PN-AAZ-622
ISN 45069

MINING

SOUTHERN AFRICAN
DEVELOPMENT COORDINATION
CONFERENCE

Harare, Republic of Zimbabwe
30th — 31st January 1986

Mining

STRATEGIES FOR THE NEXT FIVE YEARS

CONTENTS

		Page
1.0	INTRODUCTION	1
2.0	MINERAL RESOURCES AND DEVELOPMENT POTENTIAL	2
3.0	SECTORAL POLICY AND STRATEGY	4
4.0	REVIEW OF MINING SECTOR PROGRAMME	7
	4.1 Existing Projects	7
	4.2 Possible Areas of Further Cooperation	8
5.0	IMPLEMENTATION SCHEDULE OF MINING SECTOR PROJECTS 1986-1990	9
	5.1 Programme Justification	11
	5.2 Constraints on Implementation	12
	5.2.1 Funding	12
	5.2.2 Human Resources	13
6.0	MINING SECTOR COORDINATION WORK PROGRAMME	13

ANNEXES

I	Mineral Resources Potential	15
II	Mineral Production in SADCC Member States	23
III	Existing Programme - Project Briefs	29
IV	Proposed Projects	87

1.0 INTRODUCTION

The mining industry provides a foundation for economic activity in the region and its development is crucial to the success of the other sectors of the SADCC programme of action. The mineral wealth of the region is substantial and includes base metals, energy minerals, ferro alloy metals, precious metals, industrial and refractory minerals, gemstones, fertilizer and chemical minerals. Mining and minerals account for approximately 12 per cent of the gross domestic product and some 35 per cent of exports of the region.

The important role of the mining sector has been recognised and emphasised in the Lusaka Declaration, Southern Africa: Towards Economic Liberation and in many of Africa's major economic and political declarations. The 1980 Lagos Plan of Action lays down a general strategy for the development of Africa's mineral resources in the 1980s. In fulfilment of these directions, intensive work has been initiated by SADCC to elaborate a coherent programme aimed at strengthening the region's mining sector.

Founded on the principles of self reliance and local resource-based development leading to the integration of the region's economies and the reduction of dependence, a five year strategy has been drawn up for the mining sector taking cognisance of the aspirations embodied in the Lusaka Declaration.

The five year programme takes into consideration the present economic situation of the region and the continuing influence of world recession. In addition, the balancing of policy objectives and resource endowments has been assessed with regard to determining how the maximum benefit from the mining sector can be achieved for the region.

The programme seeks to meet the objectives laid down by the Lusaka Declaration while recognising the need for commercial viability often dictated by the demands of the mining industry world-wide. In the last decade the world has suffered from low metal prices, over- supply and a change in demand caused by advances in technology. These factors contribute to the current situation within the region and also influence its future development.

It is hoped that the five year programme as presented will contribute to achieving steady progress towards integration of regional supply and demand and will ensure that the reliance on international sources of supply is gradually reduced. In this regard, the programme focuses special attention on manpower development, small scale mining, industrial and construction materials, fertilizer mineral raw materials, all aimed at the substitution of imported commodities. This focus will also provide essential linkages to the other sectors, particularly agriculture, energy and industry, aimed at coordinated development.

Unlike the other SADCC sectors, planning for the mining sector is of comparatively recent origin. Its serious beginning can be traced to the deliberations of Maputo in July, 1983 culminating in the approval of a programme of action by the Council of Ministers in Blantyre in May 1984.

As measurable quantitative targets cannot be determined at the present stage of knowledge of resources, requirements and technology in the mining sectors of the sub-region, a broad analysis has been made with regard to the targeted outcomes. Successful completion of the project studies and implementation of planned programmes will enable the attainment of the broad objectives of the mining sector. The planned projects are also expected to create significant induced changes through multiplier effects which are not possible to measure at this stage. However, as knowledge increases, targets may susequently be set for specific mining branches.

For a number of the larger mining projects in the five year programme, it will be several years before these come on stream because of the time required to identify and prove commercially exploitable resources, arrange for infrastructural services, prepare detailed techno-economic studies, and secure capital funding. Hence the special emphasis of the five year programme on assisting the development of small scale mining which will enable rapid increases in income, employment, and output in the short term, particularly in the production of industrial minerals for the manufacturing, building, chemical, and agricultural sectors.

The successful implementation of this programme will therefore establish a sound technical and economic base for the future development of the mining sector in the SADCC region.

2.0 MINERAL RESOURCES AND DEVELOPMENT POTENTIAL

The importance of mineral resources and production to the region is well documented in the SADCC Mining Sector Co-ordinating Unit Report, Analysis of Mineral Resources Development and Opportunities in the SADCC Region (January 1985). The diversity of minerals demonstrates the potential for intra-regional development and allows the mining industry to provide significant support to the other sectors.

The known mineral resources give a very good spread between industrial, construction, energy and metallic minerals in addition to precious metals and gemstones. The mineral wealth within the SADCC region is well known for having significant reserves of major minerals such as copper, in addition to the number of different minerals. The latter forms a good base for developing both nationally and regionally. As an example, construction materials for the building industry are available throughout the region. This includes limestone, dolomite and gypsum, the essential ingredients for cement manufacture. The application of lime as a soil conditioner is equally important.

On account of the low density of population and the vast land areas, the need to develop a network of roads is paramount. Again, the region has good reserves of road stone aggregates and surfacing gravels.

Industrial minerals are essential ingredients of all industrial isation and economic development. Their uses are diverse, but can be broadly sub-divided into a number of categories. Chemical raw materials include sulphur, salt and soda ash. Fertiliser production is dependent upon potash and phosphates, in addition to the availability of either sulphur or sulphuric acid. Refractory minerals such as magnesite, kyanite and sillimanite are available within the region, while substantial potential for abrasives such as corundum and garnet can be utilised to substitute the abrasive products which are currently imported.

Other industrial minerals include known deposits of bauxite, fluorite, talc, mica, graphite, and lithium in addition to heavy minerals and rare earths. Other significant process minerals include barite and bentonite, while kaolin has numerous uses and is available in quantity within the region.

Iron ore is available for both processing within the region and for export. Also, a number of important minerals and metals used in steel products, such as chrome, manganese, molybdenum and vanadium are being mined or have potential for further development.

Although gold production is relatively small by world standards, it is important as a hard currency earner and also provides numerous opportunities for small scale development. Other precious metals, although more commonly recovered as by-products, include silver, and platinum group metals.

Gemstones in significant quantities are available throughout the region. These include emerald, amethyst, aquamarine, garnets, tanzanite, tourmaline together with diamond production. All of these have development potential, particularly for small scale mining. Associated industries for the cutting and polishing of gemstones and diamonds as well as the use of industrial grade diamonds for cutting tools can be expanded.

Although the potential for uranium is limited, the region has significant energy resources in the form of coal. In addition to conventional industrial and domestic uses, long term developments such as gasification and liquefaction for future energy demands have a significant potential.

In many cases the reserves and the levels of production are significant in world terms. However, more data is required to assess the total mineral wealth of the region and to fully utilise the production levels and balance the intra-regional demand.

Annex I gives provisional data on resource availability in the SADCC region.

Annex II shows the large number of minerals currently being mined together with their source and production rate. The list vividly demonstrates the diversity of mineral wealth and the very good basis on which the region can develop.

Historically, mineral development in the SADCC region has been dominated by an over-reliance on foreign operators whose interests were geared largely to meeting the demands of the industrialised countries. In part, this has resulted from the need for finance and technology, which has often been provided by the world's major mining and finance houses. As a result, the region's development has been uncoordinated and has suffered from the fluctuations of the international market. Project viability has generally been viewed only with regard to commercial returns on investment but with little regard given to the wider regional or national social and economic benefits. A different emphasis is therefore needed which will allow SADCC member states greater utilisation of their own mineral resources for the integrated development of the region. A practical view of other industrial developments also needs to be taken. For example fibre optics are replacing the traditional markets for copper. Aluminium, like copper, is similarly depressed. The world-wide nuclear industry has slowed down and the steel industry has seen drastic cut-backs in recent years.

The SADCC Region therefore, needs to give greater consideration to its own requirements and how to meet them as opposed to the previously uncoordinated policy dictated by the demands of the industrialised countries. An integrated effort is required to establish a common basis on which to plan the future development of mining in the region. For example, the economics of small scale mining of roadstone is ideally suited to localised operations which are planned to support an overall and regional requirement. A closer look at the availability and usage of construction materials including limestone, clays and refractory minerals is expected to help the balance of trade on an intra-regional basis.

The SADCC mining sector strategy is an attempt to promote the development of the mining industry along these lines and is presented in the next section.

3.0 SECTORAL POLICY AND STRATEGY

The objective of SADCC regional cooperation for the Mining Sector derives from the principles and policies set out in the 1980 Lusaka Declaration and amplified in the Mineral Resources Development Strategy adopted by the SADCC Council of Ministers at their meeting in Blantyre in May 1984. This policy is fully consistent with the Lagos Plan of Action of 1980 which sets out three main objectives for mineral development:

(a) Establishment of sovereignty over natural resources
(b) Development of mineral based industries
(c) Development of indigenous skilled manpower capability.

The Lusaka Declaration emphasises the need for the region to reduce its dependence, particularly but not only, on South Africa, for manufactured goods and expertise. The Declaration also emphasises the need for self-reliance of the region in terms of material requirements, and the need to develop a rational strategy which would benefit the Member States both individually and collectively.

The report on regional cooperation in the Mining Sector presented to the SADCC Council of Ministers in 1981 at Harare, Zimbabwe was the first substantial analysis of mineral development policy for SADCC and included mineral beneficiation, marketing, financing, technology, manpower training etc, as areas which might benefit from regional cooperation. Mining Sector coordination, which was subsequently assumed by Zambia, led to the redefinition of a development strategy for the exploitation of mineral resources within the SADCC region covering the following areas:

(a) Improvement of knowledge of mineral resources through establishment of adequate inventories of existing and potential resources, creation of better forecasting systems of consumption patterns with a view to rationalising the utilisation of mineral resources and the development of mechanisms for intra-regional trade;

(b) Establishment of the appropriate scientific, technical and industrial environment required for the development of mineral industries;

(c) Cooperation among SADCC countries in the development exploitation and utilisation of mineral resources;

(d) Training of high level professional, managerial and technical personnel in all aspects of mineral resource development, with a view to alleviating the shortage of qualified manpower and reducing dependence on expatriate personnel and specialised services from overseas;

(e) Development of suitable systems of transfer of technological know-how and exchange of scientific, technical and economic data on geology, mining activities and mineral economics among SADCC countries;

(f) Attainment of maximum diversification of the mining industries bearing in mind the principle of equitable regional development;

(g) Prioritisation of programmes in the light of their feasibility and capacity to delivery maximum benefits to the region. For example, operational projects for the production of goods and services can be preferred.

Following the adoption of this strategy, the SADCC Council of Ministers in May 1984 in Blantyre approved a nine project promotional programme as follows:

i) Regional Mining Sector Skilled Manpower Survey;

ii) Preliminary Study of Small Scale Mining, Processing and Marketing;

iii) Inventory on Geology, Minerals, and Mining;

iv) Foundry, Fabrication and Machining Facilities;

v) Mining Machinery Manufacturing, Repairing and Reconditioning Facilities;

vi) Production of Mining Chemicals and Explosives;

vii) Sharing of Mineral Processing Facilities;

viii) Establishment of Iron and Steel Industry;

ix) Fertilizer Mineral Raw Material Development.

In addition to the above programme, in May 1985 the SADCC Council of Ministers meeting at Maseru approved several new project areas as follows:

i) Remote Sensing Survey of Mineral Resources using Spot-Satellite;

ii) Central Isotope Geochronology Laboratory;

iii) Refractory Industry in the SADCC Region;

iv) Processing of Bauxite;

v) Manufacturing of Diamond Tools;

vi) Market Study of Production of Common Salt, Soda Ash, Potash and Related Products;

vii) Feasibility Study on Expansion of Copper Semi-finished Products for Local and Export Markets;

viii) Processing of Lime, for Chemical, Industrial, Agricultural and Construction Purposes.

The region-wide policy framework has taken into account development policies at the national level in all SADCC countries which have been concerned with exploration, diversification away from traditional mining activities and into industrial minerals for domestic use. Policies have also sought to encourage inter-alia small scale mining.

4.0 REVIEW OF MINING SECTOR PROGRAMME

4.1 Existing Projects

Of the nine projects in the initial programme approved during the May 1984 Blantyre Meeting, seven projects have so far secured funding to facilitate undertaking of preliminary studies as follows:

Project 1.0.1	Sub-regional Skilled Manpower Survey EEC
Project 2.0.1	Small Scale Mining Processing and Marketing EEC
Project 3.0.1	Inventory on Geology, Minerals and Mining EEC
Project 4.0.1	Foundry Fabrication and Machining Facilities IDU/CFTC
Project 5.0.1	Mining Machinery and Spare Parts Manufacturing, Repairing and Reconditioning Facilities IDU/CFTC
Project 6.0.1	Mining Chemicals Manufacturing Facilities IDU/CFTC
Project 7.0.1	Sharing of Mineral Processing Facilities - under negotiations
Project 8.0.1	Development of Iron and Steel Industry- study is being undertaken by UNIDO as SADCC/PTA Joint Project
Project 9.0.1	Development of Fertilizer Mineral Raw Materials - under negotiations.

It may be noted that the French Government has shown interest in Project 7.0.1 while NORAD and ADB are interested in Project 9.0.1 and negotiations with them to facilitate commitment of funds are continuing. Studies have already been commissioned in respect of the project areas in which IDU/CFTC is rendering assistance.

As regards the projects recently approved in Maseru, negotiations are being conducted with cooperating partners indicated against each project as below:

Project 10.0.1	Market Study for Common Salt, Soda-ash, Potash and other Related Products within the Sub-region - NORAD

Project 11.0.1	Market Study for Semi-finished and Finished Copper Products within the Sub-region - Netherlands Government
Project 12.0.1	Preliminary Study on the Possibility of Establishing a Refractory Industry in the Sub-region - UNIDO
Project 13.0.1	Central Isotope Geochronology Laboratory for the SADCC Sub-region - EEC
Proejct 14.0.1	Integrated Exploitation and Processing of Bauxite Deposits within the SADCC Sub-region and Establishing an Alumina/Aluminium/Calcination Industry - several Governments/Agencies have been approached
Project 15.0.1	Processing of Lime in the SADCC Sub-region - NORAD has been approached
Project 16.0.1	Remote Sensing Survey of Mineral Resources in the SADCC Sub-region using Spot Satellite - EEC has indicated that the funds for the project will be made available
Project 17.0.1	Manufacturing of Diamond Tools in the Kingdom of Lesotho - under negotiation with IDU/CFTC

Briefs on these projects are presented in Annex III.

