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Regional Rail Systems Support Project

690-0247

Mozambique Component

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REGIONAL RAIL SYSTEMS SUPPORT PROJECT PAPER

MOZAMBIQUE COMPONENT

(690-0247.56)

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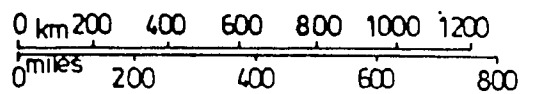
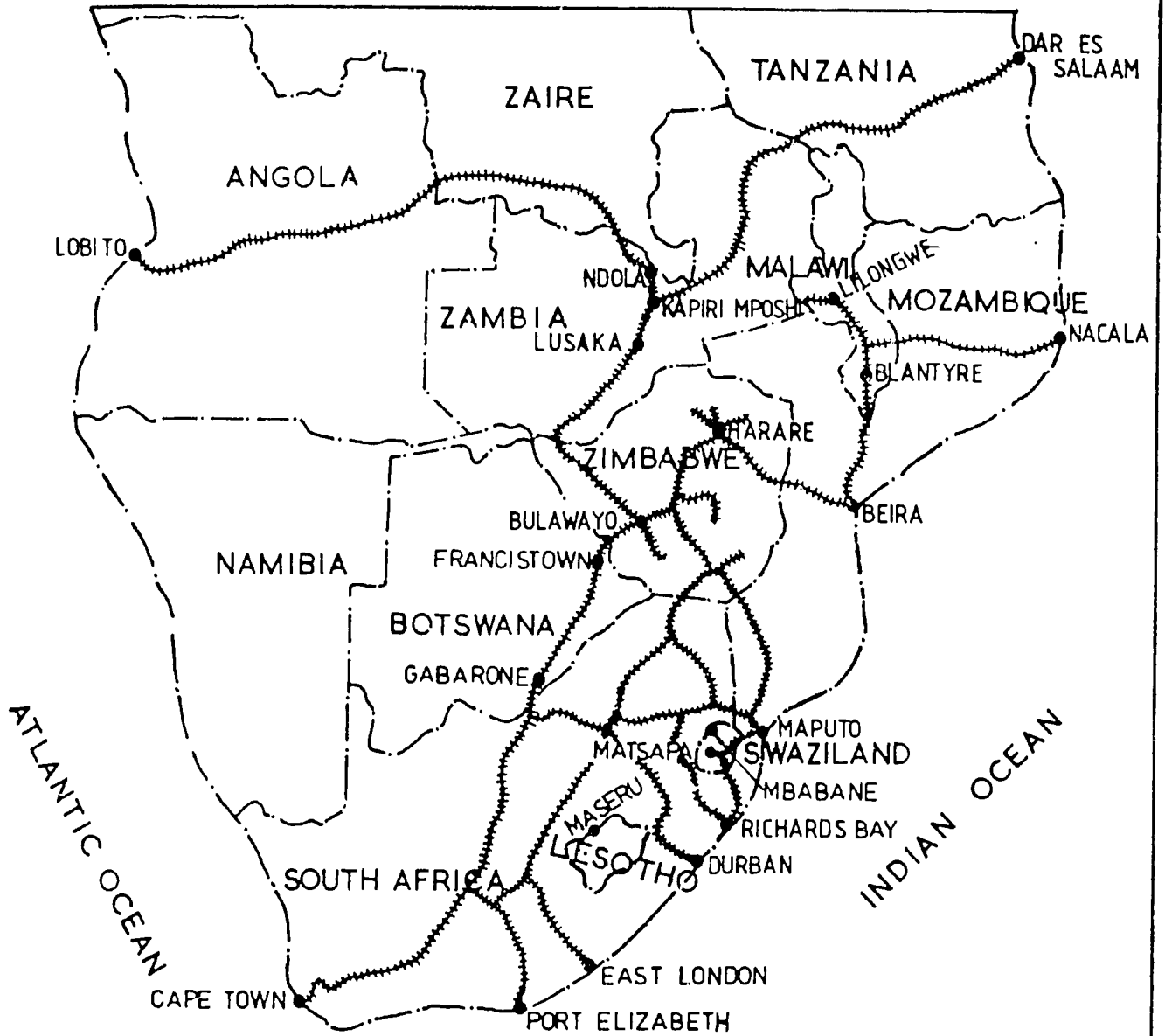
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ABBREVIATIONS AND ACRONYMS

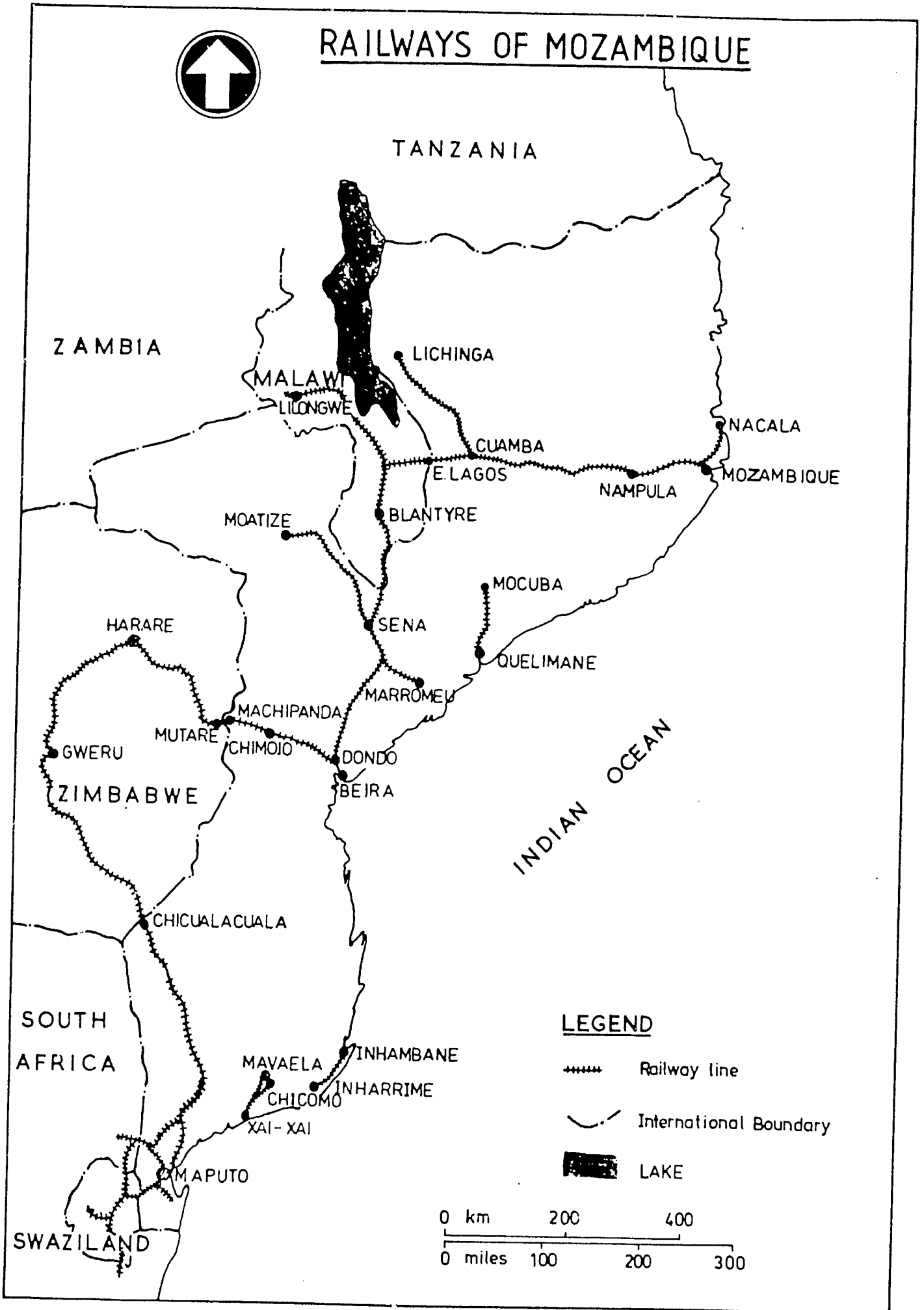
ADB	- African Development Bank
AID	- Agency for International Development
CBD	- Commerce Business Daily
CFM	- Caminhos de Ferro de Mozambique (Rails of Mozambique)
CFM(C)	- Caminhos de Ferro de Mozambique - Centro (Railways of Mozambique - Central)
CFM(N)	- Caminhos de Ferro de Mozambique - Norte (Railways of Mozambique - North)
CFM(S)	- Caminhos de Ferro de Mozambique - Sul (Railways of Mozambique - South)
CIDA	- Canadian International Development Agency
CMO	- Contract Management Office
COP	- Chief of Party
DANIDA	- Danish International Development Agency
DE	- Diesel Electric Locomotives
DH	- Diesel Hydraulic Locomotives
DM	- Duetsche Mark
DNPCF	- Direccao National des Portos e Caminhos de Ferro (National Direction of Ports and Railroads)
EDF	- European Development Fund
ERR	- Economic Rate of Return
FAA	- Foreign Assistance Act
FINNIDA	- Finnish International Development Agency
FRG	- Federal Republic of Germany
FX	- Foreign Exchange
FY	- Fiscal Year
GDP	- Gross Domestic Product
GE	- General Electric
GPRM	- Government of the People's Republic of Mozambique
HB	- Handbook
HP	- Horse Power
IBRD	- International Bank for Reconstruction on Development (World Bank)
IDA	- International Development Agency (World Bank)
IEE	- Initial Environmental Examination
IRR	- International Rate of Return
IFB	- Invitation for Bids
IQC	- Indefinite Quantity Contract
IDM	- Institute of Development Management
KFW	- Kreditanstalt fur Wiederaufbau
KM	- Kilometers
LC	- Local Currency
LOP	- Life of Project
MT	- Metric Tons
MNR	- Mozambique National Resistance
MT	- Metacai (Mozambique Currency)
NORAD	- Norwegian Agency for International Development
NRZ	- National Railways of Zimbabwe
NTK	- Net Ton Kilometer
ODA	- Overseas Development Association

O-J-T	- On-the-job Training
PACD	- Project Assistance Completion Date
PBI	- Parson Brinkerhoff International Inc.
PID	- Project Identification Document
PIO/C	- Project Implementation Order for Commodity Procurement
PTA	- Preferential Trade Area
PIL	- Project Implementation Letter
PM	- Person Months
PP	- Project Paper
PSC	- Personal Services Contract
RCMO	- AID Regional Commodity Management Officer
REDSO/ESA	- AID Regional Economic Development Services Office for East and Southern Africa
RFMC	- Regional Financial Management Center
RFP	- Request for Proposals
RFQ	- Request for Quotations
UTES	- Rail India Technical and Economic Services
RSA	- Republic of South Africa
SADCC	- Southern Africa Development Coordination Conference
SARP	- Southern Africa Regional Program USAID/Zimbabwe
SATCC	- Southern Africa Transport and Communication Commission
SATS	- South Africa Transport System
SCFM	- Standard Cubic Feet per Minute
SIDA	- Swedish International Development Agency
SR	- Swaziland Railways
TA	- Technical Assistance
UK	- United Kingdom
U.S.	- United States of America
UNCTAD	- United Nations Conference on Trade and Development
USAID/S	- U.S. AID Mission in Swaziland
USAID/Z	- U.S. AID Mission in Zimbabwe
USAID/M	- U.S. AID Mission in Mozambique
USD	- United States Dollar

RAILWAYS AND PORTS OF SOUTHERN AFRICA



- +++++ Railway line
- International Boundary



I. BACKGROUND AND PROBLEM STATEMENT

A. The Setting - Traffic Patterns and Projections

This section describes the current traffic patterns and projections for the two principal Mozambican transport systems receiving assistance under this component of the Regional Rail Systems Support (RRSS) Project. The Summary and Recommendations cover document provides an overview of all components of RRSS, and includes a description of the entire SADCC rail transportation system. A description of how the railway authority of Mozambique is organized, including the roles of various divisions, can be found in Section IV.B. and Annex H, Institutional Analysis.

The Mozambique Railways (CFM) consists of six separate railroad lines. The three largest are CFM-Sul [CFM(S)], CFM-Centro [CFM(C)], and CFM-Norte [CFM(N)], and the balance are rather short lines. Each of the six lines is physically independent interconnections within Mozambique), as well as managerially autonomous.

CFM(C) consists of the Port of Beira and the rail lines radiating from Beira to the borders with Zimbabwe (Machipanda line) and Malawi (Sena line), as well as to the coal fields of Moatize within Mozambique. Because of sabotage and long periods of inadequate maintenance, only the main line from Beira to Zimbabwe has been open in recent years. The security problems on this functioning railway line continue to plague operations, which are restricted to the daytime. A major military presence exists in the Beira Corridor to keep the line open and to protect the pipeline which provides almost all of Zimbabwe's crude petroleum.

Because of the non-reliability of service and limitations on serviceable motive power, much of the international transit traffic which traditionally and logically flowed through Beira has found alternative, more costly outlets through South African ports. According to CFM traffic statistics for the first six months of 1987, current traffic (extrapolated to annual rates) amounts to 450,000 tons/year. Of this, 83 percent is transit traffic and 17 percent national. Of the international traffic, 76 percent is descending traffic to Beira, originating in Zimbabwe (49 percent), Zambia (26 percent), and Malawi (25 percent).

CFM(S) consists of the Port of Maputo and the rail lines radiating from Maputo to the borders with Swaziland (Goba line), South Africa (Ressano Garcia line), and Zimbabwe

(Limpopo line). Because of rebel activity and serious track deterioration, service on the Limpopo line had been halted entirely until very recently, and the ongoing rehabilitation of the rail line has been adversely affected. Services on the Goba line have been maintained at reduced levels due to the deterioration of the track. The Ressano Garcia line has been affected relatively little by rebel actions.

For the same reasons as described for CFM(C), shippers have found alternative routings for export traffic. Overall volumes through Maputo in 1986 were reduced to approximately 24 percent of their 1981 levels. According to CFM traffic statistics for the first six months of 1987 (extrapolated to annual rates), 2.1 million tons were handled by CFM(S). Of this, 61 percent was international traffic, almost all of which (96 percent) was descending traffic into Maputo Port (including Matola) originating in Zimbabwe (40 percent), South Africa (33 percent), and Swaziland (27 percent).

