will be required to prepare separate Management Letters giving observations and comments, and providing recommendations for improvements of accounting records, systems, controls and compliance with financial covenants.