4.2 Possible Areas of Further Cooperation

Most of the above project areas will require lengthy time period for project formulation and implementation, extending in most cases beyond the end of the five year strategy. It will be imperative, therefore, to maintain development momentum by developing existing capacity where feasible and identifying short gestation mining projects which have a regional impact and can be implemented during the early years of the strategy. These projects will be identified by further consultations with member states.

Other possible areas of further cooperation are as follows:

- Coal mining
- Hydrogeological investigations
  The SADCC Mining Sector Coordinating Unit in consultation with member states and other sectors will develop these new areas of cooperation
- Regional mining workshops
- Strengthening of the Mining Sector Coordinating Unit

In proposing these areas for the regional mining programme, due consideration has been given to factors such as short term perspective, sufficiency of reserves, low capital cost, availability of technical know-how/manpower and energy resources in addition to the contribution of the projects to the overall strategic objectives of the Mining Sector.

Briefs on these areas of cooperation are presented in Annex IV.

5.0 IMPLEMENTATION SCHEDULE OF MINING SECTOR PROJECTS 1986-1990

In order to successfully implement the five year programme the following indicative schedule is intended to show how these mining sector projects will develop within the time period 1986-1990.

PROJECT	PRELIMINARY STUDY	DETAILED FEASIBILITY	COMMENCE IMPLEMENTATION
Skilled Manpower Survey	Oct '85 - April '86	*	June '86
Small Scale Mining	Oct '85 - April '86	Oct '86 - Sept '87	Jan '88
Inventory of Geology	Oct '85 - March	Oct '86 - April '87	Oct '87
Foundry Fabrication	May '85 - Jan '86	June '86 - May '87	Jan '88
Mining Machinery	May '85 - April '86	Oct '86 - Sept '87	June '88
Mining Chemicals	Sept '85 - May '86	Jan '87 - Dec '87	June '88
Sharing Mineral Processing Facilities	Nov '85 - May '86	*	Nov '85
Iron and Steel	July '85 - Dec '85	June '86 - May '87	June '88
Fertilizer Minerals	Jan '86 - June '86	Jan '87 - Dec '87	June '88
Salt, Soda, Potash Project	Oct '86 - July '87	*	Jan '88

PROJECT	PRELIMINARY STUDY	DETAILED FEASIBILITY	COMMENCE IMPLEMENTATION
Copper Based Products	Oct '86 - March '87	Oct '87 - Sept '88	June '80
Refractory Bricks Fabrication	March '86 - Sept '86	Jan '87 - Dec '87	Jan '89
Geochronology Lab	*	*	Jan '86
Bauxite Deposits	June '86 - May '87	Jan '88 - Dec '89	Jan '90
Lime Utilisation	Oct '86 - May '88	Sept '87 - Aug '88	Dec '88
Remote Sensing	Jan '86 - June '86	Jan '87 - Dec '87	June '88

* Not necessary

In presenting the above schedule, it has been assumed that each of the preliminary studies will indicate a potentially viable project(s), both with regard to capital and operating costs. A decision will need to be taken at this stage with regard to the need for a detailed feasibility study. This will produce a document containing accurate costs sufficient to be presented to potential investors and finance institutions.

The above schedule has taken a positive aporach in that a number of the studies will culminate in a viable project(s) of some form which will go forward for implementation.

Preliminary studies relating to eight projects are scheduled to start before the end of 1985, of which seven have funding secured.

The rest of the projects are expected to commence before the end of 1986.

For those projects which will require detailed feasibility studies, five are expected to start before the end of 1986, and six before the end of 1987, and one project before the end of 1988.

As regards project implementation, three projects, namely the skilled mining manpower survey, sharing of mineral processing facilities and the Geochronology Laboratory, are expected to be implemented before the end of 1986. Most of the other projects, following confirmation of feasibility and securing of funding, are expected to commence implementation within the plan period.

The projects for small scale mining will also develop rapidly into the implementation stage because of their low capital investment and infrastructural requirements.

Where project feasibility studies are completed by member countries during the programme period, these may be included for implementation within the framework of the SADCC mining programme.

5.1 Programme Justification

It is not difficult to envisage the impact which the projects outlined in the strategy will have on the economies of the region. The strategy emphasises the need to develop and diversify the mining sector and promote new mining activities. Hence the proposed projects are aimed at significantly meeting the targets of development and diversification by the year 1990 and beyond. For example, projects such as small scale mining, iron & steel, fertilizer mineral raw material, refractory, lime, and diamonds are included mainly by reason of their ability to develop and diversify the mining sector.

Similarly, increased processing of products will result from projects such as sharing of mineral processing facilities, integrated exploitation and processing of bauxite deposits and copper semi-manufactures. These will increase import substitution and reduce dependence on external facilities for processing purposes. They will also go a long way to reverse the illogical pattern of mining development that has for too long been imposed on the region.

Manufacture of inputs to the mining industry and adequate supply of skilled manpower for mining jobs are the other attainable targets of the plan. For instance, the project for the regional manpower survey, when completed, will assess both the demand and supply aspects of skilled manpower. Several projects, such as mining machinery manufacturing, production of mining chemicals and explosives, and manufacture of diamond tools are geared to the physical production of inputs to the mining industry. Projects that may emanate from future programme of action by the mining sector will also be appraised in terms of how much impact these can create in terms of the above criteria such as diversification, increased production, manufacture of mining inputs and self-sufficiency of the region in mining manpower. A well-developed and diversified mining sector will also absorb an increasing number of people as the plan progresses through 1990 and beyond.

The employment effect of the plan should not only be viewed in the light of how many people will find employment, but in terms of future relocation and redeployment of miners. Countries with major mining activities such as Angola, Botswana, Zambia and Zimbabwe, are already facing a situation of depleting resources. This is why these countries should plan ahead for redeployment of miners in the small-scale mining and diversified mining sector. For example, the indirect employment effects of a small-scale mining and processing

project are significant. Thus mining in the SADCC Region should be organised and developed in such a way that its integration into the domestic economy provides maximum employment potential.

Between 1987 and 1990, it is thus possible to expect a developing and diversifying mining sector within SADCC. Its relationship with the other sectors, such as agriculture, energy and manpower will develop as one of complementarity so that gains from coordination in regional efforts will be maximised. Other measures, such as harmonising mining law between SADCC member States deserve special mention as exploration and geological research along common borders will entail some formal agreement as regards mining laws of the member states. In the longer term, the strategy may also envisage the establishment of a centralised mining and mineral processing research establishment to develop the specific requirements in mining, mineral processing and extraction metallurgy for the region. This would include laboratory facilities for the testing and analysis of ores as a fundamental step in the region's development and self-reliance.

5.2 Constraints on Implementation

In a strategy document like this, actual and potential constraints should not be overlooked. these vary from identification of commercially exploitable resources, accurate estimation of regional productive capacity and regional demand over the longer term, provision of infrastructure to permit the establishment of mines and the transportation of mineral products, securing of finance and other essential resources for possible regional projects. There must also be due regard to the fact that a number of the mining projects overlap with the areas of other sectoral coordinators especially manpower, energy, industry and agriculture. Constant and effective liaison with other Sectoral coordinators will be maintained to ensure complementarity in the overall development of the sub-region.

5.2.1 Funding

The projects currently put forward for approval all fall within the category of initial investigations, as opposed to full feasibility studies or the implementation of projects requiring capital investment.

The approved projects together with those under possible areas of further cooperation will require initial funding of approximately U S$ 3,200,000 for the five year programme. By July 1985, a sum of over US$ 600,000 had been raised.

However, during the strategy period it is expected that the studies put forward at this stage will indicate the particular inputs required for further development. In many cases, the further phases of the work may require a pre-feasibility or feasibility study up to bankable document level. Funding requirements estimated for this stage of project development is US$ 4 million. The total funding requirement of the programme is therefore just under US$ 8 million.

The available resources and technical expertise within the region will be utilised as far as possible to support these projects in the feasibility and implementation stages. These resources would be supplemented by external assistance, both governmental and private, and the possibility of joint-venture undertakings would also be explored. The main SADCC cooperating partners may be called upon to fund preliminary studies and to assist in attracting potential investors.

5.2.2 Human Resources

SADCC countries suffer from a severe shortage of skilled manpower especially in the fields of technology and science. Most of these countries inherited at independence very high rates of illiteracy, low enrolment ratios, and a virtual absence of technical education and institutions of higher learning.

After independence, great efforts have been made by all SADCC countries to reverse this trend. However, despite these efforts, there are still severe shortages of technical and professional people in relation to demand for such skills in most SADCC member states.

Technical institutions such as Technical College, Bulawayo, Zambia Institute of Technology, Kitwe, and the Departments of Mining and Geology of the Universities of the SADCC countries are in the process of being strengthened and diversified so as to train various mining skills. In addition, the Mining Manpower Survey Project, when completed, will provide a precise picture of the supply of and demand for mining skills and will enable the SADCC Region to take rapid steps towards the removal of the manpower constraints on the mining sector.

6.0 MINING SECTOR COORDINATION WORK PROGRAMME

The success of this action plan will depend upon the ability of the Coordinating Unit. Thus strengthening of the Unit and particularly of its resources are the sine qua non of this development action plan.

As mentioned earlier, the coordination activities will logically include the organising of workshops on technology, rehabilitation and investment. This will entail strengthening both in terms of personnel, services and facilities.

For overall progress to be made in the areas mentioned, both domestic and foreign entrepreneurs need the information about what new exploration results have been presented, what mineral resources maps and mineralisation reports are available, what new mines and what beneficiation plants are being proposed or developed, and what new mineral joint venture possibilities are being discussed. Contact is also needed with mineral process plant engineering consultants, contractors and operators who themselves also need some of the information mentioned above. Accordingly the SADCC Mining Sector Coordinating Unit in conjunction with the relevant Ministries and Departments of SADCC Member States need to establish the following:

- compile a list of effective entrepreneurial mining companies and diversified trading companies;

- collect similar lists of mineral process engineering consultants, contractors and operators having relevant expertise and patents useful in the various categories of mineral beneficiation and downstream processing;

- contact on a continuing basis the people and organisations of the lists in the above sub-sections, and direct a stream of relevant information to the listed organisations.

Member countries have responsiblity for promoting and implementing particular projects including mobilising resource support locally in the SADCC Region and externally. The Coordinating Unit will facilitate and assist member countries in their implementation activities.

It is envisaged that for the implementation of some of the projects that may arise from the sixteen studies where Sector functions overlap closest liaison among Sectors will be maintained. The Mining Sector programme will require active participation during the implementation stage by member states in terms of project location and finance sourcing.

Over the period of the programme and beyond, the Mining Sector Coordinating Unit will endeavour to increasingly utilise the technical expertise from among the nationals of member States to be able to successfully implement the programme. It has been recognised that technical assistance schemes are a temporary measure; in the long term the nationals of the member states will have to be fully involved in the work programme of the Coordinating Unit.

ANNEX I

MINERAL RESOURCES POTENTIAL

Table 1 SADCC Mineral Statistics*

		Area (sq kM)	Population (millions)	(GDP) Gross Domestic Product (millions*) *Estimated Value in US$	Mineral Production (million $)	Mineral Exports (million $)	Total Exports (million $)	Mineral Export % of Total Export	Mineral Production Ranking		% of Working Labour Force Employed in Mining
									Includes Energy	Excludes Energy	
SADCC Member States	ANGOLA	1246700	7.30	7000	1700	1600	2000	80	1	4	9
	BOTSWANA	582000	0.86	722	534	500	637	75	4	3	10
	LESOTHO	30355	1.41	348	19	19	46.6	41	8	8	9
	MALAWI	118484	6.30	1434	7	0	289	0	9	9	1
	MOZAMBIQUE	738030	13.30	2404	18	17.7	354	5	6	6	11
	SWAZILAND	17364	0.61	500	23	13.6	271	5	5	5	3
	TANZANIA	945000	18.70	4749	45	43.3	566	8	7	7	2
	ZAMBIA	752614	5.95	3460	1056	1000	1100	91	2	1	6
	ZIMBABWE	391109	7.50	5924	547	426	1065	40	3	2	6

*All Figures -- Latest (1983 - 84) available derived from a number of sources including national government gazettes

Table 2 Constructional Mineral Status of SADCC

(Provisional data on resource availability, subject to amendment.)

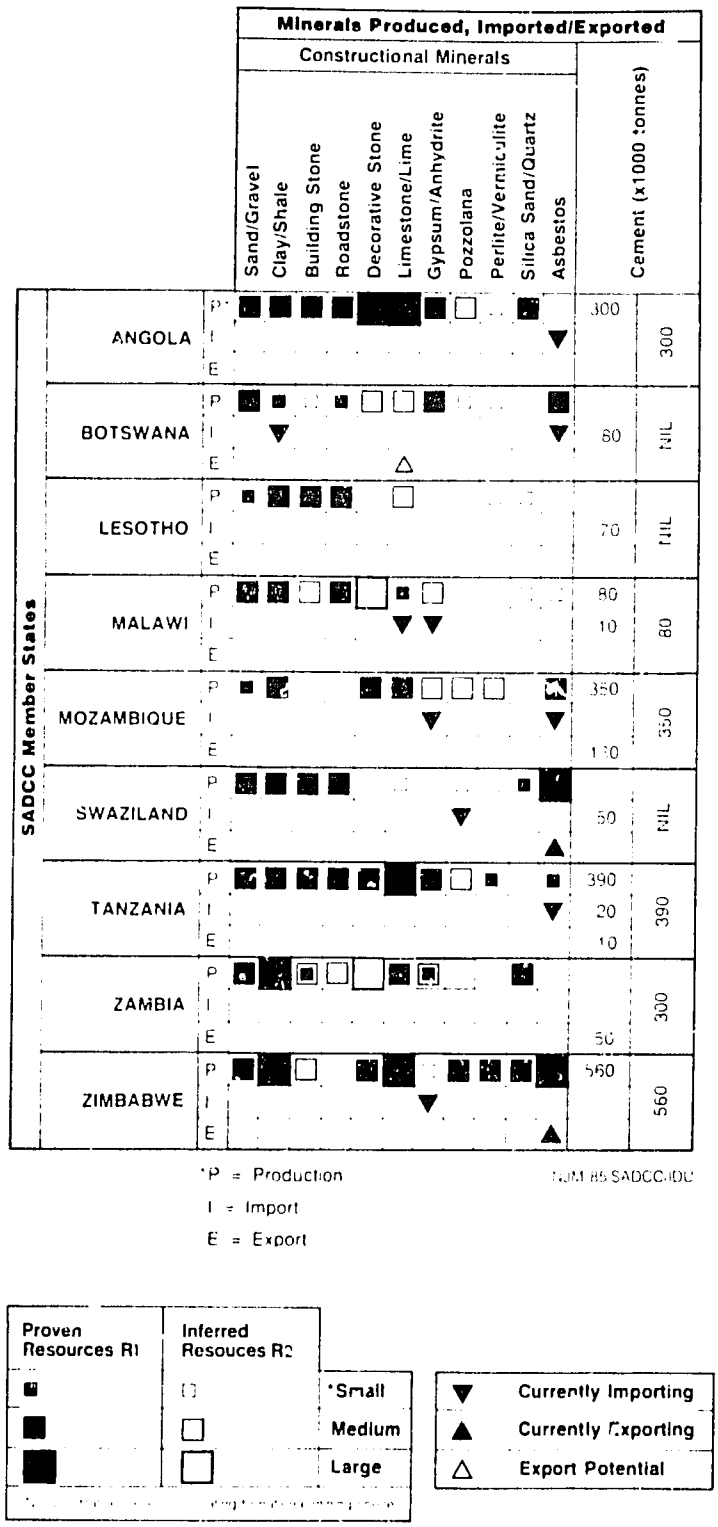

Table 3 Industrial Mineral Status of SADCC

(Provisional data on resource availability, subject to amendment.)