CFM(N) consists of a single rail line connecting the port of Nacala with Malawi. Although currently closed to international traffic, the Nacala line is being rehabilitated and could be open and providing limited service by the end of 1989. Following the rehabilitation, combined with ongoing infrastructure improvements at the port, CFM(N) will be capable of handling about 1.0 million metric tons of cargo annually.

Traffic projections for railway routes through to Mozambique ports based on the most recent research by SATCC have been reviewed during the design of this project. The projections used to justify the mix and level of assistance represent the most conservative forecasts available. Tables 1 and 2 show existing and projected traffic for the southern corridors to Maputo and Beira ports using CFM(S) and CFM(C), respectively.

The traffic projections show large increases in Mozambican and South African traffic which are mainly due to coal exports. Traffic on Mozambique's northern system to Nacala port on CFM(N) has also been reviewed in order to ascertain total CFM locomotive fleet requirements even though AID is providing assistance to CFM(C) and CFM(S) only. Future locomotive requirements of CFM are based on forecasts of traffic and assumptions concerning availability, which are a function of maintenance standards and utilization of mainline locomotives. The requirement and the fleet size for CFM(S), CFM(C) and CFM(N) are summarized in Table 3.

Calculations of the total mainline locomotive needs of CFM indicate an overall deficit from 1990 (assuming 65 percent availability), although CFM(S) taken alone has a surplus. The need for CFM to coordinate the requirements of its constituent systems in order to maximize the utilization rate of the locomotive fleet is essential. If the projections of locomotive requirements hold firm, then new units will be needed by the end of the project in 1992 and reappraisal of motive power needs should be thoroughly assessed at that time.

Table 1 CFM (S) Traffic Forecast by User Country
(000's tonnes)

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Total Tons	<u>2051</u>	<u>3807</u>	<u>6075</u>	<u>6718</u>
Mozambique	305	464	757	814
Zimbabwe	419	669	868	999
Swaziland	410	1209	1370	1540
Botswana	0	20	40	40
South Africa	917	1445	3040	3325

Table 2 CFM(C) Traffic Forecast by User Country

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Total Tons	<u>481</u>	<u>998</u>	<u>1713</u>	<u>2269</u>
Mozambique	83	344	781	1203
(Coal)	0	0	(400)	(600)
Zimbabwe	247	450	597	656
Zambia	84	90	100	110
Malawi	66	114	235	300

- Sources:
- (1) SATCC Demand Forecasts (SWECO) February 1988.
 - (2) Operational Plan CFM(C), CIDA 1987 SATCC proj. ROP1
 - (3) Louis Berger International, Southern Corridor Study, June 1988.
 - (4) Study for the Rehabilitation of the Limpopo Line ODA/CIDA, May 1988

Table 3 Locomotive Requirements - CFM

	1987	1990	1995	2000
CFM(S) Requirement	14	24	30	32
Fleet size	46	46	45	45
CFM(C) Requirement	12	25	29	32
Fleet size	20	20	10	10
CFM(N) Requirement	4	6	7	8
Fleet size	13	13	11	7
CFM(ALL) Requirements	30	55	66	72
Fleet size	79	79	66	62
Fleet needed	55	79	88	96
Availability Assumed	58%	70%	75%	75%

NOTE: Fleet needed = Requirement divided by Availability

Source: CFM (June, 1988)

Calculation By: USAID Project Design Team (June, 1988)

NOTE ON AVAILABILITY RATES: The project is intended to improve maintenance standards in the locomotive workshops and consequently, increase the availability of existing locomotives.

B. Problems to be Addressed

This component of the Regional Systems Support Project is designed to improve the level of availability of locomotives for operations and in so doing reduce the need to purchase new locomotives at a time when regional traffic is being attracted back to the shorter routes through Mozambique. By avoiding the need to purchase new locomotives, CFM will be able to meet this growing demand more cost effectively, resulting in cost savings to its regional customers.

CFM faces significant obstacles in its attempts to satisfy the growing demand for services. These include:

1. Inadequately maintained locomotives and wagons

Mainline locomotives in CFM(S) are General Electric U20C, from four to twenty years old, the majority of which require various types of major maintenance. In addition, there are locomotives awaiting rehabilitation and locomotives awaiting non-scheduled minor and major accident repairs. Other locomotives which had been cut off on the Limpopo line for a number of years are now being reexamined to determine if they should be rehabilitated or scrapped.

The CFM workshop in Maputo has received technical assistance from Rail India Technical and Economic Services (RITES) for the past 7 years. At this shop, CFM(S) has attempted to properly schedule periodic maintenance, repair locomotives suffering non-scheduled accident damage, and rehabilitate inoperative locomotives. The output has been sufficient to exceed the number of locomotives annually suffering major damage.

In CFM(C), six of the eight General Electric U20C diesel electric locomotives are less than 10 years old. They are serviced at a running shed where daily, weekly and monthly maintenance is carried out. Apart from small consumable items, no parts for the GE locomotives exist in Beira. Other locomotives at CFM(C) include steam driven mainliners and shunters, most of which were rehabilitated under an ongoing AID-funded project. A large number of other steam locomotives have been scrapped. Maintenance, repair and rehabilitation of steam locomotives is being carried out at the Beira workshop. However, CFM(C) is unable to adequately maintain and repair diesel electric locomotives due to a shortage of parts, inadequate physical facilities and inadequate shop tools and equipment.

The wagon fleet is divided equally between Maputo and Beira. Apart from the wagons rehabilitated by the Italians at the Maputo workshop and also by CFM(S) and CFM(C) under their normal maintenance programs, most are in need of rehabilitation and conversion from bronze bearings to roller bearings. The wagon and coach repair workshop at Maputo is large and well equipped, but the running repair shop is small, inadequate and poorly equipped. The CFM wagon repair shop at Beira is of adequate size, moderately well equipped and has a separate well equipped wheel and tire shop.

2. Poorly Equipped and Structurally Inadequate Maintenance Workshops

The diesel and wagon workshops in Maputo are adequate in size, but have been poorly maintained over a period of several years. The workshops have also endured excessive rain damage. Lighting and electrical systems are inadequate and several gantry cranes are in need of overhaul. Additional problems include standing water in the shop area due to inadequate drainage and inoperable equipment (e.g., central air compressor).

On the CFM(C) system there are inadequate facilities and equipment for diesel repairs. The diesel locomotive repair shop at Inhamingha on the Dondo-Malawi line was cut off in 1985 and is not functioning. Under AID project (690-0231.56), space was cleared in CFM(C)'s steam locomotive workshop to make room for diesel maintenance and repair, but due to the shortage of funds, only building partitions were erected and construction was not completed. Construction of a diesel workshop building must be completed and equipment provided for diesel locomotive maintenance. Current conditions adversely affect worker productivity and the overall output of the locomotive maintenance program at CFM(C).

3. Lack of Adequate Spare Parts

Due to poor track condition and acts of sabotage, spare parts are consumed quickly throughout the CFM system. Expensive machinery is frequently sidelined for want of relatively inexpensive parts. Parts are usually provided only within the context of specific donor-funded activities due to a critical shortage of foreign exchange. A new IBRD-funded project will provide parts to rehabilitate Rumanian-made diesel hydraulic shunting locomotives. The Kuwait Fund has financed spare parts sufficient to maintain locomotives currently operable in CFM(S) through May 1989. The supply of parts is not

adequate, however, to undertake major rehabilitation and no funding for any rehabilitation efforts has been committed to date. AID-financed spare parts for diesel locomotives will be sufficient to meet requirements through 1988 for CFM(C). Beyond that, there will be a critical shortage of spare parts on the CFM(C) system.

4. Inadequately Trained Personnel

In the human resources area, broad programs of railway organizational development and improvement in the base educational levels in Mozambique are required. The former are being addressed by studies and long-range assistance programs being funded by others, while the latter will be achieved on a long-range basis by changes outside the transport sector. There remains a requirement for on-the-job training and technical assistance in locomotive maintenance procedures and in materials management.

5. Inadequate Management Systems

Management areas are also in need of immediate attention. In the financial area, assistance is required immediately to improve the system of accounts and to move CFM toward an accounting system which accurately identifies and allocates costs. There is also a pressing need to develop a management information system which can produce key operating indicators of railway performance and provide this information to management in a timely fashion. Ultimately, a cost accounting system is required enable CFM to revise national and international tariffs based on a sound understanding of the actual costs of rail services.

6. Poor Physical Conditions of the Track

Due to inadequate attention to maintenance over the past 12 years, particularly the lack of a program to replace wooden ties, track conditions on the rail lines connecting Zimbabwe, Swaziland and Malawi with ports in Mozambique deteriorated dramatically. However, substantial investments by the Governments of Zimbabwe and Mozambique and the donor community have greatly improved track conditions, particularly on the Beira line. In the north, three donors are supporting the rehabilitation of the rail line from Nacala to Malawi. Recently, emergency track repairs have been completed on part of the Limpopo line connecting Zimbabwe with Maputo and several donors have expressed a firm interest in further improvements to this vital transport artery. Similarly, a donor commitment was recently made to rehabilitate the track connecting Swaziland with the port of Maputo.

Based on current and anticipated donor and SADCC-country support to reestablish the viability of the Mozambique railway routes through extensive repair of track, as well as substantial investments to improve maintenance capabilities, rail line repair is not a necessary activity under the proposed RRSS Project. (See Annex J for details on donor-supported projects in track repair and maintenance).

7. Poor Conditions at Mozambican Ports

As in the case of track conditions, adequate attention is being placed on port improvements, and rail line and port capacities will be well matched as ongoing and planned projects are completed. Although the ports are operating at levels of efficiency below those experienced prior to the mid-1970s, massive port development projects currently underway portend favorably for the 1990s. (See Annex J for details on donor-supported projects to improve port infrastructure and management.)

8. Security

All areas of CFM operations have been seriously affected by incidents of sabotage. Attacks have resulted in the loss of lives as well as damage to track, locomotives and wagons. Operations have been interrupted for extended periods of time and routine maintenance of the line has been virtually impossible to carry out. All three main lines of CFM have made encouraging efforts to improve security and those efforts have been increasingly supported by the international donor community. The security situation has been improving and it is assumed that conditions will continue to improve over the period of this project. Nevertheless, security problems are a reality which CFM will continue to have to face.

C. Project Rationale

This component of the overall Project, which provides assistance to Mozambique Railways, seeks to improve locomotive availability and operational efficiency through improved maintenance and repair facilities, rehabilitation of locomotives, an improved supply of spare parts, on-the-job training and improved financial and inventory management. These activities will enable CFM to meet increased traffic demands through 1990, while simultaneously increasing its management and operation capabilities and capacity.

The current pattern of traffic flows in the SADCC region is an anomaly resulting from events beyond the control of the

region's rail and port authorities. Past wars of independence, sanctions against Rhodesia (now Zimbabwe), the loss of skilled managers and technicians and the continuing devastation of a major guerilla war have dramatically affected the use of traditional routings. Before these events, Malawi, Zimbabwe, Swaziland and Zambia made extensive use of the regional rail network connecting those countries with the ports of Mozambique.

In the past, Mozambique road, rail and port systems carried 90 percent of the internationally traded goods of Swaziland and Zimbabwe, nearly 100 percent of Malawi's imports and exports and 80 percent of Zambia's copper exports. These routes are shorter and at one time were cheaper and more efficient than the longer, often contorted paths to ports in the RSA. To re-establish these once cost effective transport routes to their former status will save valuable foreign exchange for the landlocked countries and provide a tremendous economic stimulus to the entire region. It is a job that must be done if the region is to grow with a sense of self direction and economic independence.

II. PROJECT DESCRIPTION

The goal of the project is to support the development of a stronger economic foundation for growth in southern Africa. The purpose of this project component is to strengthen and expand the capacity and operational efficiency of Mozambique Railways, focussing on CFM(S) and, to a somewhat lesser extent, CFM(C).

The proposed project will provide assistance to Mozambique Railways in the two principal areas:

- locomotive maintenance and rehabilitation;
- financial management and accounting.

The locomotive maintenance and repair program will be comprised of:

- procurement of parts to rehabilitate eight diesel electric locomotives;
- procurement of spare parts for routine maintenance over a three-year period of 54 diesel electric locomotives and 12 steam locomotives;
- renovation of the locomotive workshop in Maputo and completion of the diesel repair shop in Beira in order to have fully-operational and safe shops for CFM(C) and CFM(S);
- procurement, installation and repair of tools, equipment and machinery for the Beira and Maputo workshops;
- technical assistance and training for CFM(S) in mechanical and electrical repair and maintenance of diesel electric locomotives, including workshop operations and organization; and
- technical assistance and training to improve the procurement, inventory control and storeroom management functions at CFM(S).

The main objective of the locomotive maintenance and repair program is to increase the carrying capacity of CFM by increasing the availability rate of the locomotive fleet. Increased availability will be achieved through improved maintenance of the entire locomotive fleet for a period of three years, as well as the rehabilitation of eight locomotives which are currently inoperative. By the end of the project in 1992, AID assistance will have helped CFM increase locomotive

availability, on a fleet-wide basis, from a 1988 level of 58 percent to 75 percent. An integral part of the project is the development of CFM's internal capability to sustain an effective routine maintenance program after the completion of the AID-funded project.

In the area of financial management, A.I.D. will provide technical assistance and training to establish a financial system which provides timely and accurate information to the management staff of DNPCF and CFM. Included in this project activity will be the generation of cost and revenue data; the development of up-to-date income statements as well as projected income and budget forecasts; the determination of actual costs of services so that revisions may be made to the existing tariff schedule and rates charged by CFM; and the generation of more complete, timely and accurate accounts receivable and payable data.

Training and staff development, including on-the-job training (o-j-t), is an important element of the project. Capabilities will be improved so that CFM and DNPCF are able to sustain the improvements achieved through the technical assistance and training efforts. Three long-term technical assistance positions will be filled by full-time trainers. One mechanical and one electrical trainer will conduct classroom and o-j-t for locomotive repair and maintenance staff. One full-time trainer will conduct courses and provide o-j-t in accounting and financial management. These intensive training efforts will be supplemented by o-j-t conducted by the other technical assistance personnel and by short-term consultants.

In summary, the anticipated outputs of the assistance provided under this project component are:

- 1) 8 diesel electric locomotives rehabilitated and operating;
- 2) 54 diesel electric and 17 steam locomotives properly maintained and operating;
- 3) fully-equipped and structurally sound locomotive workshops in Beira and Maputo;
- 4) improved ordering, stocking and inventory control system in place at the CFM(S) workshop in Maputo;
- 5) improved financial control and accounting system functioning to provide useful information to CFM and DNPCF managers; and
- 6) 192 locomotive maintenance technicians, 24 procurement and inventory control staff, 12 financial managers and 12

accountants trained and working in key staff positions in CFM(S) and DNPCF.