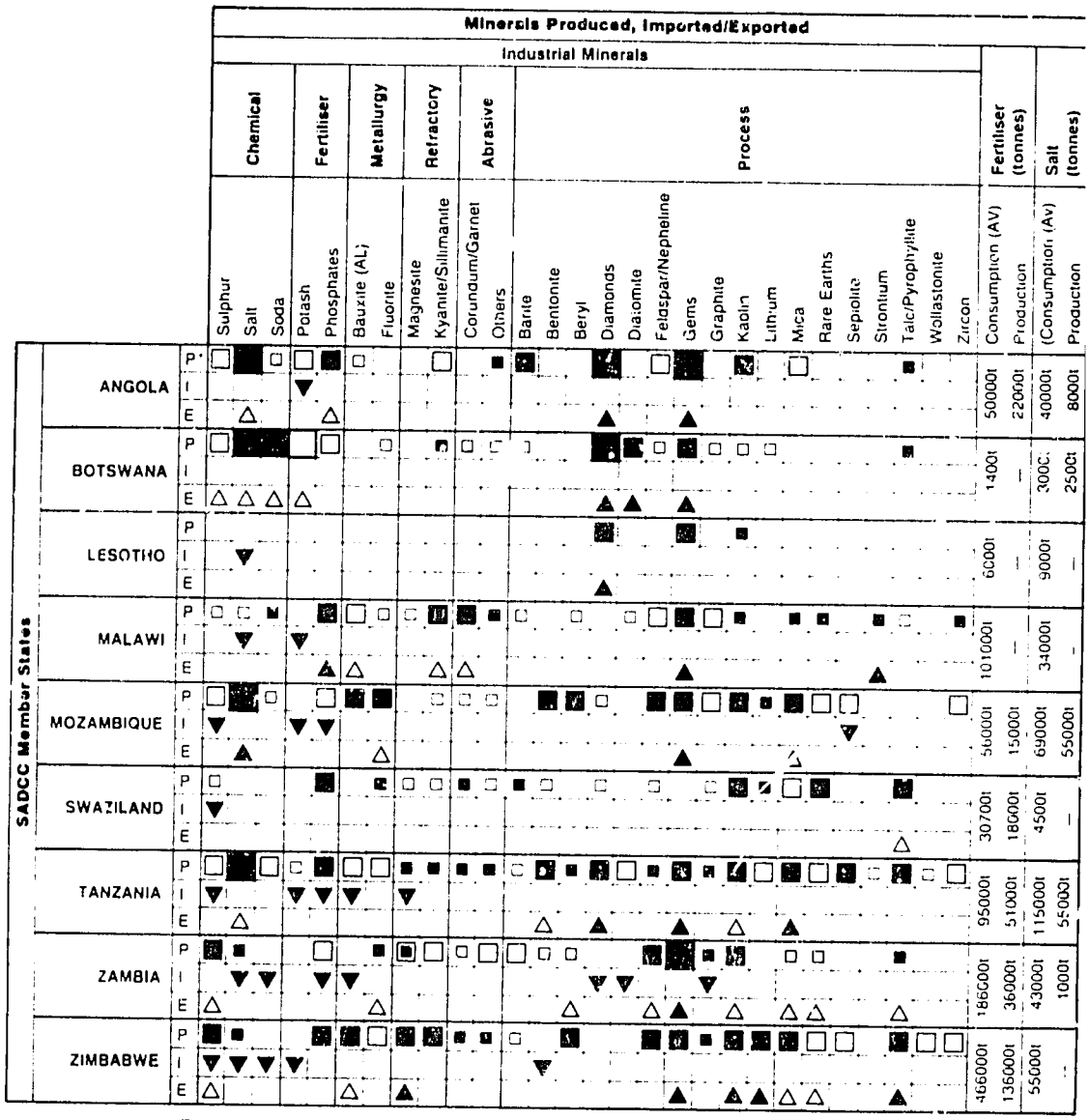

Table 4 Metallic Mineral Status of SADCC

(Provisional data on resource availability, subject to amendment.)

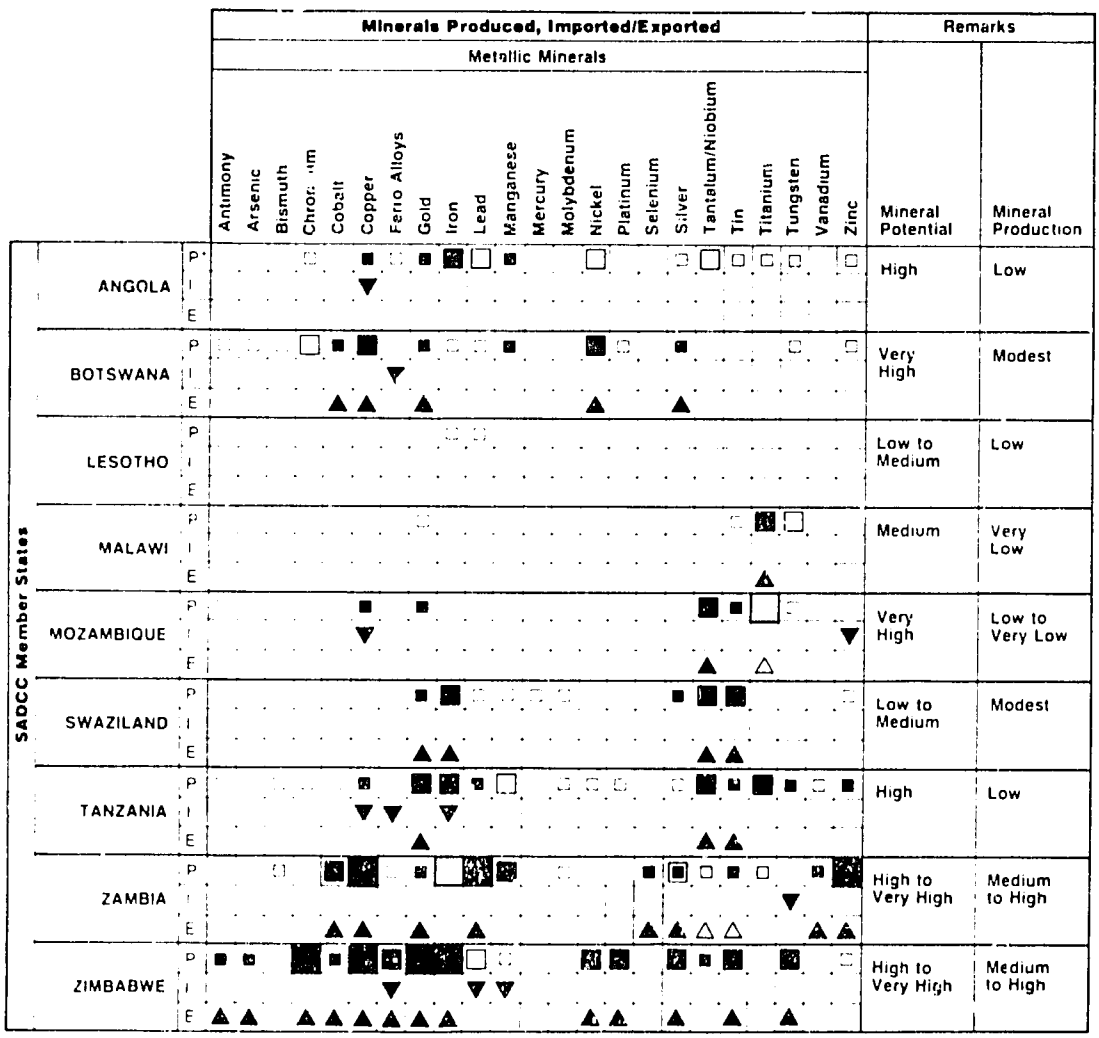

Table 5 Energy Mineral Status of SADCC

(Provisional data on resource availability, subject to amendment.)

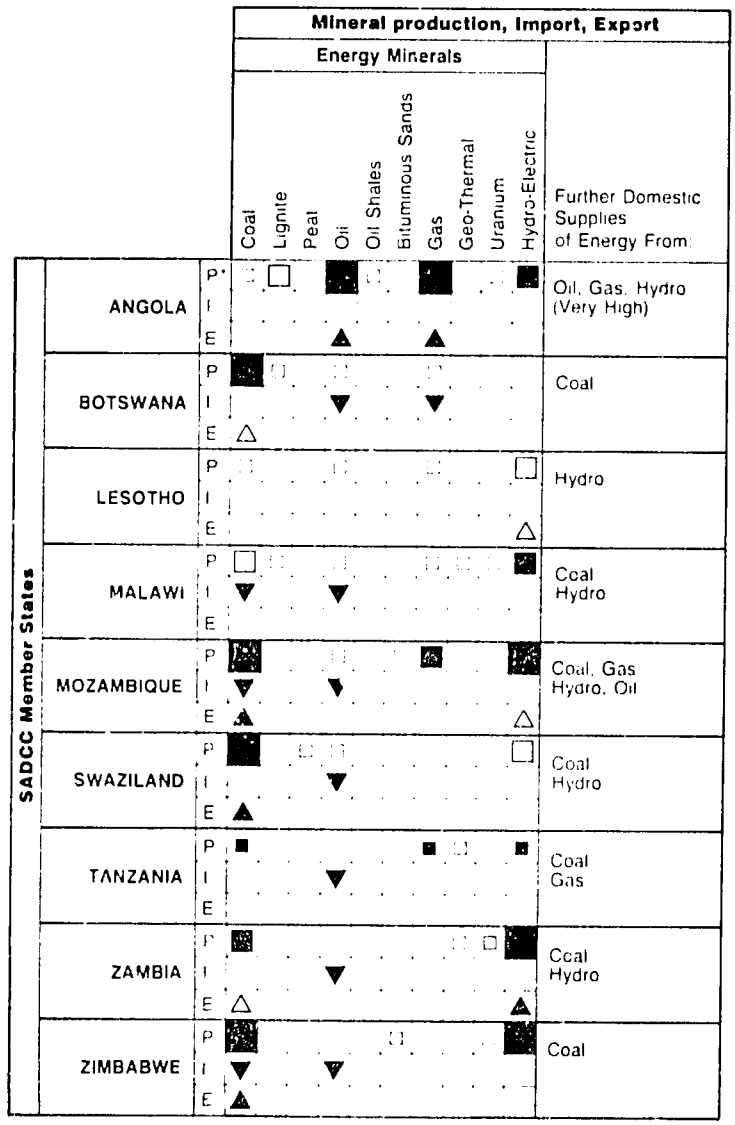

Table 6 SADCC Trade Flow in Mineral Commodities: Raw/Semi-Processed

(Provisional data, subject to amendment.)

Imports	Exports: ANGOLA	BOTSWANA	LESOTHO	MALAWI	MOZAMBIQUE	SWAZILAND	TANZANIA	ZAMBIA	ZIMBABWE	Imports From: SADCC Countries	Number of Items
ANGOLA					GW	GW	P GW	C Zn	C Fe	-	8
BOTSWANA					Na	Pt		CE	CE	4	4
LESOTHO	CE							CE	CE	3	3
MALAWI					Na C			Ca C	C AS	3	6
MOZAMBIQUE							BC	C		2	2
SWAZILAND	GW		CW		CE Na		GW	CE Ca		5	7
TANZANIA	CE		BC		CE	AS CW P Pt Ex		CE C	AS CE C	6	13
ZAMBIA						AS			Fe AS	2	3
ZIMBABWE	CW	CuN	BC CW		GW Na	CW Pt	BC CW GW Na	Pb Ca		-	14
Exports To: SADCC Countries	5	2	4	NIL	6	4	5	8	7		
Exports To: Number of Items	5	3	5	0	9	9	9	12	10		

NJM 85 SADCC/IDU

AS = Asbestos
BC = Building Construction
CE = Cement
CW = Ceramic Ware
C = Coal
Cu = Copper
Ex = Explosives
P = Fertiliser
GW = Glass Ware
Pb = Lead
Ca = Lime
Pt = Paint
Na = Salt
K = Soda Ash
Fe = Structural Steel
ZN = Zinc

ANNEX II

MINERAL PRODUCTION IN SADCC MEMBER STATES

MINERAL PRODUCTION IN SADCC MEMBER STATES*

MINERALS PRODUCED	SADCC COUNTRIES	MINERAL PRODUCTION IN TONNES 1980	1981	1982	WORLD AVERAGE 1980-1982	SADCC AVERAGE 1980-1982	SADCC PRODUCTION % OF WORLD PRODUCTION
ANTIMONY (metal)	Zi	150	137	195	56,400	161	0.3
ARSENIC	Zi	79	21	-	33,073		
ASBESTOS	Mo	94	1,425	652			
	Sw	32,800	35,264	30,145	4,500,000	265,581	5.9
	Zi	250,949	247,503	197,682			
BARYTES	Zi	195	-	800	7,700,000	332	
BAUXITE	Zi	4,281	5,139	7,533	88,300,000	5,651	
BENTONITE	Mo	848	716	1,455	8,795,000	1,500E	
CHROMIUM	Zi	552,475	536,052	432,410	8,800,000	506,979	5.77
COAL	Bo	371,395	380,698	410,367			
	Mo	409,000	535,000	67,000			
	Sw	175,984	157,701	115,043	3,866,666,000	3,291,750	0.09
	Ta	4,250	3,000	-			
	Za	568,799	527,340	603,934			
	Zi	3,133,036	2,866,323	2,772,980			
COBALT	Bo	226	254	254			
	Za	3,310	2,570	2,446	27,433	3,122	11.4
	Zi	115	93	97			

MINERAL PRODUCTION IN SADCC MEMBER STATES
(continued)