To achieve the outputs listed above, A.I.D. will finance the following:

- 1) Parts to rehabilitate diesel electric locomotive (\$2,400,000);
- 2) Parts to maintain diesel electric locomotives for a three-year period [\$5,900,000 for CFM(S) and \$1,200,000 for CFM(C)];
- 3) Parts to maintain steam locomotives used for CFM(C) (\$1,000,000);
- 4) Renovation of the locomotive repair and maintenance workshop in Maputo (\$1,500,000);
- 5) Completion of the diesel repair and maintenance workshop in Beira (\$150,000);
- 6) Tools and equipment for the Maputo and Beira workshops (\$1,630,000 and \$1,580,000, respectively);
- 7) Technical Assistance (TA):
 - a) Long-term (three years each) for CFM(S)
 - 1 Chief of Party (COP) Railway Mgt Specialist
 - 1 Deputy COP/Financial Mgt Specialist
 - 2 Mechanical Technicians
 - 2 Electrical Technicians
 - 1 Finance/Cost Accounting Specialist
 - 1 Inventory Control/Storerom Mgt Specialist
 - b) Short-term:

Eighteen (18) person-months in selected engineering fields, finance, accounting, inventory control, storeroom management.
 - c) In addition, an administrative assistant will be hired locally for a three-year period to manage all logistical support for the long- and short-term technical assistance team.
8. Training:
 - a) Three long-term advisors for a period of three years each will provide classroom and o-j-t training at Maputo in the following:

- 1 - mechanical for repair and maintenance of diesel electric locomotives;
 - 1 - electrical for repair and maintenance of diesel electric locomotives; and
 - 1 - financial management and accounting.
- b) Eighteen (18) person-months are included in order to bring in training experts to conduct short courses in accounting, financial management, inventory control and storeroom management, and locomotive repair;
 - c) Commodities and classroom equipment for in-country short courses (\$100,000); and
 - d) Specialized courses, e.g., at the G.E. workshop school or at special G.E.-sponsored courses in Africa, (\$200,000).

9. Other Commodities:

- a) prefabricated houses for long-term TA;
- b) furniture for long-term TA;
- c) vehicles for long-term TA; and
- d) computers for the accounting and inventory control departments.

Two project managers will be financed under the project to assist USAID/Mozambique with all aspects of project monitoring and reporting, as required by AID One will be a locally hired engineer; the other, an American project manager with substantial experience in implementing capital development projects.

Specific budget allocations for the various project activities are identified in Section III. A description of the technical approach which will be employed is contained in Section IV. A. and Annex E. Illustrative scopes of work for technical assistance personnel and trainers are included as Annex L and details on training activities are in Section IV. D. and Annex G.

III. FINANCIAL PLAN

AID's life-of-project (LOP) contribution to this project component totals \$34,500,000. Of this total, \$13,198,000 will be obligated in FY 1988 and the remaining \$21,302,000 in FY 1989.

The Host Country contribution will be \$3,000,000 (nine percent of the total cost of the project). Government of Mozambique and CFM contributions are primarily in-kind, representing salaries of counterpart staff and trainees, existing tools and equipment at workshops, an amortized value of locomotive workshops (for three years), and offices and other support for the AID-funded technical assistance team. CFM's major financial outlay will be the foreign exchange costs of some spare parts.

Table 4

SOURCES AND USES OF FUNDS

MOZAMBIQUE COMPONENT

(US\$ 000)

	<u>A I D</u>		<u>HOST COUNTRY</u>		TOTAL
	FX	LC	FX	LC	
I. Technical Assistance	10,743			2,600	13,343
II. Training	3,620				3,620
III. Commodities	15,248		400		15,648
IV. Construction	1,650				1,650
V. Evaluation/Audit	250				250
VI. Contingency (5%)	1,944				1,944
VII. Inflation (5%)	<u>1,045</u>				<u>1,045</u>
GRAND TOTAL	34,500		400	2,600	37,500

Table 5

AID EXPENDITURES BY YEAR
MOZAMBIQUE COMPONENT
(US \$000)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
TECHNICAL ASSISTANCE					
Long-Term	2,062	2,860	2,860	1,461	9,243
Short-Term	110	83	83	56	332
Admin. Assistant	23	42	44	19	128
PSC Proj. Manager	308	221	221	78	828
Local Hire PSC	50	55	60	47	212
SUBTOTAL	<u>2,553</u>	<u>3,261</u>	<u>3,268</u>	<u>1,661</u>	<u>10,743</u>
TRAINING					
Long-Term Advisor	786	953	953	487	3,179
Short-Term Advisor	72	121	48	-	241
Short-Term Courses	-	100	100	-	200
SUBTOTAL	<u>858</u>	<u>1,174</u>	<u>1,101</u>	<u>487</u>	<u>3,620</u>
COMMODITIES					
Computer/Software	25	50	25	-	100
Spare Parts-Diesel-CFM(S)	2,300	3,000	3,000	-	8,300
Spare Parts-Diesel-CFM(C)	300	400	500	-	1,200
Spare Parts-Steam-CFM(C)	-	1,000	-	-	1,000
Workshop Tools - Maputo	1,630	-	-	-	1,630
Workshop Tools - Beira	1,580	-	-	-	1,580
Training Equipment	100	-	-	-	100
Housing/Furniture/Equip.	1,158	-	-	-	1,158
Vehicles	180	-	-	-	180
SUBTOTAL	<u>7,273</u>	<u>4,450</u>	<u>3,525</u>	-	<u>15,248</u>
CONSTRUCTION					
Maputo Workshop	700	800	-	-	1,500
Beira Workshop	100	50	-	-	150
SUBTOTAL	<u>800</u>	<u>850</u>	-	-	<u>1,650</u>
EVALUATION/AUDIT					
SUBTOTAL	-	100	50	100	250
CONTINGENCY 1/	11,484	9,835	7,944	2,248	31,511
INFLATION 2/	1,061	530	353	-	1,944
	<u>-</u>	<u>518</u>	<u>415</u>	<u>112</u>	<u>1,045</u>
TOTAL	12,545	10,883	8,712	2,360	34,500

1/ 10% of Commodities and Construction, 5% of Technical Assistance in Year 1.

2/ 5% P.A. Beginning in Year 2

Table 6

HOST COUNTRY CONTRIBUTION

MOZAMBIQUE COMPONENT

(U.S. \$000)

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
Counterpart Staff					
Salaries/Benefits*	180	180	180	180	720
Other Staff Trained*	200	200	200	200	800
Office Space*	15	15	15	15	60
Supplies, Office Equip etc	5	5	5	5	20
Workshop Space*	50	50	50	50	200
Workshop Equipment*	200	200	200	200	800
Spare Parts	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>400</u>
TOTAL	750	750	750	750	3,000

* Indicates In-kind

IV. SUMMARY OF PROJECT ANALYSES

A. Technical Analysis

1. Introduction

The Mozambique railway system consists of 3,138 kms of single track rail except for an 88 km segment - Ressano-Garcia - which consists of a double track. The 1.067m railway gauge is compatible with that of the other countries in Southern Africa and enables cargo to move from landlocked countries to the ports of Maputo, Beira and Nacala. The main users of CFM are Mozambique, Zimbabwe, Malawi, Swaziland, Zambia and South Africa.

2. Locomotives

A program for phasing out steam locomotives in favor of diesel electrics has been in effect since 1985. Currently only CFM(C) operates steam mainline locos and shunters on the Beira line. All but two of the diesel electrics in current use by CFM are General Electric Model U20C (2150 horsepower), and were manufactured in either the U.S.A. or Brazil for mainline use. The other two diesel electrics are British Model AEI (1200 horsepower). Shunters at CFM(S) are Rumanian diesel hydraulics (1200 horsepower). All shunters used by CFM(C) are steam locomotives.

There are currently 67 G.E. locootives in CFM's fleet, of which 46 are based at CFM(S), eight at CFM(C) and 13 at CFM(N) in Nacala. As of June 1988, the status of CFM's G.E. mainline diesel electric locomotive fleet was as follows:

<u>Location</u>	<u>In Operation</u>	<u>Out of Service</u>		<u>Abandoned</u>
		<u>Repairable</u>	<u>Scrap</u>	
CFM(S)	28	18	1	1*
CFM(C)	6	2	-	8**
CFM(N)	<u>7</u>	<u>6</u>	<u>1</u>	<u>-</u>
TOTAL	41	26	2	9

* abandoned on Limpopo line - status unknown

** abandoned on Sena line - status unknown

(NOTE: Of the 18 Rumanian-made shunters at Maputo, only two are operating, requiring the use of 10 mainline G.E.s for shunting purposes).

The locomotive availability of the G.E. diesel electric fleet has increased as a result of better maintenance in recent years and averaged 61 percent for an month period ending May 1988. (Availability is defined as the true readiness to haul freight or pull passenger trains.) At Beira, the availability rate of mainline steam locomotives increased to 60 percent over the three month period ending May 1988, as steam locos rehabilitated in Zimbabwe under AID Project 690-0231.56 came on stream.

Locomotive availability and operational performance are heavily dependent on: spare parts for maintenance and repair; workshop conditions; the availability of tools and equipment; and labor skills. Without spare parts, locomotives do not run, and without regular maintenance, the life of a locomotive decreases rapidly. Presently, donor funding for parts has dwindled to zero and stocks on hand will soon be reduced to dangerously low levels.

3. Goods Wagons

The three major railway systems have wagons of various types and sizes, with approximately 3000 at CFM(S), 3000 at CFM(C) and 900 at CFM(N). Most of the wagons are in poor condition except for those being reconditioned under specific donor-funded rehabilitation or roller bearing conversion programs. The need to convert or rebuild over 2000 wagons has been identified by various studies undertaken by donor agencies. Of this total estimated need, a firm commitment has been made by DANIDA to rehabilitate 1000 wagons for CFM(C), and DANIDA is considering providing approximately US\$600,000 to procure raw materials for rehabilitating wagons for CFM(S). Other donors are considering providing funding for materials to recondition 500 to 1000 wagons (including conversion to roller bearings). The Government of Italy is providing substantial technical assistance at the wagon repair workshop for CFM(S). This technical assistance program, combined with commodities provided by other donors, is sufficient to cover the wagon requirements for CFM(S) over the next five years.

4. Maintenance Capability

a. Workshops

CFM(S) has fully equipped diesel locomotive and rolling stock repair shops, running-maintenance sheds and storerooms. However, the workshops are in a poor state of repair due to prolonged weather damage, and repairs are needed, mainly in roofing, side glazing and power supply. Electrical circuits are in particularly bad condition and some machinery needs repair. Tools and materials are inadequate and some overhead cranes require motor replacement and overhaul. Spare parts are

being used more rapidly than expected and the supply will be insufficient by mid-1989.

CFM(C) has fully-equipped steam locomotive and rolling stock repair sheds, running sheds and stores. However, for diesel locomotives it has only one running shed, together with a structurally complete but unfinished and unequipped diesel locomotive maintenance and repair shop. No machinery, equipment or tools exist for this diesel shop, and spare parts other than consumables do not exist.

CFM(C) presently suffers from major power outages (approximately 40 percent of the time in 1988) which should be remedied in October 1988 when new back up generators are supplied by SIDA. CFM(N) has a diesel locomotive repair shop at Nampula (which is under conversion from steam to diesel) and a fully equipped running shed at Nampula.

b. Manpower and Training

CFM(S) and CFM(C) have some technically qualified management personnel in all branches of engineering (electrical, mechanical, civil). However, serious deficiencies exist in management and technical skills at both of these railways. Technical assistance being provided by RITES presently fills some of these gaps, mostly in CFM(S). Indications are good that the current RITES contract, which expires in December 1988, will be renewed. In addition, CFM(C) will be getting nine technical assistance personnel from Spain in July 1988.

c. Workshop Productivity

Locomotive repair at CFM(S) is presently supported by RITES. Schedules have been developed for maintenance, repair and rehabilitation. Inadequate numbers of skilled technical staff, combined with inadequate training and a lack of spare parts, have resulted in low workshop productivity. Limited card inventory systems and poor distribution of parts to the workshop, combined with inadequate attention to overall workshop planning, are also serious constraints contributing to the low locomotive availability rate. Wagon productivity is high due to the successful completion of a program to rehabilitate 130 wagons by Italian-funded technical assistance.

At CFM(C), productivity at the steam workshop is relatively high as a result of an AID-funded project to provide spare parts. However, diesel locomotive running maintenance is infrequent and periodic maintenance is virtually nonexistent. These problems are due to a lack of spare parts, tools, and workshop equipment, combined with a paucity of qualified technicians.

5. Proposed Project Actions and Justification

CFM's overall performance is currently limited by several factors, including:

- low availability of locomotives due to limited management skills at workshops coupled with a low level of line technical skills;
- non weatherproof workshops in Maputo combined with electrical distribution circuit problems.
- insufficient spare parts for the provision of normal maintenance for G.E. locomotives in Maputo and Beira.
- insufficient spare parts for the provision of normal maintenance for steam locomotives in Beira.
- major lack of tools and equipment at the diesel workshop in Beira and need for some tools and equipment repair in Maputo; and
- a lack of parts to rehabilitate the 24 G.E. locomotives currently out of service.

a. Locomotive Power

Traffic forecasts strongly reinforce the need to maintain, repair and rehabilitate locomotives at CFM(S) and to gradually transfer some locomotives from CFM(N) and CFM(S) to CFM(C). With increased traffic due to opening of the Beira and Sena lines, there will be a need for increased capability and capacity of CFM(C) to maintain and repair more diesel locos. CFM(S) will also experience increased traffic as the Goba and Limpopo lines reopen, but will not need additional locomotive power since the present fleet is more than sufficient and there is adequate workshop capacity.

The existing G.E. diesel electric fleet, through improved maintenance and the provision of spare parts under the project, can accommodate current 1988 traffic. However, additional diesel electric locomotives must be rehabilitated to meet the forecasted traffic growth over the next 10 years, including the critical year of 1991 when all lines (except Sena) will be open. By 1995, it is expected that many of the steam locomotives currently in operation will be phased out, at which time they should be replaced by diesel electric locomotives.

The proposed project will provide spare parts for the

maintenance of the G.E. diesel electric fleet [54 in CFM(S) and CFM(C) combined] for a 36 month maintenance period. In addition, parts will be provided for the complete rehabilitation of eight G.E. diesel electric locos over a 36-month period. The locomotives thus rehabilitated will probably equal in number those that will be involved in major accidents. The project will also provide funding for spare parts for the steam locomotives located in Beira. This will increase the operating life of the steam locomotive fleet in CFM(C) by at least three years. Steam locomotives will be needed to meet traffic requirements through 1991.

b. Workshop - Tools and Equipment

To improve the performance in the workshops and raise the quantity and quality level of locomotive maintenance and service work, AID will provide new tools, rehabilitate existing equipment, provide some new equipment to the workshop in Maputo, and provide G.E. testing equipment, tools and other equipment to the diesel workshop in Beira.

c. Workshop Repair

The workshops located in Maputo are currently in need of repair. This is due primarily to years of neglect and to a severe hailstorm which occurred in 1979. All workshops have major roof leaks, broken glass, and defects in the electrical distribution systems. The diesel workshop has problems with flooding during the rainy season due to poor drainage, as well as with a turntable which is not in working order. Funding will be provided under this project to take care of repairs in the diesel repair shed, running shed and wagon repair shed.

At Beira, workshop repair is not required at either the steam or diesel workshop. However, the diesel workshop still has to be completed including additional inspection pits and rail lines. This project will provide funding for this work.

d. Computerization Workshop Operations

Currently all inventory control, purchasing and maintenance records are being performed manually at the Maputo workshops. With the increase in complexity and number of spare parts being ordered, installed or handled by the Workshop Materials Planning, Purchasing and Stores Division, a need for computerization is a definite must. This project will provide funding for a personal computer at each of the Workshop's Planning, Purchasing and Stores

units, a Data Base Program suitable for use by the three sections, repairs to the system and necessary computer training.

e. Technical Assistance

The project will fund project technical assistance at CFM-S in these areas of most immediate need.

- a) Locomotive maintenance and rehabilitation and on-the-job training.
- b) Financial management.
- c) Accounting systems development and implementation.
- d) Inventory control systems.

The project will also fund staff to assist USAID/Mozambique in implementing the project. Housing for the technical assistance team, otherwise not available in Maputo, will be provided by constructing or erecting prefabricated housing on railway land.

f. Technical Training

Finally, the project will fund technical training for electrical and mechanical technicians located in Maputo and at any GE short term schools that may be set up in Africa. Training will also be provided in inventory control, stores management, financial management and accounting.

B. Institutional Analysis

A detailed Institutional Analysis is contained in Annex H. The Mozambique Railways organization (CFM) is lodged under the National Ports and Railways Department (DNPCF), which is in turn a unit of the Ministry of Transportation and Communications (MTC). A number of functions of railways (e.g. commercial, finance, planning) are partially within staff departments at the DNPCF or Staff Directorates at MTC.

Many of the CFM personnel performing these functions are, therefore, under dual supervision, within a matrix organization structure referred to in Mozambique as "double subordination."

Geographically, all DNPCF and MTC functions are in Maputo, which poses an extra burden on CFM(C) in Beira, as it is relatively inaccessible from Maputo. The present organizational arrangements are less than ideal and provide less clear lines of authority than desirable in a commercial enterprise. The Government is committed to a reorganization proposal that will separate DNPCF from the Ministry to operate as an autonomous parastatal. Other proposals not yet adopted, would place the staff functions now performed at the MTC and DNPCF level under more direct control of CFM.

The reorganization plan should assist CFM in developing a more commercially oriented sense of enterprise. However, an analysis conducted by the PP team indicates that CFM's problems are not primarily related to its organizational structure.

CFM is, on the one hand, substantially overstaffed for its present traffic level and, on the other hand, lacks skilled personnel throughout the organization. General literacy levels in Mozambique are low, and this problem is abundant on the railways. The workforce is also high in average age. Personnel felt to have potential for training (those under 40 years of age with better than a 4th grade education) amount to only 12 percent and 18 percent of the workforce of CFM(C) and CFM(S), respectively.

There is a large clustering of the workforce at the lower skill levels. Senior technicians, skilled machine operators, and other skilled technicians are in extremely short supply. To fill this gap, underqualified employees are filling higher level positions.

Employee retention is a serious problem at all CFM units. The present exit rate at CFM(S) is 700 persons each year. While there is definitely a need to reduce the oversized workforce, ironically it is some of the most skilled personnel who are

which are never the best, are particularly harsh at the CFM workshops. For example, protective clothing and equipment are nonexistent and hand tools are in short supply.

Employee productivity is low and a lax atmosphere prevails. To counter this, an incentive program has been instituted at Maputo diesel workshop by RITES. The system has worked well so far, resulting in lower cost per unit of output and higher pay. The program is a good model and should be expanded. In addition, a number of major management studies have been performed on CFM units. The need for basic educational improvements, internal and external training programs, enhanced productivity, and better financial controls are common features of most assessments of CFM. While the continuation of the study efforts should be enthusiastically supported, there are certain immediate objectives which CFM should concentrate on.

Based on site visits, meetings, and reports reviewed, the PP team concluded that the three most significant management needs at CFM are:

- Development of a cadre of skilled mid-level managers;
- Development of business plans and goals, objectives, and performance measures; and
- Delegation of authority and assignment of responsibility for meeting planned performance.

Mid-Management Cadre

In order for significant progress to be made at CFM, a cadre of mid-level managers needs to be developed. Senior management alone cannot make the number of decisions required, and the present situation distracts senior management from their role as long-range strategic planners. At the present time, many of these functions are performed by the RITES team, funded by the Kuwait Fund through 1988. Currently a proposal is being reviewed which would extend the RITES assistance to Mozambique through 1993. The present RITES team personnel level is 52 and is proposed to drop to 46 during the five-year renewal period. Until management development and technical skills development at CFM has progressed, the RITES team is vitally needed to sustain the progress made to date at CFM. Other expatriate assistance presently being provided to CFM (on the order of 250 persons), is also a significant factor in bolstering the CFM's organizational capabilities.

Business Plan: goals, objectives, and performance measures

CFM needs to formalize the directions in which it wishes to

progress, in terms of their priority to the railway system. The heavy program of infrastructure development now underway is clearly the immediate priority, as it represents rebuilding for survival. However, the development of a plan to run the rebuilt railways with CFM personnel and improve efficiency and financial return has yet to be established. On a broad front, goals, objectives, performance measures, and target performance levels need to be established. CFM should increasingly be run by the numbers.

Management Development

As part of an overall program of organizational development, a system of accountability needs to be instituted. Authority must be delegated to field managers to carry out necessary activities in areas where responsibility has been assigned to them. In parallel with such a development, improved accounting systems and management information systems need to be developed. These would be outputs of a straight-forward organizational study which would establish mission and function statements for each unit; job descriptions for all employees especially supervisory employees; responsibilities and reporting relationships; and authority delegated.

The institutional analysis included a review of the program of donor assistance presently funded and expected to be funded to the benefit of CFM. Specifically, it was assumed in the project design that the following technical assistance will be provided by other donors:

- RITES workshop and financial team, (46 persons), renewal of present contract through 1993;
- Italian wagon technical assistance to CFM(S),(14 persons);
- Spanish technical assistance to CFM(C),(6 persons);
- Funding of the Workshop Organization and Methods study recommended by Mott, Hay and Anderson.

With the technical assistance provided as an integral part of this project component, and assuming the continued funding of the RITES and other donor technical assistance, DNPCF and CFM are judged able to effectively implement the Project. The AID-funded technical assistance effort will focus on the management problems described in this section in three specific functional categories: (1) financial management and accounting; (2) locomotive maintenance, including shop organization and operations; and (3) purchasing inventory control and stores management.

C. Economic Analysis

A detailed economic analysis of the project is contained in Annex F. The analysis focuses on the locomotive repair and rehabilitation program. The financial management activities were not evaluated due to difficulty in ascribing economic benefits specifically to those technical assistance activities. However, without the technical assistance, the chances of realizing the full range of economic benefits included in the evaluation of the locomotive program will be greatly reduced.

The economic benefits of improved maintenance of the locomotive fleet result from increased availability of locomotives and, consequently, increased utilization of assets. The savings accrue due to avoiding the costs of extra new locomotives in order to ensure that capacity is sufficient to meet demand. In the basic case, locomotive requirements with and without the project have been calculated for assumed levels of availability improvement (from 58 percent at the start of the project to 75 percent upon completion). The provision cost of the additional units required to make up the capacity if availability was not improved was considered under cost savings or project benefits.

In the basic case, project costs took into account the spare parts separately needed for rehabilitation and maintenance, fixed equipment in the workshop, and technical assistance, including training and project management costs and an allocation of housing costs. Recurrent costs of operating the locomotive fleet up to the year 2000 have been calculated, including sufficient spare parts and technical assistance as well as local costs and overhead. The result of the basic evaluation was that an Economic Internal Rate of Return of 17.7 percent could be expected from the project.

The effects of external factors and project options have been evaluated through a range of sensitivity analyses. The analyses covered the effects of security problems and locomotive sabotage, alternative financing of technical assistance using RITES, and extension of the rehabilitation program. Project cost increases of 10 percent and 25 percent, as well as reductions in demand were also tested. The results are summarized in Table 7.

Table 7
SUMMARY OF PROJECT EVALUATION ECONOMIC SCENARIO

	IRR %	NPV @ 10%
i) Basic	17.7	\$6.370 million
ii) Severely damaged locomotives to be replaced by new	Negative	-
iii) Severely damaged locomotives to be rehabilitated and 1 in 4 replaced	14.2	3.231
iv) Transferring TA (3.6 million) to spare parts with RITES doing the TA	21.8	8.68
v) Project Costs + 10%	15.0	4.475
vi) Project Costs + 25%	11.6	1.570
vii) Traffic levels constant 1990-1995, then increasing at 1.5% p.a.	3.5	-4.02

The distribution of economic benefits from the project depends on the perception of costs and the consequent effect on tariffs. Since mechanisms to accurately estimate the cost of traffic on CFM lines are not in place, the benefit distribution in the short-run is theoretical. In the medium- and long-term, the introduction of accurate costing and the application of cost accounting principles to tariffs will occur, partly influenced by technical assistance in accounting and financial management. The distribution of benefits by user country is estimated in Annex F and is summarized in Table 8.

Table 8
Benefit Distribution

	<u>1990</u>	<u>1995</u>	<u>2000</u>
Land Locked Countries	71%	60%	56%
Mozambique	14%	21%	28%
South Africa	15%	19%	16%

D. Training Analysis

Background

Currently there are approximately 15,900 workers in CFM (excluding the port). Their division according to the three lines are as follows: CFM (N) - 4,862, CFM (C) - 5,983, and CFM (S) - 5,080. The workforce is old, with nearly sixty percent above age 40. Approximately 80 percent of the workforce have not gone beyond the fourth year of formal education. A sizeable minority of employees (at least 40 percent) are illiterate. One consequence of this situation is that CFM has very few accredited artisans. It is estimated that less than 20 new apprentices are produced per year. According to a 1986 field study less than 20 workers at CFM South and Central had 12 years of schooling. Nevertheless, according to most qualified observers, the quality of CFM's skilled and semi-skilled workforce is not the major problem. CFM's most serious manpower problem is in its lack of qualified supervisory, management and technical staff. CFM has yet to fill the gaps created by the departure of the Portuguese at independence. Railway supervisors lack formal education as well as management and supervisory training.

There is also a problem of retention of skilled employees. Salaries for skilled and supervisory employees are low when compared to the private sector and other Railway Authorities in the region. Consequently, as employees are trained-up quite a few leave to take higher paying jobs elsewhere. Recent experimental incentive programs developed by the RITES team for the diesel workshops and the Italian-funded technical assistance team for the wagon workshop are succeeding in overcoming this problem.

Staffing Situation at the Diesel Workshops

The staffing situation at the diesel workshops in Maputo and Beira reflect the condition of CFM as a whole in that the staff levels are well below officially established requirements. Furthermore, virtually all those in technical and supervisory positions are under-qualified, both in terms of formal qualifications and actual skills. For example, in the highest supervisory and technical skill category at the Maputo diesel shop, only 20 of 88 positions are filled. In the lower skilled and semi-skilled category, the situation is better, with 206 of 321 positions filled. Even allowing for some overstaffing, there is a critical shortage, particularly in the supervisory and highly skilled positions. Moreover, many of the 20 Mozambicans holding supervisory and technical positions lack the complete range of skills needed to perform well.

Current Railway Training Programs

Formal training for CFM staff is undertaken at the Inhambane Railway School and the regional centers at Maputo and Beira. A railway school for CFM(N) is planned for Nacala.

In 1974 the National Railway Training School was established at Inhambane. It remained largely inactive until 1985 when the French and the Portuguese Governments provided \$9,000,000 to develop the school. Each year approximately 200 persons are tested for enrollment at Inhambane and of these less than 100 are accepted. They all must have at least a Sixth grade education and must pass academic, technical and aptitude tests.

The Maputo and Beira training centers specialize in short courses on railroad subjects ranging from one to nine months. In 1987, 321 CFM(S) staff members attended courses at the Maputo center, of which 289 passed; at Beira 269 passed of the 290 attendees. Under a phase II program, France, Portugal and the EEC are planning additional training at these centers. It is expected that up to 1,000 employees could be accommodated yearly at each center by 1990.

Presently there is no program for training managerial staff. Most of these managers lacked the educational and experimence background necessary when they were promoted into these positions at independence. Because of language and pressures of work they have not been able to take advantage of overseas and regional training opportunities.

On-the-Job Training (O-J-T)

O-J-T is the most prevalent form of training at CFM and probably the most effective. In almost all areas where expatriates are currently supporting the existing system, some o-t-j training is taking place. The RITES team is providing limited o-t-j training at the diesel shops. The Italians who are undertaking rehabilitation of the wagon fleet are providing very structured o-j-t, supplemented by classroom instruction.

Generally, o-j-t has not been as effective as it could be because the expatriate technicians are often not experienced trainers and their terms of reference emphasize the production rather than training aspects of their work.

The Project Component Training Plan

The training plan focuses on structured o-t-j training for CFM(S) personnel in the diesel locomotive workshops and CFM(S) accounting personnel.

Training will consist of the following elements:

1. Structured o-t-j training: All counterparts and other personnel with training potential will follow a competency-based training program with periodic reviews and assessments.
2. Supplemental classroom instruction: Three classrooms will be established at the Maputo workshop where the necessary remedial skills and theoretical foundations will be taught using small homogeneous groups. The entire workshop and accounts section will receive up to eight hours of classroom work per week.
3. Close coordination with railway and regional training schools: Many workers will need longer term training in technical skills and even literacy training, which by 1989 should be available at the Maputo and Beira centers. Higher level regional training and English language training will also be available through other donor-funded projects.
4. Other formal short-term training: Funds are provided for work attachments at other railroads in Africa (e.g., NRZ and Kenya Railways) and attendance at the General Electric diesel training course.
5. Incentive scheme: Training, to be effective, must be desired by those being trained. Incentives will include the awarding of certificates to employees after they master a set of skills (as well as public recognition), Employees with the most potential will be given training contracts in which benchmarks would be set, leading to promotion in grade.