MINERALS PRODUCED	SADCC COUNTRIES	MINERAL PRODUCTION IN TONNES 1980	1981	1982	WORLD AVERAGE 1980-1982	SADCC AVERAGE 1980-1982	SADCC PRODUCTION % OF WORLD PRODUCTION
COPPER	Bo	15,553	17,819	18,375			
	Za	609,935	587,442	529,641	8,133,300	618,296	7.6
	Zi	26, 901	24, 583	24,693			
DIAMOND (in carats)	An	1,500,000	1,400,000	1,400,000			
	Bo	5,101,000	4,960,252	7,768,840	41,466,670	7,668,407	18.5
	Le	53,714	52,921	42,119			
	Ta	269,876	236,500	220,000			
FELDSPAR	Mo	921	775	696			
	Za	475	452	362	3,633,300	1,937	
	Zi	1,253	2,393	866			
GOLD (in kg)	Ta	3	9	9			
	Za	257	328	418	1,256,665	12,508	1.0
	Zi	11,443	11,691	13,367			
GRAPHITE	Zi	7,385	11,218	8,225	560,330	8,943	1.6
GYPSUM	Ta	8,119	11,500	11,500	67,700,000	10,373	
IRON ORE x 1000 tonnes	Zi	1,622	1,098	837	845,000	1,185	0.14
PIG IRON/x 1000 tonnes	Zi	93	45	40	485,670	59	
STEEL INGOTS x 1000 tonnes	Zi	800	691	528	677,330	673	

MINERAL PRODUCTION IN SADCC MEMBER STATES
(continued)

MINERALS PRODUCED	SADCC COUNTRIES	MINERAL PRODUCTION IN TONNES 1980	1981	1982	WORLD AVERAGE 1980-1982	SADCC AVERAGE 1980-1982	SADCC PRODUCTION % OF WORLD PRODUCTION
FERRO ALLOYS	Zi	221,910	227,002	161,000		203,304	
KAOLIN	Mo	216	296	310			
	Ta	7,434	5,400	-	1,7,016,665	8,127	
	Zi	4,450	4,657	2,441			
LEAD	Za	14,131	18,018	23,198	5,300,000	18,449	
LITHIUM	Zi	21,030	16,444	9,786	6,300 (Li) metal	15,754 (Min)	
MAGNESITE	Zi	78,217	60,194	60,660	11,500,000	66,357	0.6
MICA	Mo	226	300	148			
	Ta	3	2	2	194,000	1,293	0.7
	Zi	1,022	1,406	844			
NICKEL (metal content)	Bo	15,442	18,278	17,756	700,000	30,960	4.4
	Zi	15,075	13,018	13,301			
PETROLEUM x 1000 tonnes crude	An	7,420	6,480	6,590	2,850,000	6,830	0.24
PHOSPHATE ROCK	Zi	130,337	122,235	121,608	133,000,000	124,730	0.09
PLATINUM GROUP (kg metal content)	Zi	304	234	139	209,700	225	0.1

MINERAL PRODUCTION IN SADCC MEMBER STATES
(continued)

MINERALS PRODUCED	SADCC COUNTRIES	MINERAL PRODUCTION IN TONNES 1980	1981	1982	WORLD AVERAGE 1980-1982	SADCC AVERAGE 1980-1982	SADCC PRODUCTION % OF WORLD PRODUCTION
SALT	An	50,000E	50,000E	50,000E			
	Mo	28,000E	28,000E	28,000E	169,800,000	99,378	0.06
	Ta	36,724	27,400	-			
SILLIMANITE	Zi	716	870	2,207	477,670	1,265	0.26
SILVER (kg metal content)	Za	23,752	22,219	27,599	11,247,330	52,957	0.47
	Zi	29,681	26,913	28,708			
SULPHUR (x 1000 tonnes S content)	Za	92	90E	90E	52,500	117	0.22
	Zi	29	27	24			
TALC	Zi	456	386	270	6,966,670	370	
TANTALUM/NIOBIUM (concentrate)	Mo	51	67	50			
	Zi	60	57	62	37,330	60	0.16
TIN (metal content)	Zi	934	1,157	1,196	224,000	1,096	0.5
TUNGSTEN (metal content)	Zi	90	60	35	49,000	62	0.13
ZINC	Za	37,076	42,170	51,117	6,300,000	43,455	0.7
BERYL	Mo	6	7	8			
	Zi	9	42	52		52	

MINERAL PRODUCTION IN SADCC MEMBER STATES
(continued)

MINERALS PRODUCED	SADCC COUNTRIES	MINERAL PRODUCTION IN TONNES 1980	1981	1982	WORLD AVERAGE 1980-1982	SADCC AVERAGE 1980-1982	SADCC PRODUCTION % OF WORLD PRODUCTION
SELENIUM	Za	23	22	23			33

Key: An = ANGOLA
Bo = BOTSWANA
Le = LESOTHO
Ma = MALAWI
Mo = MOZAMBIQUE
Sw = SWAZILAND
Ta = TANZANIA
Za = ZAMBIA
Zi = ZIMBABWE

E = Estimate; All figures in tonnes except where stated otherwise.

* Source for figures: World Mineral Statistics 1978 - 1982
British Geological Survey 1984 HMSO - Publication.

ANNEX III

EXISTING PROGRAMME - PROJECT BRIEFS

Project Ref. No: 1.0.1

REGIONAL MINING SECTOR SKILLED MANPOWER SURVEY

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	To assess the professional, technical and managerial manpower requirements for the SADCC region forecast future requirements, identify training institutions that require strengthening and establishment of new training institutions, where necessary.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Four months
Starting Date	October 1985
Completion Date	April 1986
Estimated Costs	US $100,000
Source of Financing	EEC

TERMS OF REFERENCE

(i) Provide data on supply and demand for skilled manpower concentrating on technical, professional and managerial job categories at present occupied by expatriate personnel. The study will cover mining operations and mineral exploration except for oil and gas dealt with under the energy sector.

(ii) Enumerate by job categories and countries total employment showing SADCC nationals and expatriates.

(iii) Provide job descriptions and qualifications and how acquired.

(iv) Identify existing training facilities including those organized by industry itself.

(v) Taking account of industry's own development plans and of replacement requirements, make tentative forecast of skilled manpower requirements over next ten years.

(vi) Identify which ones can be developed to be regional training institutions with indications of additional inputs needed and numbers of trainees who can be absorbed in each category.

(vii) Identify categories (if any) who require training outside the region giving indication of the numbers approved to be sent annually for training for the next ten years.

(viii) All the numbers will be shown separately by each country and the trainees common entry qualifications will be described.

(ix) The study to be completed in 4 months.

OBJECTIVES

The survey aims at providing information on the following issues:

(i) Present trained manpower availability

(ii) Present trained manpower requirements

(iii) Future trained manpower requirements.

(iv) Present national training policies and programmes.

(v) Existing and projected training facilities.

(vi) Present utilisation and potential capacity of existing facilities.

(vii) Future requirements for training facilities.

(viii) Present standard of training and examination procedures.

(ix) Future standard of training and examination procedures.

(x) Present cost/funding structure of training programmes.

(xi) Future cost/funding structure of training programmes.

LONG TERM OBJECTIVES

The study will enable decisions on the following:-

(i) Identification and strengthening of existing institutions.

(ii) Establishment of new training facilities, where necessary.

(iii) Attainment of self-sufficiency in engineering and technician manpower in mining related fields.

(iv) Standardisation of training programmes.

(v) Establishment of administrative systems for scholarships, awards, accreditation, and funding.

(vi) Sharing of training facilities.

BACKGROUND AND JUSTIFICATION

The Member Countries of the Southern African Development Co-ordination Conference (SADCC) are endowed with abundant mineral resources, many of which have not yet been fully exploited or even explored.

In many Southern African countries, the mining sector plays an important and in some cases a decisive role in the economy through the contributions to the gross domestic products, earnings, Government revenues, recurrent and development expenditure, imports, employment and via its indirect impact on the other sectors of the economy.

The political economic and social life of millions of people in the sub-region is directly and indirectly affected by the performance of the mining sector. Inevitably, therefore, the on-going world recession in the mining industries has adversely affected all the countries in the sub-region.

However, the abundant mineral resources of the region have not been fully developed and one of the factors constraining the ability of SADCC Member countries to exploit and develop these resources is the lack of suitably qualified personnel in mining related fields to undertake the various tasks associated with the economic exploitation and development of mineral resources.

All the SADCC countries suffer from severe shortages of skilled manpower especially in the fields of science and technology. Most of the countries inherited at independence very high rates of illiteracy, low enrollment ratios, a virtual absence of technical and other institutions of higher learning. After attaining independence, great efforts have been made to develop human resources by expanding educational enrollment and by establishing institutions for technical and higher education. However, in spite of these commendable efforts, most countries in the sub-region suffer from severe shortages of indigenous skilled manpower.

The degree of reliance on expatriate manpower varies from country to country. However, in the main indigenous manpower occupies unskilled and semi-skilled jobs, while the expatriates dominate the managerial, administrative, professional and technical fields.

This fact may be illustrated by looking at one of the highly developed mining industries in the region. Zambia has made tremendous progress in the training of its manpower for the mining industry. Nineteen years after independence with some existing mines as old as 50 years and more, the expatriate labour force accounting for less than 4% of the total manpower in the mining industry is still critical to the continued smooth operation of these mines, particularly in the managerial and technical areas. The situation in other Member countries is not likely to be any different from that obtaining in Zambia. If anything, the situation may even be worse given that Zambia has a longer mining history than most other Member Countries.

It is, therefore, imperative that appropriate measures are taken to train, on a more co-ordinated and enlarged scale, indigenous manpower in the required skills to support a sustained programme of exploration, exploitation and development of the sub-region's mineral wealth. In order to do this, existing training institutions will need to be strengthened and where necessary new ones established.

Therefore, in order to provide a more co-ordinated regional training programme necessary to meet the needs of all Member Countries in the various mining disciplines, a detailed study be undertaken.

Project Ref. No: 2.0.1

PRELIMINARY STUDY ON SMALL SCALE MINING, PROCESSING AND MARKETING

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	Identify existing small scale mines, study production, processing and marketing policies, supply and demand of industrial minerals and gemstones in Member States and make recommendations on technical assistance and financing schemes for the small scale operator. Review and formulate appropriate legislation on small scale mining and identify appropriate processing techniques with a view to providing guidelines to the small scale operator.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Six months
Starting Date	October 1985
Completion Date	April 1986
Estimated Costs	US $100,000
Source of Financing	EEC

TERMS OF REFERENCE

(i) A preliminary inventory of existing small scale mining in gemstone, industrial and other minerals in each Member country.

(ii) Study of production, processing and marketing policies in SADCC Member States.

(iii) Study of supply and demand of industrial minerals and make recommendations for marketing of minerals.

(iv) Evaluation of possible assistance for small scale miners and their financial requirements.

(v) Formulate, review and recommend legislation governing small scale mining in Member States.

(vi) Provide and undertake studies on import substitution.

(vii) Identify appropriate processing techniques and provide guidelines to the small scale operator.

(viii) To identify existing deposits of minerals which can be exploited by small scale operators.

OBJECTIVES

(i) Adopt schemes to encourage small scale mining for minerals.

(ii) Adopt common marketing policies for minerals.

(iii) Promote exploitation and utilization of industrial minerals.

(iv) Work out mechanisms to stimulate legal trade in minerals.

(v) Adopt acceptable standards for minerals produced.

(vi) Assist in the identification and characterization of mineral deposits.

JUSTIFICATION

(i) Despite the region's richness in gemstones, industrial minerals and other minerals, there are few legally established functional production and marketing centres.

(ii) Avenues aimed at discouraging illegal mining and marketing of gemstones should be provided.

(iii) Incentives and encouragement from the Government would result in increase of output of minerals and thereby earnings to all concerned.

(iv) Industrial minerals constitute the basis of manufacturing, building, chemical and agricultural industries.

(v) Small scale mining is labour intensive and need not rely on expensive technology and expertise. It is, therefore, likely to produce:

(a) Avenue of employment
(b) Secondary industries
(c) Help growth of infrastructure
(d) Assist in distributing income
(e) Social order and satisfaction
(f) Growth of rural economy

BACKGROUND

It is difficult to define precisely what constitutes a small scale mine. Conditions of occurrence, institutional factors and degree of industrialisation all affect a definition. There have been several types of definitions based on complexity of the operation; on the basis of individual commodity; on the number of people employed; on the basis of life span of the deposit etc. Regardless of specifics

in the SADCC context small scale mining would be considered to involve little investment in infrastructure and fixed plant; will often involve mobile processing plants with small production per day; heavy or total reliance on manual labour and dependence on Government and other technical institutions for guidance on exploitation.

All naturally occurring mineral resources are exhaustible and therefore subject to depletion. It is the obligation of Governments to provide the necessary incentives to explore for new deposits. Concomitantly, it is necessary to develop ways to explore for and exploit smaller deposits. Whereas such deposits may not be viable propositions for large mining houses, they provide not only suitable opportunities for the small scale miner but also enable optimum utilization of the available resources of the Member States. According to Pelletier who worked as a Geologist in Southern Central Africa for many years, "few regions in the world offer better promise to the small mine worker, most of the mineral deposits of the sub-continent lend themselves to exploitation on a small scale and certain minerals are mainly the province of the small worker. Many gold deposits even asbestos deposits can be mined in a small way, in mica, corundum, beryl, tantalite and many others are more often than not mined by individuals or small syndicates. The small worker is a valuable and necessary member of the mining community in Southern Africa and he should be encouraged".

The carbonatities in Tanzania, Malawi and Zambia are important as over 100 mineral species have been identified in them; most being in the rare or very rare category. However, common mineable economic minerals include magnetitie, barite, fluorite, limestone, vermiculite, apatite, zircon, wollastorite etc. Petmatite of some granites in Mozambiquian Belt contain uranium and few hundred tonnes of davidite ore was produced by hand sorting. The Zambia petmatite carry tin, tantalum, fluorite, mica and amethyst; nearly all of which are mined by small scale operators. Other minerals produced by small workings include antimony, corundum, magnetite, phosphate, emeralds and tin. Gemstones are the backbone of mining in Tanzania. These consist of diamonds, beryl, emerald, garnet, zircon with lesser amethyst and tourmaline.

Industrial minerals by their very nature (high bulk and low value) do not lend themselves attractive to large operators; therefore, they are often suitable for localised small scale operations. Industrial minerals are a varied complex group and may be classified on the basis of end uses. They range from least extensive commodities such as sand and gravel, to the most precious such as diamonds. The group may be classified into chemical raw materials (feldspar, salt, fluorite etc.) fertilizer raw materials (phosphate, limestone etc.) ceramic raw materials (sand, feldspar, clay etc.) metallurgical fluxing raw materials (fluorite) structural raw materials (clay, gravel, sand etc.) extended and filler tegiment raw materials (talc, clay etc.) and process aid raw materials (sand clay, manganese etc.) based on end uses.

Whereas metals and fuels are regarded as the "glamour products" of the mining industry, the industrial minerals have always been regarded as the "dirt" and the "forgotten segment" of the industry. However, industrial minerals consumption throughout the world is growing at a faster rate than the other segments of the mining industry.

Production and use of industrial minerals within any region reflects better than any other mineral commodity the standard of living of that region, as shown in 'improvements in transport and communication facilities, housing and any size and breadth of the consumer market'.