Technical Assistance

Three full-time trainers will be funded: one each in mechanical and electrical engineering, and one in accounting. One of the three positions will be designated as the senior trainer responsible for the direction and supervision of the entire training program.

The trainers will assess the competency, skill and knowledge gaps, and aptitudes of the personnel in their respective fields. In collaboration with other technical assistance personnel, specific training plans will be developed with benchmarks and rewards for selected personnel. The trainers will monitor training activities to ensure plans are being carried out and coordinate with other training programs. Finally, the trainers will develop or revise teaching

materials, handbooks and manuals for use in o-j-t and classrooms.

In the workshops, training will include engine theory and function, engine repair, circuitry, generator operations, problem diagnosis, motor traction, pneumatic systems, use of tools and equipment, and safety. In finance and accounting, training will be provided in basic bookkeeping and accounting (e.g., double entry bookkeeping, central accounts, clerical procedures, etc), stores accounting, cost accounting, and the preparation of financial information for managers.

E. Beneficiary Analysis

There are only five transport corridors outside of the RSA linking SADC member states to ports. Of these, three are in Mozambique. For Malawi, Zimbabwe, Swaziland, and to some extent Zambia, the routes through Mozambique are the shortest and least expensive alternatives for the shipment of imports and exports. In fact, the rail lines to Nacala, Beira and Maputo once carried the majority of internationally traded goods in the region (excluding direct trade with the RSA).

The restoration of the once efficient and cost effective transport systems will have a dramatic and direct impact on the economies of SADC countries. The benefits will be pervasive and people involved in almost every economic activity will be positively affected. Those involved in commercial enterprises will face lower total transport costs and a smaller proportion of those total costs will require foreign exchange. The result should be an increase in production and better use of scarce foreign exchange. Foreign exchange saved will be available for capital equipment and spare parts in other productive sectors, thereby affecting employment and incomes across the socio-economic spectrum of the SADC countries. Lower unit transport costs will profoundly affect those who depend on imports of both capital and consumer goods.

The Economic Analysis section of the PP describes the benefits to be derived from the Project and identifies the countries that will make use of the transport routes through Mozambique.

F. Environmental Considerations

The project entails the supply of locomotive spare parts, workshop tools and equipment, technical assistance and training to existing railway workshops and lines at Maputo and Beira. The locomotives are part of an existing fleet and are diesel electric (smokeless) and steam type. Construction work will be confined to the railway workshops and housing on approved, serviced sites. Changes to the physical environment will be minimal, except for facial repairs to the workshops in Maputo. Increased use of the rail system could cause increased frequency of noise and air pollution from steam locomotives, but this will only occur for short periods of time and within a narrow band around the railway line.

An Initial Environmental Examination, recommending a Negative Determination, was submitted with the PID and approved by the Africa Bureau Environmental Officer and GC/AFR.

G. Financial Analysis

The financial management and accounting procedures of CFM(S) and CFM(C) were reviewed by a team of management consultants from the firm of Deloitte, Haskins and Sells (under contract to USAID/Zimbabwe). The team concluded that the accounting data was irreconcilable and virtually unusable for the purpose of financial analysis. The proposed response presented in this component of the project addresses this problem by including nine person-years of long-term technical assistance and o-t-j training in financial management and accounting. This technical assistance effort should greatly improve the capability of CFM to prepare reliable accounting data and financial information upon which to base management decisions.

Although there is a paucity of reliable data, it is still necessary to determine whether the project is viable and sustainable after AID assistance is completed. The main concern is whether sufficient foreign currency will be earned by CFM to pay for spare parts and other foreign currency expenses. Estimates of revenue, based on an average unit revenue of 2.4c/ntk (U.S. cents per net ton kilometer) were used in the analysis. (This figure is comparable to revenues on contiguous railways in the region.) Foreign currency expenditure items include fuel, spare parts, wagons, tarpaulin hire/maintenance and an allowance for miscellaneous items. The net result on the foreign exchange account is produced and presented in the Table 9. It shows that with the very low traffic volumes experienced at present, CFM does not earn sufficient foreign currency to sustain the project. However, CFM has established a program to set aside a percentage of foreign exchange earnings for purchase of spare parts. With the extra traffic movement generated by the opening of the Limpopo Line in 1990, the foreign exchange account could probably break even. The future financial position seems more secure. After 1990, sufficient foreign exchange should be generated to pay for spare parts for locomotives repair and maintenance activities.

Table 9
CFM PROJECTED FOREIGN CURRENCY INCOME & EXPENDITURES

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Total ntk	329,437	901,000	1,444,205	1,765,717
of which Mozambique	58,138	125,342	304,235	498,852
Transit	<u>271,299</u>	<u>776,348</u>	<u>1,139,920</u>	<u>1,266,865</u>
1. FX Revenue	6,511	18,632	27,359	30,405
2. FX Expenditure				
- Fuel	2,425	4,446	5,336	5,821
- Spare parts	0	0	2,531	2,891
- TA	800	800	800	0
3. - Wagon Hire/Maint.	3,850	8,300	5,000	5,000
- Tarpaulins	1,920	2,155	2,000	2,000
- Miscellaneous	<u>1,349</u>	<u>2,355</u>	<u>2,350</u>	<u>2,356</u>
TOTAL	<u>10,349</u>	<u>18,056</u>	<u>18,017</u>	<u>18,068</u>
4. FX Surplus(Deficit)	<u>(3,838)</u>	<u>576</u>	<u>9,342</u>	<u>12,337</u>

- NOTES: 1. Typical Unit Revenues are Malawi - 3.8c/ntk, Zimbabwe - 2.2c/ntk, and Mozambique - 2.4c/ntk (assuming Pass/Freight ratio 30/70 and 82% of freight revenue is transit for 1987; 2.4c/ntk is O.K.
2. Fuel - consumed at 70l/loco hour. Cost 25c/liter; or \$73,500/year assuming 12 hr, 350 day/year operations. Mainline Fleet needed 1987: 30; 1990: 55; 1995: 66; 2000: 72; allowance for shunting locos 10%.
3. Wagon hire - increase to 1990, then reduction as home fleet increases. Similarly tarpaulins. In 2000 hire charges become maintenance costs.
4. Source - PP team estimates using available data from various estimates of traffic projections, including SATCC (SWECO) reports.

V. IMPLEMENTATION PLAN

A. Project Management Roles and Responsibilities

1. CFM

CFM has primary responsibility for planning and carrying out the rehabilitation and maintenance of locomotives, with technical assistance from RITES. The ongoing maintenance program will be augmented by electrical and mechanical technicians financed under this project component. Similarly, maintenance of locomotives in Beira will be performed by CFM(C) with limited assistance from RITES. CFM(S) will also be responsible for most project procurement, and DNPCF will be responsible for the local construction contracts for the workshops. With assistance provided by the RITES team, CFM(S) has already procured substantial quantities of spare parts with financing from the Kuwait Fund and World Bank. However, since AID regulations will apply to this large-scale procurement activity, project funds will be allocated for assistance through an Indefinite Quantity Contract (IQC) to assist CFM in the preparation of specifications, and tender documents and with the review of bids and proposals for locomotive spare parts and workshop equipment (see the final two paragraphs of the USAID section for details).

CFM(S) will designate a project director to monitor progress on the rehabilitation and maintenance of the CFM(S) components as well as the broader assistance to purchasing, inventory and stores, financial management and strategic planning efforts.

2. Technical Assistance Contractor (AID Direct Contract)

The project technical assistance Contractor will be responsible for providing technical advisors and trainers to assist CFM(S) in the areas of locomotive repair and maintenance, financial and accounting management, and purchasing and inventory control. In addition, 76 person-months of short-term technical assistance and training will be provided by the Contractor. The technical assistance contract will be coordinated closely with other technical and management assistance to CFM(S) being financed by other donors. Annex J provides detailed scopes of work for the long-term technical assistance team members.

Finally, the Contractor will be responsible for the procurement of all classroom supplies, equipment and training aids, as well as for the planning and implementation of short-term training. Attendance at short-courses (e.g., at other railway training schools in the region) will be coordinated by the Contractor. Funds for training commodities and attendance at formal short courses will be included in the Technical Assistance Contract.

3. USAID

USAID/Mozambique will have primary management responsibility on behalf of AID. In view of the size and complexity of the activities proposed and USAID's current and anticipated capacity to absorb additional implementation responsibilities, a two person (one U.S. and one local) PSC project management team will be funded under the project. The PSC project management team will be responsible for most of the day to day management of the project, including inspections: monitoring of implementation progress; review of workplans, parts and equipment lists, technical drawings and specifications; and the preparation of various project reports. The U.S.-hire PSC should have substantial experience in the implementation of capital projects. The local-hire should be an experienced civil mechanical engineer. Overall project management will be the responsibility of the Project Development Officer, USAID/Mozambique with assistance from the Commodity Management Officer, USAID/Mozambique. Contracting, controller and legal support will be provided by USAID/Swaziland. The anticipated reduction in the PDO and Engineering staff at USAID/Zimbabwe means that little, if any, implementation support could be provided by regional staff from that office.

Funds are included to assist CFM in the early stages of project implementation. Likely areas of short-term assistance, which will be in addition to the prime technical assistance contract, are: (1) preparation of spare parts lists and specifications for the locomotive maintenance and repair program; (2) preparation of tools and equipment lists for the Beira and Maputo workshops; (3) preparation of bid documents for major procurement actions; (4) preparation of design drawings and bills of quantity for workshop construction and renovation activities; (5) review of proposals and bids for parts, tools, equipment and workshop construction. Eight person months of short-term assistance, probably through an existing IQC, has been included for the above tasks.

In addition, four person-months are included to help CFM establish a basic stocking and parts tracking system prior to the arrival of AID-financed spare parts. This short-term assistance will be required, assuming that the prime technical assistance contractor will not be on site soon enough to install a functioning system before the arrival of the first batch of spare parts.

4. Reporting Requirements

a) Project Progress

The project will be monitored by a Project Committee which will meet at least quarterly to review ongoing progress,

future work plans and to address implementation problems. Composition of the Project Committee will include representatives from DNPCF, the CFM(S) workshop [CFM(C) as needed], USAID/Mozambique or its representatives, and the technical assistance contractor. The committee will be chaired by a Project Director who will be designated by DNPCF.

b) Progress Reports

CFM(S) and CFM(C) will submit progress reports on a quarterly basis to the Project Committee and USAID/Mozambique. These reports are to be submitted within 10 days after the end of the calendar quarter. The project reports are expected to cover, inter alia:

- i) major activities and general progress against the work plan;
- ii) problem areas requiring Project Committee or USAID assistance;
- iii) issues and problems that impinge on the future implementation and direction of the project;
- iv) CFM's proposed solution to the problems;
- v) action to be taken during the next quarter; and
- vi) information on any matter which the Committee and/or USAID may reasonably request.

c) Financial Reports

The technical assistance Contractor will submit quarterly reports detailing expenditures for the technical assistance effort to the Project Committee and AID. The PSC project managers will prepare similar reports on all other direct AID contracts, and CFM will prepare reports on all Host Country contracts.

Expenditures and disbursements will be shown in each report by line item for the previous quarter and cumulatively. (Line items covered should be consistent with those shown in the project budget in the Grant Agreement). Any current and anticipated financial problems will be clearly noted and explained in the report. Financial problems requiring resolution by the Project Committee and USAID will be highlighted. The required format for each financial report will be determined by the Controller, USAID/Swaziland and described in Project Implementation Letters, as appropriate.

B. Implementation Schedule for the Mozambique Component

<u>ACTIVITY</u>	<u>PROPOSED DATES</u>	<u>RESPONSIBLE ORGANIZATION</u>
. Project Authorized	8/88	USAID/Z
. Project Grant Agreement signed	8/88	USAID/M, GPRM
. PIO/Ts for TA contract and PSCs signed	10/88	USAID/M, DNPCF
. CBD notices for PSCs and TA issued	11/88	USAID/S
. RFP for TA issued	11/88	USAID/S
. Initial conditions precedent met	11/88	MOT, CFM
. First RFQ for diesel loco spare parts issued	11/88	CFM, USAID/M
. RFQ for steam loco parts issued	11/88	CFM, USAID/M
. Equipment for workshops ordered	12/88	CFM, USAID/M
. PSCs for Project Management selected and contracts signed	1/89	USAID/M, USAID/S
. TA proposals received	1/89	USAID/S, USAID/M
. Agreement on TA housing signed	1/89	USAID/M, USAID/S
. Evaluation of TA proposals	1/89	USAID/M, CFM, USAID/S
. Plans & specifications for workshop construction finalized and approved	2/89	CFM, PSC
. Final Proposals for TA requested and interviews held	2/89	USAID/S, USAID/M, CFM
. U.S. PSC Project Manager arrives	3/89	USAID/M, PSC
. RFP for repair of Maputo workshops and equipment rehabilitation issued	3/89	CFM, USAID/M, PSC
. RFP for construction of diesel workshop at Beira issued	3/89	CFM, USAID/M, PSC
. TA Contractor selected, contract signed	3/89	CFM, USAID/M, USAID/S
. Contracts for housing, computers & vehicles signed	3/89	TA Contractor
. Household furniture and equipment ordered	3/89	TA Contractor, USAID/M
. Locomotive knock down begins	3/89	CFM-S
. Workshop repair and equipment Contracts for Maputo workshops awarded	4/89	PSC, CFM, USAID/M, USAID/S
. Construction Contract for Beira diesel workshop awarded	4/89	PSC, CFM, USAID/M, USAID/S
. GPRM completes work on serviced site for housing and housing erection starts	4/89	CFM
. Vehicles arrive, clear customs	5/89	TA Contractor, USAID/M
. First TA housing completed	5/89	TA Contractor
. Household furniture/equipment delivered	5/89	TA Contractor, USAID/M
. First TA Arrives (COP, Purch/inv/stores)	5/89	TA Contractor
. First Yearly Work Plan completed	6/89	TA Contractor, CFM, USAID/M
. First steam loco parts arrive	6/89	CFM, TA Contractor, PSC

. First diesel loco spare parts arrive	6/89	CFM, TA Contractor PSC
. Remainder on long term TA team arrives	7/89	TA Contractor
. Financial Management TA begins	7/89	TA Contractor CFM
. Formal workshop training begins	7/89	TA Contractor CFM
. Construction of Beira diesel workshop completed, tools and equipment arrive	9/89	CFM, PSC, SARP
. Equipment arrives for Maputo workshop	9/89	CFM, PSC,
. Second RFQ for diesel loco spare parts issued	9/89	CFM, USAID/M
. All TA housing completed	10/89	TA Contractor
. Repair of Maputo workshops completed	10/89	PSC, CFM, USAID/M
. First Semi Annual Report due	11/89	TA Contractor
. Second loco spare parts list finalized	11/89	CFM, USAID/M, TA
. First loco rehabilitated under project completed	12/89	TA Contractor CFM
. Second Semi Annual Report due	5/90	TA Contractor
. Second order of steam parts arrive	6/90	CFM, TA Contractor PSC
. Second Yearly Work Plan completed	6/90	TA Contractor CFM
. Second order of diesel spare parts arrive	6/90	CFM, TA Contractor PSC
. Information systems in place identifying costs of services	10/90	CFM, TA Contractor
. Plan for allocation of foreign exchange for spare parts finalized	10/90	CFM, TA Contractor
. Third diesel loco spare parts list finalized	11/90	CFM, TA Contractor PSC
. Third Semi Annual Report due	11/90	TA Contractor
. Mid-term Evaluation	12/90	CFM, USAID, IQC
. Progress towards cost based tariff structure verified	4/91	CFM, TA Contractor PSC
. Fourth Semi Annual Report due	5/91	TA Contractor
. Third Yearly Work Plan completed	6/91	TA Contractor CFM, USAID/M
. Third diesel loco order for Order Spare Parts arrive	6/91	CFM, TA Contractor PSC
. Fifth Semi Annual Report due	11/91	
. Final Report Due	11/91	TA Contractor
. TA Contract Funds	5/92	TA Contractor USAID/S
. Last diesel loco rehabilitated under project completed	6/92	TA Contractor, CFM
. End of Project Evaluation	7/92	CFM, USAID/M, IQC,
. Project Assistance Completion Date	4/92	

The first annual workplan will be prepared by the long-term contractor within a month of arrival and will be updated at the beginning of years two and three. The workplan will detail how the contractor will collaborate with CFM to achieve the outputs and end of project objectives for the Mozambique Component. Specific actions which must take place, projected dates, the specific individuals responsible and the amounts and sources of financial or personnel resources required will be included in the workplan.

C. Procurement and Contracting Plan

1. Commodities

Contracting and Financing Methods

a. Responsible Agency

The Procurement Unit of CFM(S) will be the likely primary implementing agency for the procurement of spare parts and workshop tools and equipment. This unit has been responsible for all phases of procurement using financing from the Kuwait Fund and the World Bank during the past three years, for a total value of \$4,000,000. Based on USAID/Mozambique's knowledge of Host Country experience, it has been concluded that CFM has the capability to contract for the procurement of spare parts and equipment.

b. Procurement Lists

Material, equipment and spare parts proposed to be financed by AID under this component of the project are detailed in Procurement Lists. As these lists are extensive (comprising more than one hundred pages), they are not attached to this Project Paper, but are being distributed separately to the following offices:

M/SER/OP/COMS, AID/Washington
USAID/Zimbabwe/CONT
USAID/Zimbabwe/ENG
USAID/Mozambique/CMO

c. Locomotive Spare Parts

Procurement List 1 contains the list of the first batch of spare parts required for both regular maintenance and rehabilitation requirements to cover a period of approximately twelve months, beginning about June 1989, for an approximate value of \$2,500,000 for CFM(S) and \$300,000 for CFM(C). This list stipulates the following three requirements:

- A. Scheduled Maintenance for Maputo - Diesel Locos
- B. Rehabilitation for Maputo - Diesel Locos
- C. Scheduled Maintenance for Beira - Diesel Locos

All parts are either General Electric or GE approved parts. It is mandatory that only GE parts or GE-approved parts are procured, to ensure absolute compatibility and to maintain terms of warranties for the original equipment. Several sources of these parts, based on category of assembly, have been identified in the United States.

The Project Paper design team reviewed the list and discussed the procedures for meeting AID requirements and has concluded that it is complete and realistic. It is expected that the solicitations will be issued after the Grant Agreement is signed, to minimize delays in procurement and to avoid a situation where the workshops are without the required minimum stock of spare parts. Current stock is estimated to carry the workshops through June 1989 for the scheduled maintenance program.

Spare parts will be purchased under competitive negotiated procurement procedures, as the list of possible suppliers is finite and known. In the past, the CFM(S) procurement unit has submitted the lists of spare parts required by either telex or mail, depending on the size of the list.

Lists for the second and third batches will be developed in conjunction with the procurement technician of the technical assistance team and the PSC Project Manager on contract to USAID/Mozambique. These orders will be placed on an annual basis.

A single order for spare parts to maintain the existing steam locomotives in Beira for a three year period will be made in the same general time period.

A contingency amount is budgeted for small value procurements of \$10,000 to \$25,000 for emergency spare parts that could be required due to repairs from collisions or other accidents, as well as covering unforeseen requirements. These orders will be placed, if needed, monthly or bi-monthly and will be delivered by air freight. AID's experience with locomotive rehabilitation projects in southern Africa demonstrates that this method of procurement will help prevent the long sidelining of locomotives due to the absence of one or two critical spare parts.

Commodities will be consigned separately to CFM(S) in Maputo, or CFM(C) in Beira and will be shipped directly by the supplier to these ports of entry. CFM has the capacity to carry out

customs clearance procedures, and delivery accounting, and has ample, organized storage space.

d. Workshop - Equipment and Spare Parts

Some equipment in the workshop in Maputo needs to be repaired or replaced. The CFM(S) procurement unit, with the assistance of the technical assistance team, will prepare a list of requirements. This list will be reviewed by the PSC Project Manager and the CMO, USAID/Mozambique. A PIO/C will be issued, and procurement will be advertised in the AID Procurement Information Bulletin. Any waivers which are required will be prepared and processed by USAID/Mozambique.

Currently, there is no spare parts inventory for any of the equipment in the workshop. CFM(S) has made a commitment to prepare warehouse space for this stock adjacent to the workshop facilities.

e. Tools for Workshop

Procurement List 3 contains the list of tools and equipment, divided into three categories:

- A. Specialized General Electric Tools
- B. Standard Tools
- C. Safety Equipment

Solicitations to procure the specialized G.E. tools will be sent to the list of usual sources that CFM(S) contacts for G.E. spare parts.

The list of tools and supplies required for the workshop will be finalized by the procurement unit of CFM(S), and reviewed by the PSC AID/Engineer and AID/CMO. The list will be incorporated into a PIO/C, and will reference a catalog of a company in the United States carrying such stock, such as McMaster-Carr, Rigid Tools, or Snap-On Tools, with the requirement that the offered item be "equal to" each line item indicated.

The requirement will be advertised in the AID Procurement Information Bulletin, published by AID's Office of Small and Disadvantaged Businesses in Washington. CFM(S) will receive requests for the tender by telex, and documents will be mailed to those potential suppliers requesting the procurement list.

Quotations will be received by CFM(S)'s procurement unit, with copies to AID/Mozambique. The quotations will be reviewed by CFM(S), who will make an evaluation for award, to be reviewed and approved by an AID/Engineer and AID/CMO. A Project Implementation Letter will be issued by USAID/Mozambique to concur in approval of each procurement award.

2. Procurement Procedures

Procurement of parts and other commodities will be guided by AID Handbook 11, Country Contracting, Chapter 3., Sections 2.2.3, "Informal Competitive Procedures", and Section 2.2.4, "Small Value Procurement".

Small value procurement procedures, for actions of less than \$100,000, will apply to the contingency orders for locomotive spare parts, as well as some of the tool, machine spare parts and, safety equipment procurements.

Per Chapter 3, "Procurement of Equipment and Materials", Sections 2.2.3 and 3.8.1, informal competitive procedures may be used if approved by the USAID Director. Informal competitive procedures apply to proprietary procurement [Section 2.2.3a (4)] when justified in accordance with Section 2.2.5. when: "(2) Compatibility with equipment on hand is required." For the request for quotations for General Electric spare parts, as described in Section B of this procurement plan, above, section 2.2.3 a. (4) is applicable, allowing for negotiated procurement procedures for proprietary procurement, under section 2.2.5 c.

Final evaluation of all procurement awards will be reviewed by a representative of the procurement unit of CFM(S) the technical assistance team, and AID. Offers for all procurements are to be submitted to CFM(S), with a copy to AID, by telex or courier. A deadline submission date will always be stipulated and observed.

3. Authorized Geographic Code(s)

The authorized source and origin for goods and services financed under the overall project, including this component, is Geographic Code 941 (Selected Free World) and SADCC countries except Angola. Nevertheless, the United States will be the source and origin of most goods and services financed under this component. The PP team determined that most project commodities are available in the United States at a reasonable price and with acceptable delivery times. The prime contractor for technical assistance will also be a U.S. firm. Therefore, procurement from Code 941 countries other than the U.S., except for spare parts for steam locomotives, will be infrequent.

Specific waivers required are contained in Annex K.

4. Receipt and Utilization

The offices of CFM(S) are located inside the Port of Maputo, thus allowing for easy access to and monitoring of incoming

shipments. Customs formalities are completed within one month, and transfer and storage is carried out directly by CFM(S) into its own warehouses located in the Port area. There is sufficient storage space available for all of the procurement proposed under this component.

It is expected that the computer inventory tracking system will be in place by the time that the first large shipment of locomotive spare parts arrives, or soon thereafter, so arrival accounting and inventory control systems will be implemented with the initial spare parts shipment.

5. Marking

AID marking requirements will be stipulated in all requests for quotations. With the issuance of Direct Letters of Commitment, a descriptive brochure on marking requirements will be included as an annex. Included with documentation required for payment will be a certificate from the supplier, attesting that all marking requirements have been met.

6. Financing Method

Financing for all commodities procured for this component of the project, other than direct support for the technical assistance team, will be made available through an AID Direct Letter of Commitment, issued by the Controller, USAID/Swaziland. This system has been used for the past three years for Mozambique's Commodity Import Programs for a total value of \$27 million and has worked well.

7. Technical Assistance Contracting

a. Long-term TA Contract and Training

Technical assistance within the Mozambique component of the project will be procured under a single contract solicited on a competitive basis by means of issuance of a Request for Proposal. Due to the complexity of the mix of services required, the need for Portuguese-language capability and the range of technical skill categories to be provided, a joint venture or consortium approach will be encouraged in both pre-solicitation advertising and in the RFP itself. The joint venture or contract should qualify as a U.S. source, origin and nationality entity. Clear lines of responsibility and control between the elements of the joint venture or consortium will be required to be established as a part of the offerors' technical proposal.

The successful offeror (Contractor) will provide all 11 long-term technical specialists and all 36 person-months of short-term technical assistance (including three long-term trainers and 18 person-months for short-term trainers). In addition, the Contractor will be responsible for hiring an administrative assistant or the local market. The Contractor will provide all logistical support necessary to position the technical field team, including official vehicles but excluding office space and basic office equipment, which will be a CFM contribution.

Under the TA Contract, the Contractor will be responsible for all in-country classroom training and o-j-t. External, formal training (e.g., at other railway training schools) will be coordinated by the contractor. Procurement of training aids and supplies will also be the responsibility of the Contractor.

Utilization of Section 8(a) and Small Business firms as prime project contractors has been thoroughly examined by the PP team. While offerors will be encouraged to utilize small and disadvantaged businesses, possibly as part of the joint-venture/consortium or as subcontractors and/or vendors, the nature and complexity of the contract to be awarded for the project technical services precludes the setting aside of the entire procurement under Section 8(a) of the Small Business Act, or as a small business or labor surplus set-aside.

b. TA Assistance in Project Management

Outside the technical assistance contract, two personal services contracts will be awarded for project managers. One will be a U.S. citizen with capital projects implementation experience, preferably with AID-funded projects. The other will be a locally recruited technical expert, probably an engineer. Both personal service contractors will work directly for the AID Representative, USAID/Mozambique, and who will be responsible for the day-to-day management of the project. Housing and other logistical support for these PSCs will be arranged by USAID/Mozambique. The expected durations of these contracts will be 36 months for the U.S.-hire and 36 - 42 months for the local-hire.

c. Evaluations

External, mid-term and end of project evaluations will be performed by firms contracted directly by AID. An external audit will be performed at the completion of the project by a non-government accounting firm, probably

contracted by means of a Work Order under an IQC. Consideration will be given to selecting a firm qualified under section 8(a) of the Small Business Act. The audit will focus especially upon the procurement performed by CFM under Handbook 11 procedures.

d. Pre-Implementation Assistance

Technical assistance required for workshop construction, ordering of parts, establishing a basic inventory system, and housing construction for long-term advisors will be contracted for directly by USAID/Mozambique or through Indefinite Quantity Contracts (IQCs). A total of 12 person-months of short-term TA has been allocated for these activities.

8. Construction Services Contract for Maputo and Beira Workshops

Construction work to be performed for the Maputo and Beira workshops and for rehabilitation of workshop equipment will be contracted by CFM under the methodology described in AID Handbook 11, Chapter 2. Periodic inspection of the construction will be supplied by the PSC AID Engineer. The construction contracts will be paid via AID direct letter of commitment.

9. Housing for the Long-Term Technical Assistance Team and the U.S. Project Manager (PSC)

Supervision of the provision of housing for long-term personnel will be contracted for by USAID/Mozambique, using Project funds. Either an AID IQC Architecture and Engineering (A&E) firm or a reputable A&E firm in the region (Code 941) will be awarded a contract to prepare design drawings, prepare tender documents, review bids and supervision of the construction of new or erection of prefabricated houses. The Government of Mozambique will be responsible for providing adequate housing sites, including utility hookup. Funds will be included in the long-term technical assistance contract to hire a local maintenance contractor to care for the houses for a period of three years.