The economies of most SADCC countries is essentially agrarian partly modified by the exploitation of valuable minerals such as copper, tin, graphite, asbestos, diamonds, gold, coal, chrome etc. mainly for export. Some economies, however, have been modified by the growth of small and large industries using agricultural and mineral raw materials. This has led to the increasing purchasing power to their population and a demand for more public insitutions, more buildings, higher wages and a higher standard of living, all of which in turn lead to an increasing demands for industrial minerals and especially large volumes, low cost constructional materials, fertilizer minerals, chemical minerals etc. as well as for the higher cost minerals namely gemstones for export. The demands have to be met either by import of such material or by further utilization of local sources.

The early stages of such development have now been reached in most Member States of SADCC. The demand is increasing and the potential uses for most minerals is widening Concomitantly the need to exploit lends a favourable opportunity for the small scale miner. The role of industrial minerals in the econony is vital, perhaps not so much in monetary value but in terms of socio-economic considerations.

Project Ref. No: 3.0.1

INVENTORY ON GEOLOGY, MINERALS AND MINING

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	To identify existing institutions concerned with mineral inventory, comment on their adequacy for formulation of national policies and assess methodology adopted in the procuring, classifying and storing information. In addition, to recommend uniform format for data storage and retrieval, taking into consideration current practices, with a view to eventually introducing computerised handling facilities and finally, review case for a regional technical services facility and detail considerations to be taken into account.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Five months
Starting Date	October 1985
Completion Date	March 1986
Estimated Costs	US $100,000
Source of Financing	EEC

TERMS OF REFERENCE

(i) Identify existing institutions concerned with mineral inventory and comment on their adequacy for formulation of national policies;

(ii) Assess methodology adopted in procuring classifying and storing information;

(iii) Recommend uniform format for data sotrage and retrieval taking into consideration current practices, with a view to eventually introducing computerised handling facilities;

(iv) Review case for a regional technical services facility and detail considerations to be taken into account.

OBJECTIVES

(a) Establish and standardise geological information systems within each member country;

(b) Stimulate geological research and exploration within the SADCC region;

(c) Carry out an inventory on geology, minerals and mining activities within the member countries;

(d) Maintain a permanent data bank on potential mineral resources at national and regional levels.

Long Term

The preparation of a comprehensive and systematic inventory of known mineral resources of each SADCC country. The proposed inventory should include:

(i) Location

(ii) Categorisation of the occurrence in terms of occurrence/deposit (mineable) mine;

(iii) Details of the category in terms of:

(a) Type of occurrence (veins/sheet/massive etc)

(b) Mode of origin (genesis)

(c) Size/volume (production details)

(d) Chemical characteristics/composition

(iv) Required evaluation to establish mineability including anticipated costs etc.

(v) The need for particular mineral(s) in the country and in SADCC.

(vi) The import level for the particular minerals in the country and in SADCC.

(vii) Uses of the minerals as an import substitution.

(e) Assessment of the potential of the country for mineral deposits and requirements for additional mineral resources exploration in each member state.

(f) A review and refinement by way of improving, where necessary, the Geological Institutional resource documentation system of each member state. This to be effected by:

(i) assessment of the prevailing documentation system;

(ii) standardisation of the existing system in a manner which would eventually enable computer application facilities;

(iii) introduction of accepted and approved techniques in descriptive and quantitative data compilation.

(g) Training of SADCC personnel in mineral resource evaluation and documentation procedures.

(h) Exchange of data compilation personnel among Member States on a rota system to facilitate understanding of the requirements of the region.

(i) Legislation making it mandatory for organisations individuals etc. to submit information on geology, minerals, mining costs/expenditure etc. to the national data bank.

(j) Preparation of a questionnaire for completion by all organisations/departments involved in the geological, mineral and mining sectors in each member state.

(k) Periodic submissions of all data collected by the national inventory of each member State to the regional technical services facility for computer coding and storage.

BACKGROUND AND JUSTIFICATION

The mining industry is by far the most important foreign exchange earner for SADCC Member States. The industry contributes a major share of Gross Domestic Product and of Government revenues. Despite determined efforts towards industrial diversification and agricultural expansion, it is evident that the mining industry's predominant position as the major foreign exchange earner in the member States is likely to continue. The larger and readily accessible mineral deposits having been found; it now requires diligent and intensive search for hidden ore bodies. Concomitantly, the smaller deposits would require to be identified, defined, categorised and methods adopted for small-scale mining. Information on the ore bodies is vital. Therefore, the continued growth and development of the mining sector is crucial to the future prosperity of all member States of the region and effective utilization becomes possible where information is available. In addition, diversification into other minerals could enhance stability of the economy.

The planning of a coherent strategy for the utilization and expansion of the region's mineral resources, requires in the first instance, comprehensive and systematic information on the locations, quantity and quality of the various ores and minerals available. This information may then form the basis for planning and regulating their systematic development and utilization in accordance with the region's evolving requirements. The purpose of this project is to enable the establishment of standardised mineral inventory for each member State and a consolidated comprehensive information system in a member State to cater for the requirement of each and every Member State.

Project Ref No: 4.0.1.

FOUNDRY, FABRICATION AND MACHINING FACILITIES

Executing Agency	SADCC Mining Sector Co-ordinating Unit
Project Description	To review and assess the existing fabrication, foundry and machining facilities including future expansion programme, taking into account present and future demand of various products and the availability of raw materials for economic and efficient running of the fabrication and foundry industry to satisfy the requirements of each SADCC Member State.
Location	Lusaka, Zambia, with visits to all SADCC Member States
Duration	Eight months
Starting Date	October, 1984
Completion Date	June, 1985
Estimated Costs	US$ 100,000
Source of Financing	Industrial Development Unit, Commonwealth Fund for Technical Co-operation (IDU/CFTC).

TERMS OF REFERENCE

(i) Assess the existing foundry facilities within Member Countries in the region including any future expansion programmes in each Member State within the region;

(ii) Assess the exisiting fabrication facilities including any future expansion programmes in each Member State within the region;

(iii) Examine and recommend the possibility of rationalizing the existing facilities as outlined in (i) and (ii) to improve the overall performance in terms of quality and productivity including production of items required for the region with the existing or improved facilities;

(iv) Examine the present and future demands of various products in each Member State;

(v) Provide data on outflow of foreign exchange to import foundry products into each Member State;

(vi) Assess the present and future availability of raw materials for efficient running of foundry and fabrication industries to satisfy the present and future demand of the region;

(vii) Recommend the development and acquisition of the technologies involved in this sector to fulfil the present and future requirements of the products in the region;

(vii) Recommend further development of fabrication and foundry industries within the region if necessary, taking into consideration availability of raw materials demand and other essential factors for viable operations and smooth running of the industries;

OBJECTIVES

(a) Utilise all the raw materials available within the region to produce sem-finished and finished products to satisfy the present and future demand of the region;

(b) Optimum utilization of the existing and future facilities to achieve the objective in (a) above.

(c) To acquire the technologies including the existing facilities to support the regional industrial base in agriculture, mining manufacturing, transport, housing and development of small scale industries within the region.

JUSTIFICATION

(a) Due to lack of efficient foundry and fabrication facilities, the region is dependent on importing spare parts in every sector of industry within the region;

(b) Due to the present economic conditions almost all industries are operating below their capacity because of lack of foreign exchange to import spare parts;

(c) Foundry and fabrication industries will go a long way in developing various industrial base which in turn will satisfy the need of the region;

(d) Despite the region's prominance in gross production of minerals local consumption is low, backward and forward linkages are nearly non-existent;

(e) Production of semi-finished and finished metal products for regional consumption and the surplus for export will:

(i) create employment

(ii) increase the value of exports from the region (improve terms of trade)

(iii) create a base for establishing a manufacturing industry.

Project Ref No: 5.0.1.

MINING MACHINERY MANUFACTURING, REPAIRING AND RE-CONDITIONING FACILITIES

Executing Agency	SADCC Mining Sector Co-ordinating Unit
Project Description	To review and assess the existing Mining machinery manufacturing reconditioning and repairing facilities, identify current and future demand and supply for major mining machinery and spare parts in the region and comment on the possibilities of establishing necessary supporting facilities for manufacturing reconditioning and repairing mining machinery, to cater for both small and large scale operators in the SADCC region.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	8 months
Starting Date	October, 1984
Completion Date	June, 1985
Estimated Costs	US$ 100,000
Source of Financing	Industrial Development Unit, Commonwealth Fund for Technical Co-operation.

TERMS OF REFERENCE

(i) Assess the existing mining machinery manufacturing, reconditioning and repairing facilities in the SADCC member States;

(ii) Study and indicate the total present and future requirement of mining machinery and spare parts taking into consideration the present operating mines and those likely to be established;

(iii) Identify the major mining machines and spare parts required and those likely to be required in future to satisfy the major needs of the industries in the region;

(iv) Study and report the net outflow of foreign exchange to acquire the types of mining machinery imported for smooth running of industries in the region.

(v) Study and investigate the possibility of rationalizing and improving the existing facilities within the region to accommodate the manufacturing of mining machinery and spare parts as well as reconditioning and repairing facilities;

(vi) Identify the possible locations to establish the necessary facilities for manufacturing, reconditioning and repairing of mining machinery, to cater for both large and small mining sector, taking into account the existing facilities and other relevant factors, to make the project economically viable for the region;

(vii) Study and recommend the number, type and size of the mills to be set up to manufacture mining machinery and spare parts and to recondition and repair mining equipment, indicate the projected cost for such infrastructure facilities;

(viii) The study should determine the possibility of marketing all the mining machinery and spare parts produced effectively within or outside the region;

(ix) The study should recommend the standardization of mining machinery, equipment and spare parts for use in the region;

(x) Recommend supporting facilities for reconditioning and re-utilization of mining machinery, equipment, tyres and spare parts.

OBJECTIVES

(a) To attain self-sufficiency in mining machinery and spare parts for the mining sector within the region, taking into account present and future requirements for the region;

(b) To export surplus mining machinery spare parts.

JUSTIFICATION

(a) The high cost of replacing machines which, if they were maintained properly, could have had a longer economic life;

(b) The high cost of new spare parts;

(c) The fact that the mining industry within the region can generate and support a machine tooling industry for the manufacture of spares;

(d) The machine tool industry so established will cover other areas (agricultural machinery, civil engineering equipment, transport and consumer services);

(e) Creation of employment opportunities and transfer of technology.

Project Ref No: 6.0.1.

PRODUCTION OF MINING CHEMICALS AND EXPLOSIVES - PRELIMINARY STUDY

Executing Agency	SADCC Mining Sector Co-ordinating Unit
Project Description	To provide data on the existing facilities for the production of mining chemicals and explosives, taking into consideration demand and supply for the mining chemicals and explosives in the region and to comment on the availability of raw materials in the region to justify the establishment of new and supporting facilities for the production of mining chemicals and explosives to satisfy the SADCC region's demand.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	8 months
Starting Date	October, 1984
Completion Date	June, 1985
Estimated Costs	US$ 100,000
Source of Financing	Industrial Development Unit, Commonwealth Fund for Technical Co-operation (IDU/CFTC).

TERMS OF REFERENCE

(i) Assess the existing facilities for production of mining chemicals and explosives within the region including the proposals of improving the existing facilities for increased production.

(ii) Prepare inventory of chemicals and explosives used in the Mining Sector and the quantity consumed by each Member State in the SADCC region, including future requirements of the region.

(iii) Identify source of supply of chemicals and explosives including total cost of importing to each member state of the region.

(iv) Identify the availability of raw materials within each Member State to be used in the chemical industries for the production of various chemicals and explosives used in large quantities by each Member State of the SADCC region.

(v) Recommend the possible locations for manufacturing of chemicals and explosives including the type of technology and plant to be required, indicating the estimated cost.

(vi) Study and determine the possibility of marketing of chemicals and explosives within and outside the region.

OBJECTIVES

(a) Produce mineral processing chemicals and explosives locally and thereby reduce external dependency.

(b) Increase employment and facilitate the transfer of technology in the region.

(c) Satisfy present and future mining chemicals and explosives requirements for the SADCC region.

JUSTIFICATION

The SADCC block as a whole is endowed with tremendous mineral wealth. However, like the rest of the third world, there exists a serious absence of a vertically integrated industrial infrastructure. This is partly due to the fact that technological transfer to the region by transnational companies has always been directed to the exploitation and export of resources and to the extraction of profit rather than increasing the general overall level of industrial development.

On the other hand, the present attempt of regional integration of the SADCC Member States' mining industry, might justify the establishment of profitable production facilities of explosives and some reagents and chemicals used in bulk in the ore processing facilities, as are for instance xanthates and poly- avrylamide type floculant in Zambian copper mines. It is, therefore, useful to conduct an inventory of the type of chemicals and explosives currently being used within SADCC and specific consumption levels for each Member State.

Project Ref No: 7.0.1.

SHARING OF MINERAL PROCESSING FACILITIES

Executing Agency	SADCC Mining Sector Co-ordinating Unit
Project Description	To review and assess the current known and future mineral processing facilities and how they can be best utilized to benefit all the Member States in the SADCC region.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Five months
Starting Date	November 1985
Completion Date	May 1986
Estimated Costs	US$ 100,000
Source of Financing	Under negotiation

TERMS OF REFERENCE

(i) Provide data on the existing mineral processing facilities.

(ii) Identify mineral resources of the SADCC region with particular reference to the type of mineral deposits, form in which they occur and their location.

(iii) Study and comment on the present and future possible mineral processing routes and how they can be rationalised in the SADCC block.

(iv) Assess the present market for mineral processing/metallurgical products within SADCC in context of volume and value, taking into consideration the growth potential of such a market.

OBJECTIVES

(a) Harmonise the utilization of existing plants.

(b) Establish metallurgical plants whose economies of scale would only be justified on a regional level.

JUSTIFICATION

(a) Despite the fact that the region is endowed with tremendous mineral wealth, there exists a serious absence of an integrated industrial infrastructure within the Member States.

(b) There is lack of forward and backward linkage industries within the region.

(c) Transfer of technology

(d) Development is retarded in individual Member Countries due to non-existent of some mineral processing facilities.

Project Ref. No: 8.0.1

ESTABLISHMENT OF IRON AND STEEL INDUSTRY - PRELIMINARY STUDY

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	To carry out an assessment of all aspects of present and potential projects within the region, aimed at setting up of Iron and Steel Plants with empahsis on product specialization to meet the Iron and Steel requirements within the region.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Six months
Starting Date	July 1985
Completion Date	December 1985
Estimated Costs	US$ 100,100
Source of Financing	Under negotiation with France

TERMS OF REFERENCE

(i) Provide data on demand and supply of iron and steel in each member State;

(ii) Study and report the outflow of foreign exchange to import semi-finished steel products in each member State;

(iii) Provide data on availability of raw materials for establishment of iron and steel industry in each member State (i.e. iron ores, coal, electricity and fluxes);

(iv) Identify possible processing routes based on locally available raw materials in each member Country;

(v) Assess the capacities of existing plants for iron and steel;

(vi) Assess the viability of establishing complementary units for iron and steel;

(vii) Provide data on product specialisation of iron and steel products in each member State to meet the regional market.