METHOD OF IMPLEMENTATION

<u>CATEGORY</u>	<u>IMPLEMENTATION METHOD</u>	<u>FINANCING METHOD</u>
a. Procurement of spare parts, equipment and tools for diesel locomotive maintenance program	CFM, HB 11 (Equipment and Materials)	AID Direct Letter of Commitment
b. Procurement of workshop Construction, Maputo and Beira	CFM, HB 11 (Construction Services)	AID Direct Reimbursement
c. Technical Assistance (including vehicles, computers and other support commodities)	AID HB 14 Contract	AID Direct Reimbursement
d. Project Management (Personal Services Contracts)	AID HB 14 Contracts	AID Direct Reimbursement
e. Workshop Equipment Rehabilitation in Maputo	CFM HB 11 (Construction Services)	AID Direct Reimbursement
f. Audit & Evaluation	AID HB 14 Contracts	AID Direct Reimbursement

VI. EVALUATION PLAN

The Mozambique Railways component concentrates on rehabilitation and maintenance through provision of spare parts and appropriate technical assistance. Thus, the success of the project will be measured by the extent to which these key constraints in the operations of Mozambique Railways are ameliorated during the term of the Grant. Timely and appropriate provision of essential spare parts and equipment, locomotive rehabilitation and maintenance, critical workshop renovation and the impact of technical assistance and training efforts will be the focus of the evaluations to be carried out.

Two evaluations will be conducted for the Regional Rail Systems Support Project. With project authorization in August 1988, a mid-term evaluation is scheduled for September 1990. A final evaluation is planned in October 1992, six months before the project's anticipated completion date of April 1993. The budget for this component includes \$250,000 to cover evaluation and audit costs.

For the interim evaluation, the team will include a project development officer, commodity management officer, locomotive workshop engineer-training specialist, financial management specialist, and a transport economist. In addition, CFM will provide the services of appropriate personnel (e.g., mechanical engineer, finance officer) to serve on the evaluation team. The Project Committee, technical assistance Contractor, two-person PSC project management team and USAID/Mozambique Project Manager will provide all necessary documentation and data required by the team.

Examination will be made of implementation matters such as the timeliness of delivery of project commodities, the quality of technical assistance and training, and progress locomotive maintenance, repair and rehabilitation. Increased workshop productivity will also be examined. All investigations will be with a view to the attainment of anticipated project outputs.

To the extent possible, objective project performance indicators such as national trade and rail transit data as well as operational indications such as turnaround times and locomotive availability, will be reviewed based on CFM data and actual observations made by the evaluation team. At this point, however, it may be possible to only assess trends.

The interim evaluation will assess specific objective indicators such as:

- a. Beira diesel workshop rehabilitation complete; equipment in place;

- b. Status of equipment orders for workshops;
- c. Status of locomotive spares orders;
- d. Progress in implementing workshop training programs;
- e. Performance and quality of assistance in financial management;
- f. Status of locomotive rehabilitation; and
- g. Information systems in place identifying costs of services.

The final evaluation, in October 1992, will examine all project implementation aspects, as well as assess project impact at that time. In addition to repeating assessments and using similar information sources as for the interim evaluation, the final evaluation will document project impact by measuring changes in locomotive availability, financial performance, and maintenance capability. Although parts of the evaluation will be subjective, indicators such as average locomotive availability and time required to service locomotives will be directly measurable and can be used as surrogate measures of improvement in related areas such as management and staff training to the level necessary to carry out maintenance responsibilities.

Specifically, such indicators will include:

- a. Percentage of SADCC external trade using Mozambique ports increases;
- b. Locomotive availability increases (anticipated from 58% at time of project authorization to 75% by date of project completion);
- c. CFM(S) ongoing capability to do all scheduled maintenance on locomotives;
- d. CFM(C) improved capacity to maintain locomotives;
- e. Rehabilitation of eight GE U20C locomotives completed and locomotives in service;
- f. Approximately 66 locomotives adequately maintained and in service;
- g. Rehabilitation of Beira and Maputo workshops completed and both in use;
- h. Improved financial management, based on accurate and reliable accounting information; and

- i. Improved systems management (purchasing, inventory, stores control).

Project progress will also be routinely monitored by the Project Committee which will meet quarterly to review progress and future work plans and to consider any implementation problems.

The findings and recommendations of both the interim and final evaluations will be incorporated into AID's evaluation system in order to share relevant lessons learned.

VI. CONDITIONS PRECEDENT, COVENANTS AND NEGOTIATING STATUS

The following special conditions and covenants will be included, in substance, in the Project Authorization and Project Grant Agreement.

A. Conditions Precedent

1. Prior to any disbursement under the Grant, except for technical assistance to assist CFM and USAID/Mozambique with pre-implementation actions, and prior to the issuance of any commitment documents under the Project Agreement, the Grantee shall furnish in form and substance satisfactory to AID, evidence that: (i) DNPCF has formally designated an individual at DNPCF who will be Project Coordinator; (ii) the Project Committee has been established, with membership identified from USAID/Mozambique, CFM(S), CFM(C), DNPCF and the AID-funded technical long-term assistance team; and (iii) critical staff positions in DNPCF, CFM-Sul and CFM-Centro presently filled by the RITES are filled by qualified persons, or that adequate plans and funding are in place to staff these positions through alternative means. (Specific positions are listed in the Amplified Project Description, Annex A of the Grant Agreement).
2. Prior to disbursement of funds for long-term technical assistance or to the approval by AID of any commitment documentation with respect thereto, the Grantee will provide, in form and substance satisfactory to AID:

Evidence of suitable housing sites for the technical assistance team, that adequate utilities and other infrastructure are in place, and that all required Government and Municipal approvals of the housing sites have been obtained.

B. Covenants

1. The Grantee will covenant that it will identify a suitably-qualified counterpart for each project-funded, long-term consultant in financial management, inventory and training and that each counterpart will be assigned on a full-time basis to work with the consultant during the period of the Consultant's assignment.
2. The Grantee will also ensure that adequate office space and secretarial support is allocated to the AID-financed technical assistance team.

3. The Grantee will covenant that all spare parts procured with Project funds for diesel electric locomotives will be used to repair and maintain locomotives on an as-needed basis regardless of whether the locomotives are assigned to CFM(S) or CFM(C).
4. The Grantee will covenant that all personnel sent for training under the project will be required to return to work for CFM, in a position making use of the training received, for a period of not less than two years unless AID otherwise agrees in writing.
5. The Grantee will covenant that adequate classroom space will be made available for workshop training.
6. The Grantee will covenant that by the end of the project period, sufficient foreign exchange will be allocated to CFM from its foreign exchange earnings for the continued procurement of spare parts for maintaining diesel electric locomotives. This allocation shall be in addition to other requirements for foreign exchange.
7. The Grantee will covenant that vehicles and computers procured under the project will be for the exclusive use of the technical assistance team and CFM in furtherance of the objectives of the project until such time as AID assistance is terminated.
8. The Grantee will covenant that all housing for technical assistance personnel financed by AID will be for the exclusive use of the technical assistance team during the project and that upon the completion of the project, these houses will be reserved for other technical assistance personnel funded by AID.
9. The Grantee will covenant that all railroad tracks leading to and from the locomotive and general workshop areas shall be maintained in such vertical and horizontal alignments that derailments of locomotives and wagons shall not occur.
10. The Grantee will covenant that adequate and secure space will be made available in the CFM(S) and CFM(C) workshops for the storage of spare parts for equipment as well as additional supplies of tools and materials.

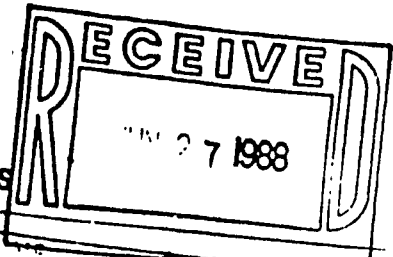
C. Negotiating Status

Meetings were held at an early stage with senior officials of DNPCF, CFM(S), CFM(C) during the development of this component of the project. Topics such as the principal inputs, issues, basic assumptions and possible conditions and covenants were thoroughly discussed. Following final development of this component of the project, additional meetings will be held with DNPCF, CFM(S) and CFM(C). They are now fully in accord with this project component as well as the implementation arrangements. DNPCF has accepted in principle all the conditions and covenants to be included in the Project Grant Agreement.



ANNEX A

REPÚBLICA POPULAR DE MOÇAMBIQUE
MINISTÉRIO DOS TRANSPORTES E COMUNICAÇÕES



MS. A HERRICK
USAID REGIONAL DIRECTOR
1 PASCOE AVENUE BELGRAVIA
HARARE, ZIMBABWE

OFFICIAL FILE

SUB: REQUEST FOR FINANCIAL ASSISTANCE

Dear Sir,

DATE		
TO		
FROM		
ADD.		
NAME		
PHON.		
MGY.		
TDC.		
CHRON.		
REF.		
DUE DATE	7-1-88	
ACTION TAKEN		
INITIALS DATE		

The Government of Mozambique wishes to request financial assistance for improvement of the Mozambique Railways, viz;

- On maintenance and rehabilitation of the General Electric locomotives fleet;
- On maintenance and rehabilitation of the wagons fleet;
- On infrastructures of the workshops as well as on equipments and commodities required for maintenance and production section of the workshop;
- On completion of the conversion of part of Beira Workshop from steam to diesel locomotives and the necessary equipment for maintenance schedule of the diesel locomotives (USAID was involved on first phase of the contract);
- On Technical Assistance and Training;

There is an immediate need for approximately Thirty Million US Dollars of donor assistance for the above items.

56

(2)

I should be grateful for your favourable consideration of this request and shall request you to send as soon as possible the draft project documentation and the draft project agreement.

Yours sincerely,



RUI LOUSA

- Vice Minister of Transport
and Communications

N/ Ref. 29/MTC-GAB/88
MAPUTO, 11/Junho/1988

cc: Mr Julius Schlotthouer
USAID Representative,
Rua Faria de Sousa, 107
MAPUTO, MOZAMBIQUE

(B) PORT CAPACITY. THE PROJECT PURPOSE IS TO INCREASE THE CAPACITY AND EFFICIENCY OF RAIL SYSTEMS IN THE SADCC REGION. THE PROJECT EXPLICITLY EXCLUDES ASSISTANCE FOR PORT DEVELOPMENT, ALTHOUGH THE PID TEAM RANKED ONE PORT ACTIVITY (DEEPENING AND REALIGNMENT OF THE CHANNEL AT MAPUTO) AHEAD OF THE SWAZILAND TECHNICAL ASSISTANCE ACTIVITY WHICH IS PROPOSED FOR FUNDING UNDER THE PROJECT. THE PP SHOULD DISCUSS WHAT IS BEING DONE BY THE GPRM AND OTHER DONORS TO INCREASE THE CAPACITY OF MOZAMBIQUE PORTS TO ACCOMMODATE PROJECTED RAIL TRAFFIC FLOWS. BASED ON THIS ANALYSIS, THE PP SHOULD VERIFY WHETHER OR NOT PORT CAPACITY IS A POTENTIAL BOTTLENECK TO INCREASED TRANSIT OF IMPORTS AND EXPORTS THROUGH MOZAMBIQUE.

3. ASSISTANCE TO MOZAMBIQUE. SECTION 560 OF THE FY-82 CONTINUING RESOLUTION REQUIRES THAT, PRIOR TO OBLIGATION OF ANY FUNDS (BILATERAL OR SADCC) FOR THE GOVERNMENT OF MOZAMBIQUE, THE PRESIDENT MUST SUBMIT A REPORT TO CONGRESS ON THE EXTENT TO WHICH (1) THE GPRM HAS ENTERED INTO A DIALOGUE WITH THE CATHOLIC CHURCH ON THE RETURN OF CHURCH PROPERTY, (2) THE GPRM HAS TAKEN STEPS TO ASSURE AGAINST EXPROPRIATION OF PRIVATE PROPERTY, AND (3) THE NUMBERS OF SOVIET/EASTERN BLOC MILITARY/SECURITY PERSONNEL ARE BEING REDUCED. IN ADDITION, PRIOR TO OBLIGATION OF SADCC FUNDS FOR ACTIVITIES IN MOZAMBIQUE, THE SADCC APPROPRIATION PROVISION OF THE CR REQUIRES THAT THE PRESIDENT CERTIFY THAT SUCH ASSISTANCE IS IN THE NATIONAL INTEREST. THE REPORT TO CONGRESS IS EXPECTED TO BE SUBMITTED BY THE END OF MARCH. THE CERTIFICATIONS WILL BE FORWARDED AT A LATER DATE, PRIOR TO THE AUTHORIZATION AND OBLIGATION OF FUNDS.

THE ECFR ALSO DISCUSSED THE APPROPRIATENESS OF A.I.D. FINANCING OF TRANSPORT ACTIVITIES IN MOZAMBIQUE IN LIGHT OF THE SECURITY SITUATION. SEVERAL POINTS WERE MADE IN FAVOR OF PROCEEDING WITH THE FROPCSI PROJECT ACTIVITIES. FIRST, TRAFFIC IS NOW MOVING ALONG THE BEIRA CORRIDOR WHERE SECURITY HAS IMPROVED AND DOWNTIME

DUE TO ACTS OF SABOTAGE ALONG THE CORRIDOR HAS EFFICIENTLY DECREASED. SECOND, THE PROJECT ACTIVITIES WILL BE LOCATED IN MAPUTO AND BEIRA WHICH HAVE NOT GENERALLY BEEN TARGETS OF VIOLENCE. THIRD, THE ECONOMIC JUSTIFICATION FOR THE PROJECT DOES NOT REQUIRE GREATLY INCREASED SECURITY. IN FACT, THE PID STUDIES INDICATE THAT THE PROJECT WOULD SHOW A POSITIVE NET PRESENT VALUE AT CURRENT TRAFFIC LEVELS, DUE TO INCREASED EFFICIENCY AND REDUCTION OF TRANSPORT COSTS.

4. INSTITUTIONAL AND MANAGEMENT CAPACITY OF IMPLEMENTING AGENCIES. THE ECFR EXPRESSED CONCERN THAT THIS NOT BE

VIEWS AS SIMPLY AN ENGINEERING PROJECT, AND THAT SUFFICIENT ATTENTION BE GIVEN TO THE DEVELOPMENT OF THE INSTITUTIONAL CAPACITY OF THE IMPLEMENTING AGENCIES IN MOZAMBIQUE, MALAWI, AND SWAZILAND. THE RECENT EXPERIENCE WITH TAZARA HIGHLIGHTS THE IMPORTANCE OF THIS CONCERN. A.I.D. SHOULD INSURE THAT THE RAILWAYS HAVE THE UP-FRONT CAPACITY NOT ONLY TO IMPLEMENT THE PROJECT BUT, MORE GENERALLY, TO MANAGE THEIR OPERATIONS IN AN EFFECTIVE AND EFFICIENT MANNER. THIS WOULD ENCOMPASS SUCH AREAS AS PLANNING AND BUDGETING, PERSONNEL MANAGEMENT, FINANCIAL MANAGEMENT, PROCUREMENT, AND LOGISTICS MANAGEMENT.