OBJECTIVES

(a) Attain self-sufficiency of the region in iron and steel products in manufacturing, construction, transportation and light industries;

(b) Export surplus iron and steel products.

BACKGROUND AND JUSTIFICATION

Iron and steel industry plays an important role in the economic and technological development of any country. The member States of the region are well endowed with resources of iron ore, fluxes and fuels. Industrialisation of member States would be difficult without an indigenous iron and steel industry. Steel constitutes the most important group of engineering materials used in all aspects of industrial and domestic life. The establishment of steel works result in the development of technology and industrial growth of the area.

Despite the great potential of iron ore resources, the region imports substantial quantities of steel either in the semi-finished form or manufactured goods. With the establishment of an indigenous iron and steel industry, importation of these products can be obviated and thus saving foreign exchange, creating employment opportunities, developing new skills and improving living standards of our people in the region.

In view of the known resources of the region, establishment of such indigenous iron and steel plants in Member Countries is imperative. It is, therefore, important that efforts aimed at achieving this should be undertaken without unnecessary delay.

Project Ref. No: 9.0.1

FERTILIZER MINERAL RAW MATERIAL DEVELOPMENT - PRELIMINARY STUDY

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	To review and assess the current known and future occurrences of phosphate minerals, limestone, sulphur and gas for fertilizer manufacture in the SADCC region.
Status of Project	New Project
Location	Lusaka, Zambia, with visits to all SADCC Member Countries
Duration	Six months
Starting Date	January 1986
Completion Date	June 1986
Estimated Costs	US$ 100,000
Source of Financing	Under negotiation with Af.D.B.

TERMS OF REFERENCE

(a) Review and geologically assess the current known occurrences of phosphatic minerals as well as phosphorous mineral raw material in each member State;

(b) Collect data of geochemical sampling where possible;

(c) Identify occurrences of lignite (brown coal) and peat (poor hydrous coal) and also occurrences of limestone with chemical composition (calcium and magnesium);

(d) Review bedded shoreline sediments of marine origin for phosphorites;

(e) Study carbonatite plugs which carry apapite (phosphate mineral);

(f) Study the possibility of producing Sulphur from iron pyrites in the region;

(g) Review the possibility of recovery of phosphate from basic slag of phosphorous rich iron ores where the latter is considered as source for iron and steel;

(h) Study all synetic intrusions peripheral to major granitic batholiths especially where major structures intersect;

(i) Assess the economic and technological viability of fertilizer manufacture from gas;

(j) Examine the existing facilities for manufacturing fertilizer within the region including the future expansion plans, to use phosphatic minerals to be used within the region;

(k) Recommend more suitable locations for setting up fertilizer processing plants taking into consideration the availability of phosphatic minerals and any other relevant factors, to make the project viable to satisfy the demand for fertilizer in the region.

OBJECTIVES

(a) To search for and assess the phosphatic deposits of the region systematically so that an orderly exploitation and development can be programmed for manufacturing of fertilizers within the region for existing and projected demand from agriculture sector of the region.

BACKGROUND AND JUSTIFICATION

Essentially the member states of the region are best described as agricultural nations. Although mining, stock (cattle) raising and forestry constitute an important component in a number of the member States, agriculture is the mainstay of the people. However, because of inability to grow the required quantum of agricultural produce, almost all nations of SADCC are dependent on imported food grains.

The nature of soil care and type of agriculture and pastoral farming have resulted in the depletion of important nutrients in the soil resulting in poor yields. Non-availability of fertilizers partly because of high import costs and inadequate production of the levels of fertilizers have led to poor and falling agricultural yields in the member states.

Most of the member States are well endowed with water and if soil conditioning coupled with systematic fertilizer application can be adopted soil fertility can be increased immensely and higher crop returns obtained.

Since the types of fertilizer produced depends on the raw materials available, a proper evaluation becomes essential. Initially, efforts to manufacture basic fertilizer based on local mineral raw material in addition to biogenix raw material should be undertaken. Search for phosphorous bearing rocks therefore is paramount, and all known occurrences of such rocks should be thoroughly evaluated. Thirdly, establishment of fertilizer manufacturing units in Member States should complement one another so that importation of raw material from a third source is obviated.

The planning of a systematic survey of all phosphorous occurrences should be initiated. A comprehensive documentation should precede before a coherent strategy for the exploitation utilisation and expansion is programmed. A methodical development would enhance the usefulness of optimum utilisation for the full benefit of the SADCC region.

Project Ref. No: 10.0.1

MARKET STUDY OF THE PRODUCTION FROM SUA PAN PROJECT (BOTSWANA)

Executing Agency	SADCC Mining Sector Co-ordinating Unit.
Project Description	Study of demand among SADCC Member States with a view to improving the economic viability of the project by supplying to the sub-region part of the common salt and soda ash produced, as well as other salts which could also be profitably produced, particularly potash.
Status of Project	New
Location	Lusaka with visits to SADCC Member States
Duration	Twelve months
Starting Date	Immediate
Completion Date	1986
Estimated Costs	US$ 100,000
Source of Financing	Under negotiation with NORAD

BACKGROUND

Soda Ash Botswana (Pty) Ltd, a wholly owned subsidiary of BP Minerals Int. Ltd., has already carried out a feasibility study with a view to producing some salts from brines to be pumped from SUA PAN which lies 180 km to the Northwest of Francistown. Sua Pan is the most easterly of a group of large flat unvegetated areas in the Makgadikgadi which is a large internal drainage in Northeastern Botswana.

The investigation covered the northern portion of Sua Pan beneath which lies an aquifer saturated with a brine rich in common salt (NaCL), sodium carbonate or soda ash (Na_2 CO_3) with lesser concentration of sodium sulphate and potash. The presence of concentrations of bromine and lithium chloride has also been demonstrated. It is believed that the aquifer contains 1300 millions cubic meters of brine.

Soda Ash Botswana has erected a pilot plant at the site. This is a continuing investigation on the possibilities of processing the brine.

A feasibility study has been carried out with a view to the production of 300,000 tpa of soda ash and 400,000 tpa of common salt.

JUSTIFICATION

A recent study carried out by the Industrial Development Unit of the Commonwealth Fund for Technical Cooperation (IDU/CFTC) showed that:

> The totality of the potash requirements in the SADCC region is imported and there doesn't exist in the SADCC region any project for producing potash. The only possibility is the Northern Botswana brines particularly the Sua Pan.

The market study performed by Soda Ash Botswana has not considered the possibility of supplying soda ash to the aluminium plant which could eventually be established in Malawi. This industry requires large quantities of caustic soda which can be produced using soda ash and sulphuric acid. For processing the aluminium trihydrate which constitute the Mulanje bauxite deposit in Malawi, some 30kg of Na_2O would probably be required per tonne al alumina i.e. the equivalent of 50kg of Na_2CO_3 per tonne of aluminium, assuming a small production of, let say 30,000 tonnes, of aluminium per annum. This would mean some 3000 tonnes of soda ash would be required.

Finally, it would be of interest to better explore the possbilities in the region for some products such as bromine and lithium.

PROJECT DESCRIPTION

The IDU/CFTC has prepared a comprehensive market study for fertilizers in the SADCC region. Potash has been given little importance due to the fact that, until now, no local resources were exploited. This study should be reviewed in order to define the potential market offered in the SADCC region to the potash in Sua Pan.

Finally, the market study will deal with other possible by-products of the Sua Pan project, bromine or lithium for example.

Project Ref. No: 11.0.1

COPPER SHEET AND FABRICATING PLANT (FOR SEMI-MANUFACTURED AND FINISHED COPPER PRODUCTS)

Project Description	Market study for semi-manufactured and finished copper products in SADCC sub-region (wire rods, rods bars sections, sheets, plates, strips and tubes). Feasibility study for the establishment of the plant including possible installation of other facilities (rolling mill, tube fabrication, alloys and fabrication).
Status of Project	New
Location	Lusaka, Zambia - with visits to other SADCC countries
Duration	Six - Twelve months
Starting Date	Mid 1985
Completion Date	1986
Estimated Costs	US$ 200,000
Source of Financing	Under negotiation with the Netherlands

JUSTIFICATION

Zambia is one of the largest copper producing countries. Most of the copper produced in usually exported to various countries. In 1983, the country contributed 5.9% to the world refined production, equal to 573500 tons of primary copper. This tonnage was almost completely exported, only about 1% was used for domestic fabrication.

All the copper is produced on the Zambian copperbelt from underground and open cast operations. It should be noted here that all the copper produced in Zambia is refined and is of excellent quality, very suitable for further processing. This high quality copper can be made available to a FABRICATOR. The availability of cheap electricity is also an advantage.

Most of the copper is exported in the form of cathodes. Considering the high quality of copper and availability of cheap energy the possibility of setting up a copper sheet and fabricating plant for the sub-region requirements of copper semi manufactured and finished products is a viable proposition.

In addition a recent study by the technical University Eindhoven and Tilburg University (The Netherlands) on the viability of export - orientated copper fabrication in developing countries has concluded that the prospects are good. For sheets, plates and strips, and for tubes, the preliminary assessment on the viability of export-orientated production is moderately positive. The study has recommended feasibility study.

Also one of the recommendations of a UNECA Workshop on Copper and Aluminium held in February/March 1985 in Lusaka has urged African countries to increase the capacity for semi-manufactured and finished metal products.

It is therefore being proposed that a study be undertaken to establish the viability of setting up a copper sheet and fabricating plant.

Project Ref. No: 12.0.1

PRELIMINARY STUDY ON THE POSSIBILITY OF ESTABLISHING A REFRACTORY INDUSTRY IN THE SADCC REGION

Project Description	The project will include: - a market study, aimed at assessing the requirements of the SADCC Member States in refractories products. - the identification of raw materials available in the region for the refractory industry. - recommendations in view of the production in the region of some of the refractory components.
Status of Project	New
Location	Lusaka, Zambia with visits to SADCC Member States
Duration	One year
Starting Date	Immediate
Completion Date	1986
Estimated Costs	US$ 120,000
Source of Financing	Under negotiation with UNIDO

JUSTIFICATION

Refractories figure among the materials of fundamental importance since key sectors of industry cannot operate without them. Annex 1 "A Survey of Technological Aspects of Refractories Production" which was part of the paper "needs and production potentialities of refractories in Africa" prepared by UNIDO for the second Regional Conference on the Development and Utilization of Mineral Resources in Africa, 4-9 March 1985, Lusaka, Zambia, provides valuable information on types of refractories used by various industries, as well as a Table forecasting the demand of different refractory products for some selected industries in terms of quality and quantity.

In the SADCC region some industries mainly iron and steel industry (Zimbabwe), non-ferrous metallurgy (Zambia, Zimbabwe, Botswana), building material plants (cement, lime, ceramic), glass making industry, chemical and food industry, use large amounts of refractories, which are for most of them, imported from industrialised countries. This situation must be seen as intolerable not only for the dependence it implies but also because

it is not normal that land locked countries import at high cost heavy products from overseas where raw materials are available in the region.

Actually, raw refractory materials of good quality are known to exist in the region. To name just a few, there are chromite in Zimbabwe in large quantities, kyanite in Zimbabwe and Malawi, graphite fireclays, dolomite etc. scattered in many SADCC countries.

Due to the high transport costs, these resources can hardly be exported to overseas markets. The proposed study is aimed at exploring the possibility of exporting them at least to the regional market, in order to reduce expensive imports from overseas.

BACKGROUND

Not very important attempts have been done until now within SADCC to achieve independence in the field of refractories. The more usual ones (fireclays) are locally produced for building materials industries. But neither basic nor high alumina and special refractories are produced in the region.

Comprehensive studies have however, been performed in Zimbabwe by the Department of Metallurgy and by the Yugoslav company MAGNOCHROM for producing top quality magnesite, and by the Zimbabwe Mining Development Corporation on producing Kyanite refractories.

UNIDO has recently provided the Insitute of Mining Research (Zimbabwe) with equipment for ceramics studies that could be used in part, for refractories studies.

Other specialised facilities and laboratories can probably be identified in the region.

PROJECT DESCRIPTION

The project will include a market study, an appraisal on the availability in the region of refractories, and recommendations. Refractories will be classified in:

	- Silica:	inclusive of natural ones.
-	Alumina-Silicote:	firelay, quartz-firelay, high-alumina kyanite, sillimanite, Mullite, Corundum.
-	Basic:	Magnesite, Magnesite-geophite, magnesite chromite, dolomite
-	Special:	Silicon carbide, graphite, Zirconium
-	Insulating:	Firelay, kaolin, high-alumina, corundum, fibrous, glabular, carbon.
-	Moten:	Alumina-Silicote, basic
-	High Refractory Agglomerate	Oxide material agglomerate, non-oxide material agglomerate.

The present and future requirements of the SADCC region will be defined in terms of quality and quantity. Industries to be consulted with include:

- Iron and steel Industry (iron furnaces, steelworks casting, cake ovens)
- Non-ferrous metallurgy: copper, zinc, lead
- Lime and Cement Industry
- Glass making industry
- Ceramic industry
- Chemical industry
- Power generation industry
- Food industry
- Other industries

The study will also identify the present origin of refractories and the breakdown of the costs (ex plant costs - transport costs - taxes).

The regional resources of refractories will be appraised. Sources of information will be found at the Geological Surveyors, mining departments, specialised laboratories and research institutions, private industries - data related to refractories processing will be collected.

The study will recommend the more suitable follow up in order to reduce dependence of the SADCC region on imported refractory products.

Taking into account the demand and the availability of raw materials, as well as technological and financial constraints, pre-viability or viability study(ies) should be suggested for the production of some finished refractory products to meet the regional demand and eventually, the export market.

Project Ref. No: 13.0.1

CENTRAL ISOTOPE GEOCHRONOLOGY LABORATORY FOR SADCC REGION

Project Description	With the assistance of UNESCO and the Max Planck Institute (Germany) a geochronology laboratory has already been completed at the University of Zimbabwe. This laboratory should serve the SADCC region and play a part in regional geological projects, specifically with respect to correlation in the Pre-Cambrian. The project aims at giving the laboratory the means of consolidating its activity, at developing the geological cooperation within the SADCC region, and at strengthening the links with relevant overseas institutions.
Status of Project	New project
Location	Lusaka, Zambia with visits to SADCC Member Countries
Duration	Five years
Starting Date	Immediate
Completion Date	Continuous
Estimated Costs	US$ 230,000
Source of Financing	Under negotiation with EEC

JUSTIFICATION

A large proportion of the area taken up by the SADCC Member States consist of Pre-Cambrian rocks in which Palaeontology cannot operate. Radiometric dating is essential for regional correlation while laboratories in Europe and America have played a vital role in the past, they are less likely to play in the future, an active part in work which is of regional interest.

A local geochronology laboratory would improve the understanding between geochronology and field geology and increase possibilities of local training. In this sense a central isotope Geology laboratory for the SADCC region would have a strong transfer of technology aspect.

On the other hand geologists, including those belonging to old teams, would actually prefer geochronological work to be done locally. Communication would be better, leading to faster results; better access to and participation in the interpretation of data would be obtained.

The idea of establishing a geochronology laboratory was supported in the 7th Annual Meeting of the International Geological Correlation Programme (IGCP) under the auspices of UNESCO, January 1983 in Monrovia. The recommendations of the meeting were, among others:

(i) The development of mineral resources in relation to sub-regional and regional lines must be encouraged and pursued.

(ii) With this respect, projects such as the IGCP should be encouraged and adequately funded so that the national and regional institutions can form a core and be at the forefront of geological research in Africa.

BACKGROUND

As an implementation of the recommendations of the IGCP meeting, a geochronology laboratory has been established at the Department of Geology of the University of Zimbabwe, through donations of the Max Plank Institute (F.R. of German) and UNESCO.

Amongst the facilities available to the laboratory are a Mass Spectrometer and an on-line microcomputer. For sample preparation, a clean chemistry laboratory has been built which is kept under overpressure and incorporates air hoods with absolute filters.

Iron exchange columns and resin for Rb-Sr, Sm-Nd and Pb (whole rock or ore) separation as well as sub-boiling stills for pure acid preparation, are available. The glassware is oil pyres. Crushing and grinding facilities ae also being set up.

Apart from the mass spectrometer and the computer, the project has been financed by the University of Zimbabwe. It is supported by excellent mechanical and electronic workshop facilities. Having been set up with a maximum of locally or even house-manufactured components, it will be capable of operating without undue dependence on foreign firms for maintenance and repairs.

The person in-charge is Dr J.D. Kramers, member of staff in the Rb-Sr, U-Pb and Sm-Nd methods. One technician is currently employed in the laboratory; a second technician post is projected in the near future.

DESCRIPTION OF THE PROJECT

The project is aimed at:

(i) Consolidating the existing laboratory in terms of equipment staff;
(ii) Developing a geological cooperation within the SADCC Member States;
(iii) Strengthening links with relevant associated institutions overseas.

Consolidating the Existing Laboratory

The existing facilities are already operational. They just have to be kept in such conditions, no major capital equipment would be needed in the foreseeable future; however, there would be a need for minor items whose installation would increase the efficiency and throughput of the laboratory. These items are listed in Annex 1 together with a cost estimation.

The need for staff development and training is a major issue mainly with respect to the central function of the laboratory.

In order to fulfil project requirements in the region, a staff development programme will have to be embarked upon. This would entail:

- one more member of the academic staff, preferably with a geology-chemistry or a geology-physics background, who could be registered for a higher degreed.

- two technicians, one versed more in the instrumental side and the other based more towards chemistry. Intensive training on the job would be essential.

Apart from these requirements for the central isotope laboratory, the project should also provide for similar overseas training opportunitities for at least eight staff development fellows, one from each SADCC member state.

Annexe 2 provides a breakdown of costs over the five years period, for staff and staff development/training.

Developing a Geological Cooperation within the SADCC Member States

A circular letter communicating the existence of the Harare Isotope Laboratory was sent late 1983/early 1984 to SADCC member states. Reactions have been obtained from Botswana, Malawi, Swaziland, Tanzania, Zambia and Zimbabwe. All were positive and a number of studies were proposed:

Botswana	-	dating of material in the Lomagundi basin
	-	dating of the dolerite dykes in the Soshong-Makgware area
Malawi	-	Extension of the Kibaran belt in Malawi
Swaziland	-	Archaen dating programme
Tanzania	-	Middle Proterozoic belt of South-Western Tanzania
Zambia	-	Kibaran and Pan African Belts
	-	dating of basic volcanics

SADCC Member States scientists will be given training opportunities overseas as shown above.

Furthermore to strengthen links between Member countries the following steps will be taken:

Staff of SADCC institutions will be invited to Harare for working visits for analysis of rock samples and associated training. Twelve visits (two months period) have been planned.

The project leader will undertake visits to SADCC member countries on a periodical basis.

Finally, towards the end of the project, a seminar will be held to discuss and evaluate results of the projects, as well as to prepare proposals for continued cooperation.

Annex 3 gives a breakdown of the cost of cooperation between SADCC Member States.

Strengthening Links with Relevant Associated Institutions

The Central Isotope Geology Laboratory will be monitored by the University of Zimbabwe. Hence communications will be greatly facilitateed between geochronology and other disciplines mainly in the geological field.

However, it is desired that the geochronology laboratory will develop links with an overseas associated isotope laboratory plus a Geology Department connected with it. The role of these institutions during the first five years would have a strong donor, or at least, member aspect. However, it is hoped that this asymetrical link will involve into a more equitable connection, in which both sides would derive benefits from the joint projects and mutual contributions within the SADCC regional context.

After careful considerations by the present responsible of the laboratory it has been found that a link with the ZWO Laboratory of Isotope Geology and with the Institute of Earth Sciences both of the Free University of Amsterdam would be quite advisable.

The ZWO laboratory is a large institute which serves as a Central Isotope Geology facility for all geology departments in Dutch Universities and other geological establishments in the Netherlands. It has been involved in many geochronological projects in developing countries including recently Tanzania and Zambia.

The FUA/ZWO by making available its backstopping capacity, in terms of expertise, capital equipment and training facilities, could provide for a considerable contribution from its own resources.

The roles of the FUA/ZWO would be to:

i) host technicians and academic staff development fellows during parts of their period of on-the-job training. This would entail a degree research projects in the case of staff development fellows.

ii) send out technician staff and academic staff for limited periods to aid in development of the central isotape geology laboratory.

iii) act as advisers by correspondence.

Next to the cooperation with FUA, supportive services may be requested from another University, particularly in fields of Geophysics and Structural Geology. The University of Leeds (UK) is suggested by the project leader.

Annex 4 provides a breakdown of the financial provisions for the costs incurred in correlation with foreign university; they mainly consist in-travel costs for short-term visits.

ANNEX 1

BREAKDOWN OF EQUIPMENT COSTING (USD)
FIVE YEAR PERIOD

YEAR	ITEM	COST FOREX	LOCAL	TOTAL
1	2 x 150/min vacuum pump with space kits	3,480	-	3,480
	Tungsten carbide grinding for ring grinder	5,500	-	5,500
	Airfreight	800	-	800
	Import tax	-	1,770	1,770
	sub-total	9,780	1,770	11,550
2	Silica glass replacements for 2 sets of ion exchange columns and parts of 4 sub-boiling stills	3,000	-	3,000
	Ceramic plates for filament holders	2,800	-	2,800
	Airfreight	500	-	500
	Import tax	-	1,160	1,160
	sub-total	6,300	1,160	7,460
3	Stabilized high voltage power supply to replace existing 3500V valve unit	3,200	-	3,200
	Airfreight	600	-	600
	Imported tax	-	640	640
	sub-total	3,800	640	4,440
4	Additional tefton ware for clean chemistry laboratory	2,500	-	2,500
	Airfreight	300	-	300
	Imported tax	-	500	500
	sub-total	2,800	500	3,300
5	1 spot welder to replace existing home made unit	1,900	-	1,900
	Airfreight	300	-	300
	Imported tax	-	380	380
	sub-total	2,200	380	2,580
	TOTAL	22,880	4,450	29,330

BREAKDOWN OF STAFF AND STAFF DEVELOPMENT TRAINING COST FIVE YEARS PERIOD

YEAR	R		ZMD	USD
1	1	One technician (depending on grade)	7,471-9,540	
	2	One staff development fellow (depending on grade)	9,926-11,232	
	3	Stay-in overseas staff development fellow six months (first half stay)		5,685
	4	Stay-in overseas one technician, six months		5,685
		sub-total	around 20000	11,370
2	5	two technicians	14,942-19,880	
	6	One staff development fellow	9,926-11,232	
	7	Stay-in overseas staff development fellow, six months (second half stay)		5,685
	8	Stay-in overseas second technician six months		5,685
	9	Training two specialists from SADCC through six months fellowship		11,370
		sub-total	around 30000	22,740
3	10	Two technicians	14,942-19,008	
	11	One staff development fellow	9,926-11,232	
	12	Training two specialists from SADCC through six months fellowship		11,370
		sub-total	around 30000	11,370
4		id Year 3	30,000	11,370
5		id Year +	30,000	11,370
		TOTAL	150,000	68,220
		USD equivalent	100,000	

BREAKDOWN OF THE COST OF COOPERATION WITHIN THE SADCC REGION

Year				USD
1	1	2 short visits by project leader to SADCC institutions (USD 1335 each)		2,670
2	2	2 short visits by project leader to SADCC institutions		2,670
	3	3 working visits to laboratory from SADCC member countries (USD 3800 each)		11,400
3	4	id	2	2,670
	5	id	3	11,400
4	6	id	2	2,670
	7	id	3	11,400
5	8	id	2	2,670
	9	id	3	11,400
	10	Seminar		20,000
			TOTAL	78,950

ANNEX 4

FINANCIAL PROVISION FOR COSTS INCURRED IN THE COLLABORATION WITH OVERSEAS INSTITUTIONS FIVE (5) YEAR PERIOD

		USD
1.	One visiting ZWO/FUA scientists for one month every year at USD 5852	29,260
2.	Two visiting project leader to overseas	7,640
3.	FUA support service	18,870
	TOTAL	55,770

ANNEX 5

BUDGET PROPOSAL
FIVE (5) YEARS PERIOD

USD 1985

	LOCAL	FOREX	TOTAL
Equipment	4,450	24,880	29,330
Staff and Staff development training	100,000	68,220	168,220
Cooperation within SADCC region	-	78,950	78,950
Collaboration with overseas institutions	-	55,770	55,770
TOTAL	104,450	227,820	332,270

Project Ref. No: 14.0.1

INTEGRATED EXPLOITATION AND PROCESSING OF THE MULANJE AND MANICA BAUXITE DEPOSITS AND ESTABLISHING OF AN ALUMINA/ALUMINIUM/CALCINATION INDUSTRY

Project Description	The project is a feasibility and market study aimed at establishing an integrated alumina/aluminium/calcination industry based on the Mulanje and Manica bauxite deposits in Malawi and Mozambique respectively. It would include a market study on the SADCC regional demand for various bauxite products as well as a review on the availability in the region of the major components and inputs for the project. Wherever relevant to re-evaluate the total resource potential of the bauxite deposits.
Status of Project	New
Location	Lusaka, Zambia with visits to SADCC Member States
Duration	12 - 24 months
Starting Date	Immediate
Completion Date	1986/87
Estimated Costs	US$ 250,000 (feasibility and market studies)
Source of Financing	Under negotiation with several governments/ agencies

TERMS OF REFERENCE

i) To carry out a detailed marketing study of the SADCC region as to the need for various bauxite and products.

ii) To re-evaluate the total resources potential of the bauxite deposits, mining and or hauling for processing.

iii) To define plant capacity and all details necessary for such a plant to produce calcined bauxite, processing into alumina and smelting into aluminium and other products.

iv) To analyze plant capacity, costs etc., related to the production of aluminium sulphate, alumina, calcined bauxite and aluminium.

v) Review all other imputs required for the project including caustic soda, fluorspar, graphite and refractories.

vi) To identify best location for plant(s) and proceed with the establishment of the same.

vii) Assess the environmental impact of the project.

OBJECTIVES

i) The marketing study will correctly identify what end products are most needed in the region.

ii) The resources potential re-evaluation will define plant capacities.

iii) Local processing of the ore will produce a higher-period for the possible regional and export markets.

iv) Reduce dependence on imported bauxite products.

JUSTIFICATION

The SADCC region is entirely dependant on imports from external sources for all aluminium products, although substantial bauxite resources are known to exist on the Mulanje and Manica areas, which have not been systemically evaluated.

The region is well-endowed with cheap hydro-electrical power of paramount importance for the aluminium processing.

A bauxite deposte of economic interest has been delineated on Mulanje Mountain, Southern Malawi. A feasibility study for producing 125,000 tpa of aluminium for export purposes was abondoned for lack of infrastructure.

Bauxite occurs in the provinces of Manica, Zambezia and Niassa in Mozambique. In Manica, the deposits are situated on the southeastern slopes of Mt. Moriangane. Here the deposits have been worked since 1935 producing on an average some 4,000 tons per annum. Exploitation of the bauxite had principally been from the Alumen mine, the deposits extending into Zimbabwe, where active mining has also been carried out over the past 25 years in the Penhalonga valley. The resources in Zimbabwe are nearly exhausted and thus the local industries are in particular need of the raw material. The Alumen mine is now being re-opened, however, no processing facilities exist at the mine site and therefore, temporarily the bauxite is to be transported over the border into Zimbabwe for necessary drying.

With the developments of infrastructure, and proposed expansion of the Cabora Basse electricity system, and increased demand for bauxite products in the region, a full assessment is necessary.

BACKGROUND

Mulanje Bauxite

Bauxite resources were first studied by the Geological Survey in 1924 on Lichenya Plateau of Mulanje Mountain, which stands 1200m above the general surrounding plain level. The bauxite was formed by in situ weathering process of a synthetic intrusive rock.

Anglo American Corp. conducted the first detailed exploration in 1966 and calculated reserves of 60 million tonnes of bauxite ore.

In 1973 LONRHO carried out a feasibility study with the assistance of Alusuisse, Zurch. They proved 30 million tonnes of bauxite reserves with an average alumina content of 14% on R.O.M. basis (Table 1).

These reserves were considered a limiting factor to the total potential of the project in relation to the Richards Bay smelter in South Africa considering the lack of infrastructure at that time, as well as the lack of adequate power.

TABLE 1

ORE RESERVES AND AVERAGE GRADE MULANJE BAUXITE DEPOSIT

Surface Area .....5.2km^2

Volume .....22.8 million M^3

Specific gravity.....1.264

Ore reserves Tonnage .....28.79 million tons

Average grade Al_2O_3

	R.O.M. Basis	Dry Basis
Average grade Al_2O_3	43.9%	58.2
Combined Silica	2.2	2.9
Free quartz	13.3%	17.7
Fe_2O_3	14.2%	18.8
$Ti\ O_2$	1.8%	2.4
Loss on Ignition	24.6%	
TOTAL	100	100

It must be emphasised tht the decision of importing alumine from ALUSUISSE'S facilities in Australia to the ALUSAF's Richards Bay, S.A. aluminium smelter, in which ALUSUISSE is a major shareholder, had probably a relationship with the decision to abandon the Mulanje project.

Manica Bauxite

The bauxite occurs as gibbsitic nodules and alumine-rich clays under a thin layer of dark grey loam or brown clay soil. Pockets and concretion of pure gibbsite are found within the layers of kaolin. Bauxite is also encountered as a product of superficial alteration of plagioclase at the contact zone between intrusive gabbro and granite gneiss.

Based on mineralogic assiciation, Manica bauxites can be genetically classified as "platform Deposits", related to continental lacustrine-lagoon sediments. Such deposts are normally confined to the marginal zones of platform depressions.

Platform type deposts, as in the case of Manica bauxites, are typified by high clay content and the lensoid type mineralization with complex ore morphology. Higher grade ore is found in the central part of the lenses.

A Jura-Cretaceous age has been assigned to Mozambican bauxites. Thus they can be grouped with Tertiery-Mesozoic bauxites, consituted principally of gibbsite (bohemite has as yet not been probably derives from various moderately aluminous igneous, sedimentary and metamorphic rocks. Bauxite tends to grade downwards through thick clayer residual material.

TABLE 2

Typical anlyses of Manica bauxites.

	Gibbsite Nodules	Earthy Gibbsite	Associated Clay
Al_2O_3	58.08	62.36	36.70
SiO_2 12.62	3.14	39.90	
Fe_2O_3	1.82	2.18	8.23
H_2O 26.29	30.53	13.02	

Based on the composition, Manica bauxites can be used for:

a) Electrocorundum production - requirement Al_2O_3 52% min:

Al_2O_3: SiO_2: 12:0 (ref: Earthy Gibbsite)

b) Alumine, Refractories and Aluminiferous cement - requirement

Al_2O_3 46% min; Al_2O_3 : SiO_2 :: 7:0

Al_2O_3 42% min; Al_2O_3 : SiO_2 :: 35:1

Project Ref. No: 15.0.1

PROCESSING OF LIME

Project Description	Numerous deposits of calcareous rocks occur in Mozambique in well defined geologic formations. They offer unique opportunity for the production of lime that may be used for such varied purposed as chemical and industrial, agriculture and construciton. It is proposed that a study be made of the demand within the SADCC region for varied uses of lime in different industries, and then processing plants be established according to such need.
Status of Project	New Project
Location	The location of the processing facilities will be dependant upon numerous factors - best deposits, exploitability, infrastructural facilities etc. The location will, therefore, have to be carefully reviewed. The project life will be no less than three years and will be dependant on the plant capacity.
Starting Date	Immediately after the approval by the SADCC Council of Ministers.
Completion Date	May 1987
Estimated Costs	US$ 50,000
Source of Financing	Under negotiation with NORAD

TERMS OF REFERENCE

i) To define the demand of lime within the SADCC region for varied useage.

ii) To determine type(s) of processing plant(s) needed for such products that are in demand in the SADCC countries.

iii) To analyse plant location in accordance with the overall project economic viability e.g. geologic/mining, transport, infrastructure etc.

iv) To establish plant(s) and make it fully functional.

OBJECTIVES

i) The lime plant(s) will produce material that will have direct industrial application.

ii) It will be designed to reduce dependance on imported material.

iii) Utilization of lime and lime-based products will assist developments in the sectors of agriculture, construction, refractories, chemical industry etc.

iv) The low commodity, high volume raw material upon processing as lime can be sold at a higher price and at a much enlarged market for the benefit of the SADCC countries.

BACKGROUND AND JUSTIFICATION

Calcareous rocks of varied mineralogic association occur in many parts of Mozambique in different geologic formations. The are most extensive in the provinces of Maputo, Inhambane, Tete, Nampula and Cabo Delgado. Resources survey show that the deposits are indeed extensive and can be economically exploited.

The calcareous rocks in unprocessed form have limited useage and are low commodity, high volume material. If, however, this material is beneficiated to lime, a great number of uses can be readily found in chemical and industrial functions, in agriculture and refractories and in construction. In all these fields, there exists a definite demand in the SADCC countries.

Quicklime and Hydrated Lime can be used principally in the steel industry. Housing, building constructions can also be greatly facilitated by the use of mason's and finishing lime. Captive lime can be used in the production of basic oxygen furnace (BOF) steel, alkalies, and sugar. Other important uses of lime are water purification, sulfur removal from stack gases, paper and pulp industries. Agricultural uses of lime are also of particular importance. Lime is also used in road and soil stabilization in Southern Africa. For all these uses, there exists a strong demand in the SADCC countries. It is, however, imperative to determine the exact nature of the need of various countries.

The most favourable factor in considering this project for Mozambique is perhaps the combination of large available raw material and the access to vast resources of fuel, necessary for any commercial lime industry. It is, thus, feasible to consider using the Moatize coal resources and the calcareous rocks raw material of the Tete Province.

Mozambique currently produces 11,000 short tons of lime, used principally in sugar and construction industries. The only other Southern African countries (excluding the Repulic of South Africa) that produce lime are Tanzania (7,000 short tons) and Zambia (213,000 short tons), annually. Because of the very large reserves/resources of the calcareous rocks and coal, the lime production facilities can be very significantly expanded in Mozambique.

Due to the wide varieties of Mozambican resources of calcareous rocks, they can be utilized for the production of different types of lime for specific industrial utilization. These are enumerated below:

a) The metallurgical grade requiring a minimum of 50% CaO with 60 - 80mm grain size and the detrimental minerals limited to:

- 0.05% P_2O_5
- 0.35% SO_3
- 4.0% SiO_2
- 3.0% $Al_2O_3 + Fe_2O_3$

b) In the chemical industry, particularly for the production of Calcium Cerbide, the critical factor is the control of detrital minerals. These are:

- 1 to 3% SiO_2
- 0.05 to 0.15% S
- 0.0006 to 0.010% P_2O_5
- 1-3% $Al_2O_3 + Fe_2O_3$
- 0.3 to 1.5% MgO

Different raw material specifications are needed for varied useage in the industry.

c) 95% $CaCo_3$ is needed for the sugar industry. Maximum acceptable limits of detrimental elements are up to:

- 2.5% SIO_2
- 2.0% alkali
- 0.25% $K_2O + Na_2O$

d) In the glass industry, CaO should be at least 53%, and the Fe_2O_3 content should not exceed 0.02%.

Except in coloured glass production, contents of TiO_2, Mn_3O_4 and Cr_2O_3 are undersirable, MgO, SiO_2 and Al_2O_3 create no special problem, though their contents should not fluctuate.

e) Ground lime has wide application in agriculture, where $CaCo_3$ + $MgCO_3$ should be at least 85%. Grain size of the material and fineness are important consideratons in this respect.

In view of the foregoing it is apparent that the proposed Lime Project deserves a positive consideration. It is pertinent to note here that "the Republic of South Africa was the world's Third largest user of lime in road and soil stabilization, though the industry pattern has changed in recent years and the two-thirds of the production is consumed in gold, ura a and steel industries, in near future, lime use in road and soil application will become more important as it effectively reduces the high cost of road construction and maintenance. Undoubtedly such usage will be of great importance within the SADCC region.

Project Ref. No: 16.0.1

REMOTE SENSING SURVEY USING THE SPOT SATELLITE

Project Description	The first SPOT satellite will be launched by end of 1985 and will observe the Earth with a better ground resolution than LANDSAT series of satellite. It is proposed to use the SPOT capability of recording stereo-scopic pairs of images to prepare a photogeological interpretation of the whole SADCC region in view of mineral resources exploration.
Status of Project	New Project
Location	The location of the tracking station and interpretation centre will be carefully reviewed.
Duration	The design lifeline of the first SPOT satellite is two years.
Starting Date	Immediate after approval by SADCC Council of Ministers.
Completion Date	1986
Estimated Costs	US$ 230,000
Source of Financing	Under negotiation with the EEC

TERMS OF REFERENCE

i) Define a survey programme of the SADCC region in agreement with the other planned missions;

ii) Complete a photogeological interpretation aimed at mineral resources and hydrocarbons explorations using the sterioscopic imagery;

iii) Recommend further follow-up for remote sensing surveys using the SPOT satellites to be launched in the future:

iv) Identify the most suitable place to establish the tracking station and the interpretation centre;

v) Proceed with the establishment of the above.

OBJECTIVES

i) The photo-interpretation of the stereoscopic imagery could help to recognise, other regional level, the major geological features (lineaments, faults, limits of basins);

ii) It will be intended to relate known mineral resources to the satellite imagery interpretation; then possible targets for mineral exploration will be identified;

iii) In the future it can be assumed that further satellite will load other instruments which will allow new surveys. These surveys could justify the establishment of a local tracking station and interpretation centre.

BACKGROUND AND JUSTIFICATION

The SPOT system, conceived and designed by the French Centre National D' Etudes Spotioles (CNES) is being built by French industry working in association with European partners (Belgium and Sweden); it consists essentially of an earth observation satellite and of earth stations for data receiption.

The first SPOT satellite will be launched in sun-synchronous orbit at an equatorial altitude of 822 km. During its first mission, it will offer:

- systematic coverage of the entire Earth every 26 days;
- the possibility of imaging any given area once every 2.5 days on average;
- for experimental purposes recording of stereoscopic pairs of images of a given area, the two images being obtained at short intervals.

The instruments carried by the American satellite of the TIROS and NIMBUS series in the '60s, which offered a ground resolution of the order of 1000m, were the first to reveal the potential of space as observing point. A second generation of remote sensing instruments, with a resolution of the order of 100m, were developed during the '70s for the LANDSAT series of satellites. The images they returned enabled many users to become familiar with a new type of data and to develop the methods required for their interpretation. The '80s will see the introduction of satellite-borne instruments with resolutions of the order of 10m which will open up many new fields of application.

The first SPOT satellite will observe in three sectrol bands (in the visible and near infrared portions of the spectrum) with a ground resolution of the order of 20 meters, and in a broader spectrol band (panchromatic black and white) with a ground resolution of the order of 10 meters.

One of the key features of the SPOT instrument package is the provision for off-nadir viewing (i.e. the instrument can "Look" to one side or ther other of the satellite ground track). Among the possibilities introduced by this feature is that of increased revisit coverage at intervals ranging from one of several days, which should be particularly useful for monitoring localised phenomena evolving on a relatively short timescale. Another is the recording, during successive satellite passes, of stereoscopic pairs of images of a given area.

The design lifetime of the first SPOT satellite is two years. A back-up or follow-up satellite is under construction. Further satellites are under study with a view to ensuring service over a ten year period.

The following are among the main applications for the images returned by the first SPOT mission:

= + land use studies;

+ assessment of renewable resources (Agriculture, Forestry);

+ aid to exploration of mineral and oil resources;

+ cartographic work at medium scales such as 1/100,000, development of new types of maps, and requent updated of maps at scales about 1/50,000.

Project Ref. No: 17.0.1

MANUFACTURING OF DIAMOND TOOLS IN THE KINGDOM OF LESOTHO

Project Description	Market Study on the demand for diamond tools in the SADCC Sub region and an appraisal on the production of diamond tools in the sub-region with a view to making recommendations on the possibilities of establishing a diamond tools manufacturing facility in the Kindom of Lesotho.
Status of Project	New
Location	Lusaka, Zambia with visits to SADCC Member States
Duration	Six months
Starting Date	Immediately
Completion Date	1986
Estimated Costs	US$ 80,000
Source of Financing	Under negotiation with IDU/CFTC

JUSTIFICATION

The SADCC Sub-region is well endowed with diamonds of both jewellery and industrial quality. Botswana, Angola and Tanzania are important Producers of diamonds. In Lesotho, since the closing of the Letseng Mine some hundreds small miners are involved in diamond mining, essentially of industrial quality.

The major mining countries in the SADCC Sub-region, particularly Zambia, Zimbabwe, Botswana and Tanzania use a large quantity of diamond tools, drill bits, turning tools, saws etc, most of which are imported.

Lesotho has developed skills in the diamond industry. For instance, the Machace Diamond Cutting Workshop employs some sixty workers who cut and polish stones from 0,1 carat. Many others are working in the diamond industry in the Republic of South Africa.

The dependance of the SADCC Sub-region on imported diamond tools should be reduced by establishing manufacturing facilities for diamond tools to be identified after a market study. Such an industry would be consistent with one of the most important recommendations of the Lagos Plan of action on down-stream processing of raw materials. Lesotho would like to take advantage of the local diamond production and the presence of skills to develop a manufacturing industry which is not capital intensive.

BACKGROUND

There exists in Zambia one company of the Anglo-American group, Diacarb (Board Division) based in Noola, involved in the manufacture of drilling equipment, including diamond crowns. A subsidiary of the Zambia Consoliated Copper Mines Limited (ZCCM), Circuit Engineering and Tooling Fabricates in Kitwe, Zambia, Tungsten Carbide perforation steels.

However, at this stage it is not possible to carry out an exhaustive study of diamond tools manufacturers in the SADCC Sub-region although it is likely that a wide range of them are not locally produced but imported from the Republic of South Africa and else where.

A market study will be carried out among the SADCC Member Countries so as to determine the exact requirement in drilling crowns and bits, diamond saws, grinding stones and other diamond tools for the industry, taking into account the current local production of diamond tools in the various member states.

The study will enable decisions to be made on the establishment of diamond tool manufacturing plant in Lesotho of the expansion of any existing plant within the SADCC region.

ANNEX IV

PROPOSED PROJECTS

ASSESSMENT OF COAL MINE AND COAL PREPARATION PLANT REQUIREMENTS FOR THE SADCC REGION

PROJECT DESCRIPTION

- Assess coal reserves on a regional basis, listing size and quality of deposits.
- Assess present and future requirements on a regional basis for both industrial and domestic use and define potential development of new mines and preparation facilities, together with estimated capital costs.
- Investigate specific projects and recommend how they may be made more efficient, and or expanded and estimate the capital cost involved.

JUSTIFICATION

To establish, on a regional basis, the overall future requirements, the ability to be self-sufficient in coal production and the potential for export.

COUNTRIES

Angola	-	lignite deposits
Botswana	-	Morapula coalfield
Mozambique	-	Moatize coal basin
Swaziland	-	present exporter
Tanzania	-	Songwe-Kirira coal project
Zambia	-	Karoo basin
Zimbabwe	-	N.W. & S areas

DURATION

One year

IMPLEMENTATION DATE

1986/87

HYDROGEOLOGICAL INVESTIGATIONS

PROJECT DESCRIPTION	To study how best to organise the collection of hydrological data and define areas within the region where the data is most likely to benefit future development for both the agricultural and industrial sectors.
JUSTIFICATION	Not enough is known about water supplies in the Region and the basis on which to determine these resources needs to be established as a first step towards the implementation of supplies. Water is fundamental to industry and to agriculture and without the data on its availability future development will be limited.
COUNTRIES	All SADCC countries
DURATION	One year
IMPLEMENTATION DATE	1987/88

REGIONAL MINING WORKSHOPS

PROJECT DESCRIPTION	Three separate mining workshops are to be organised covering mining technology, mine reactivation/rehabilitation, and project investment respectively. The workshops will draw participants from SADCC member countries and international agencies and mining companies.
JUSTIFICATION	The workshops are expected to play an important role in implementation of the SADCC Mining Sector Programme as they will promote and facilitate the transfer of technology investment flows to the SADCC Region.
COUNTRIES	All SADCC countries. Workshop venues to be determined.
DURATION	One week each
IMPLEMENTATION DATE	1986, 1987, 1988