THE PP TEAM SHOULD INCLUDE SUFFICIENT EXPERTISE TO ASSESS THE BROAD INSTITUTIONAL AND MANAGEMENT CAPACITIES AND CONSTRAINTS OF THE RAILWAYS, NOT JUST WORKSHOP OPERATIONS. THE TEAM SHOULD REVIEW OTHER DONOR ACTIVITIES IN THIS AREA AND DESIGN INSTITUTIONAL STRENGTHENING ACTIVITIES THAT WILL ADDRESS THE FUNDAMENTAL PROBLEMS IDENTIFIED. THIS ANALYSIS SHOULD COVER ALL RAILWAYS TARGETED FOR ASSISTANCE UNDER THE PROJECT BUT GIVE GREATEST ATTENTION TO MOZAMBIQUE RAILWAYS WHICH IS THE MAIN PROJECT BENEFICIARY. IT IS RECOGNIZED THAT, AS A RESULT OF THIS PROCESS, TECHNICAL ASSISTANCE AND TRAINING INPUTS MAY BE REQUIRED UP-FRONT AND IN SIGNIFICANTLY LARGER AMOUNTS THAN ENVISAGED IN THE PID. A LONGER LIFE OF PROJECT MAY ALSO BE WARRANTED.

THE ECPE LINKED THE DISCUSSION OF INSTITUTIONAL CAPACITY TO THE ISSUE OF RAILWAY TARIFF REFORM. IT WAS RECOGNIZED THAT, IF THE RAILWAYS ARE TO ATTAIN A REASONABLE DEGREE OF FINANCIAL VIABILITY AND EFFECTIVELY UTILIZE THE LARGE DONOR INVESTMENTS IN EQUIPMENT AND STAFF DEVELOPMENT, THEY MUST ADOPT APPROPRIATE TARIFF POLICIES. A NECESSARY FIRST STEP TOWARD IMPROVED TARIFFS IS TO IMPLEMENT FINANCIAL COST ACCOUNTING SYSTEMS WHICH CAN BE USED TO DETERMINE THE REAL COSTS OF OPERATING AND MAINTAINING THE SYSTEMS.

A SPECIFIC INSTITUTIONAL OUTPUT OF THE PROJECT, AMONG OTHERS, SHOULD BE FUNCTIONING FINANCIAL COST ACCOUNTING SYSTEMS IN THOSE NATIONAL RAILWAYS WHICH CURRENTLY LACK SUCH SYSTEMS. THE PP SHOULD DESCRIBE THE LINKAGE OF THESE FINANCIAL ACCOUNTING SYSTEMS WITH THE TARIFF STUDIES PROPOSED UNDER THE SATCC COMPONENT OF THE PROJECT (E.G., THE DATA GENERATED BY THE STUDIES WILL BE INCORPORATED INTO THE NATIONAL SYSTEMS). DURING PP DEVELOPMENT, THE MISSION SHOULD CONFIRM THAT THE NATIONAL RAILWAYS UNDERSTAND THE CONCEPT OF COST-BASED TARIFFS AND ARE WILLING TO IMPLEMENT THE PROPOSED ACCOUNTING SYSTEMS. THE MISSION SHOULD CONSIDER THE USEFULNESS OF CONDITIONS PRECEDENT OR COVENANTS IN THE PROJECT GRANT AGREEMENTS TO FORMALIZE THIS COMMITMENT. THE ECPE AGREED THAT CONDITIONS OR COVENANTS RELATING TO SPECIFIC TARIFF REFORMS BY NATIONAL RAILWAYS WERE NOT PRACTICABLE AT THIS EARLY STAGE. HOWEVER, THE MISSION SHOULD CONTINUE TO PROMOTE A UNIFIED DONOR POSITION WHICH ENCOURAGES SATCC AND THE NATIONAL RAILWAYS TO

IN THE IRRECTION OF CCST-BASED TARIFFS. ADDITIONAL TIME FOR THE FINANCIAL ANALYST ON THE PP DESIGN TEAM WOULD BE REQUIRED TO CARRY OUT THE TASKS DESCRIBED ABOVE.

5. MANPOWER AND MAINTENANCE CAPACITY OF MOZAMBIQUE RAILWAYS. THE PID PROPOSES A HEAVY DOSE OF EQUIPMENT, TECHNICAL ASSISTANCE, AND ON-THE-JOB TRAINING FOR MANAGERIAL AND TECHNICAL PERSONNEL AT THE BEIRA AND MAPUTO WORKSHOPS TO IMPROVE LOCOMOTIVE MAINTENANCE. FACTORS OTHER THAN THE LACK OF HARDWARE AND SKILLS, SUCH AS INADEQUATE SALARY INCENTIVES, LOW LITERACY LEVELS, AND POOR MAINTENANCE POLICIES, MAY LIMIT THE PROGRESS THAT CAN BE MADE IN IMPROVING MAINTENANCE AND WORKER PRODUCTIVITY. THE PP SHOULD INCLUDE AN INVENTORY OF SKILLS IN THE TWO WORKSHOPS AND AN ANALYSIS OF THE FACTORS AFFECTING WORKSHOP PERFORMANCE. OTHER DONOR ACTIVITIES IN THIS AREA SHOULD ALSO BE ASSESSED. BASED ON THIS ANALYSIS, THE PP SHOULD PROPOSE AN APPROPRIATE STRATEGY FOR IMPROVING PERFORMANCE AND REALISTICALLY ASSESS THE GAINS THAT CAN BE EXPECTED DURING THE LIFE OF THE PROJECT. TO THE EXTENT THAT POLICY AND MANAGEMENT CONSTRAINTS ARE IDENTIFIED, THE PROJECT SHOULD ADDRESS THEM AS PART OF THE BROADER INSTITUTIONAL STRENGTHENING EFFORT DESCRIBED ABOVE.

6. MISSION MANAGEMENT CAPACITY. THE PID RECOMMENDS THAT EXPERIENCED USIA ENGINEERS BE ASSIGNED TO BOTH USAID/MALAWI AND USAID/MOZAMBIQUE TO ASSIST THOSE MISSIONS IMPLEMENT THIS AND OTHER TRANSPORT PROJECTS.

THE PID ALSO RECOMMENDS THAT THE VACANT PDC POSITION IN

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USAID/MOZAMBIQUE BE FILLED AS SOON AS POSSIBLE. THE ECPR STRONGLY ENDORSED THESE STAFFING PROPOSALS.

7. PROCUREMENT.

(A) GEOGRAPHIC CODE. THE PP SHOULD SELECT THE APPROPRIATE AUTHORIZED GEOGRAPHIC CODE(S) FOR FOREIGN EXCHANGE COSTS AND THE "POST COUNTRY" FOR ICCAL CURRENCY COSTS, IN ACCORDANCE WITH THE GUIDANCE CONTAINED IN 86 STATE 74147 (WHICH MORE GENERALLY CONCERNS THE SOUTHERN AFRICA REGIONAL MANPOWER MANAGEMENT DEVELOPMENT PROJECT). THE EXEMPTION FROM FAA SECTION 604(A) AND SIMILAR PROCUREMENT REQUIREMENTS, APPLICABLE TO THE DEVELOPMENT FUND FOR AFRICA, DOES NOT APPLY TO THE SADCC APPROPRIATION.

(F) NEW LOCOMOTIVE PROCUREMENT. THE ECPR AGREED IN PRINCIPLE WITH THE PROJECT STRATEGY OF INCREASING AVAILABLE LOCOMOTIVE POWER THROUGH THE REHABILITATION OF EXISTING LOCOMOTIVES. THIS IS MORE COST-EFFECTIVE THAN BUYING NEW LOCOMOTIVES WHERE THE EXISTING UNITS ARE NOT EXCESSIVELY OLD, DAMAGED, OR INACCESSIBLE. IT WAS POINTED OUT THAT BOTH THE IBRD AND CIDA HAVE ALSO TAKEN THE POSITION THAT NEW LOCOMOTIVE PROCUREMENT IS NOT NEEDED AT THIS TIME IN MOZAMBIQUE. HOWEVER, THERE ARE TWO UNKNOWN FACTORS THAT COULD AFFECT THIS STRATEGY. FIRST, THE NUMBER OF LOCOMOTIVES THAT ARE ACTUALLY REPARABLE (CURRENTLY ESTIMATED AT 30-40) NEEDS TO BE VERIFIED. IT IS UNDERSTOOD THAT THE IBRD IS FINANCING A SURVEY OF THE MOZAMBIQUE FLEET. SECOND, THERE COULD BE A TIME LAG IN REHABILITATION OF THE LOCOMOTIVES UNDER THIS PROJECT, GIVEN THE NEED TO UPGRADE MANAGEMENT, TRAIN MOZAMBIKAN RAILWAY WORKERS, PROCURE SPARE PARTS, INSTITUTE NEW MAINTENANCE PROCEDURES AND POLICIES, ETC. THE PP TEAM SHOULD EXAMINE THE MOZAMBIQUE LOCOMOTIVE AVAILABILITY SITUATION IN A SYSTEMATIC FASHION, INCLUDING THE RESULTS OF THE IBRD SURVEY. THE TEAM SHOULD DEVELOP A REALISTIC TIMETABLE FOR REHABILITATION OF THE LOCOMOTIVES AND COMPARE THIS WITH PROJECTED TRAFFIC DEMAND. IF THERE APPEARS TO BE A SIGNIFICANT GAP BETWEEN DEMAND AND LOCOMOTIVE AVAILABILITY, THE FUNDING OF NEW LOCOMOTIVES COULD BE CONSIDERED AS ONE DESIGN OPTION TO BRIDGE THAT GAP.

(C) TECHNICAL ASSISTANCE AND TRAINING. THE ECPR ENCOURAGED THE MISSION TO CONSIDER OBTAINING TECHNICAL ASSISTANCE AND TRAINING SERVICES FOR THE PROJECT FROM EXPERIENCED, SUCCESSFUL RAILWAYS. IN ADDITION TO U.S.

SOURCES, THE MISSION SHOULD SEEK TRAINING INSTITUTIONS IN THE SADCC COUNTRIES FOR PROJECT PARTICIPANTS. TRAINING SHOULD NOT TAKE PLACE IN SOUTH AFRICA (UNLESS ABSOLUTELY NO ALTERNATIVE IS AVAILABLE) BUT IN INDEPENDENT BLACK STATES TO MEET THE PROGRAM OBJECTIVES AND CONTRIBUTE POSITIVELY TO THE LONG-TERM DEVELOPMENT GOALS FOR THE MAJORITY POPULATIONS OF SOUTHERN AFRICA. THE MISSION SHOULD BE AWARE THAT A WAIVER BY THE AA/AFR PURSUANT TO HANDBOOK 1B, CH. 5D.10.A(2) AND 5D.10.D,

WOULD BE REQUIRED TO CONTRACT WITH A RAILWAY COMPANY WHICH IS GOVERNMENT OWNED. IF THIS APPEARS TO BE A DESIRABLE OPTION, THE MISSION SHOULD CONSULT CLOSELY WITH THE RIA TO DEVELOP THE APPROPRIATE JUSTIFICATION FOR THE WAIVER.

RELATED TO THIS, THE PP SHOULD ASSESS THE HOUSING AND OTHER LIVING CONDITIONS FOR THE PROPOSED CONSULTANT TEAM IN MOZAMBIQUE, PARTICULARLY IN BEIRA, AND THE IMPLICATIONS FOR THE SIZE AND WORKING ARRANGEMENTS OF THE TEAM. THE PP SHOULD DESCRIBE THE CAPACITY OF USAID/MOZAMBIQUE TO SUPPORT THE CONSULTANTS AND DISCUSS ANY STEPS THAT MAY NEED TO BE TAKEN TO ENSURE THE EFFECTIVENESS OF THE PROJECT FINANCED CONSULTANTS.

(D) SPARE PARTS PROCUREMENT. THE PP TEAM SHOULD CAREFULLY ANALYZE THE REQUIREMENTS FOR SPARE PARTS AND RELATED TOOLS AND EQUIPMENT FOR THE REHABILITATION OF THE GENERAL ELECTRIC LOCOMOTIVES IN THE MOZAMBIQUE RAIL. THE TEAM SHOULD MAKE A TECHNICAL DETERMINATION OF THE EXTENT TO WHICH SPARES COULD BE COMPETITIVELY PROCURED WITHOUT JEOPARDIZING THE PERFORMANCE OF THE REHABILITATED LOCOMOTIVES. THE TEAM SHOULD ALSO DETERMINE THE EXTENT TO WHICH TOOLS AND EQUIPMENT ARE AVAILABLE FROM THE U.S. AND OTHER AUTHORIZED GEOGRAPHIC SOURCES. FOR THIS PURPOSE, THE PP TEAM SHOULD INCLUDE BOTH A SPECIALIST IN LOCOMOTIVE MAINTENANCE AND AN A.I.D. COMMODITY PROCUREMENT OFFICER. IF A SOLE SOURCE WAIVER FOR SPARES IS DEEMED APPROPRIATE, IT SHOULD BE INCLUDED IN THE PP IF POSSIBLE. THERE MAY ALSO BE NEED FOR A CDFR 935 WAIVER FOR PROCUREMENT OF SPECIALIZED

TOOLS AND EQUIPMENT. THE PP SHOULD ALSO CONSIDER
REQUIRING AN A.I.D. FORM 11 FOR SPARE PARTS
PROVISIONS, TO FACILITATE POST-AUDITS FOR PRICING.

IN LIGHT OF RECENT EXPERIENCE WITH TAZARA, THE MISSION
SHOULD CONSIDER INCLUDING FUNDING IN THE PROJECT FOR
SPECIALIZED LONG-TERM TECHNICAL ASSISTANCE SPECIFICALLY
TO HELP IN THE PROCUREMENT AND MANAGEMENT OF THE LARGE
QUANTITY OF SPARE PARTS TO BE FINANCED BY A.I.D.

OTHER LEGAL CONCERNS.

(A) E11(F) CERTIFICATION. GC/AFR ADVISES THAT A SECTION
E11(F) CERTIFICATION IS REQUIRED FOR THE MOZAMBIQUE AND
MALAWI PORTIONS OF THE PROJECT. THIS SHOULD BE
TRANSMITTED TO AA/AFR FOR HIM TO TAKE INTO CONSIDERATION
PRIOR TO FIELD APPROVAL OF THE PP. IN THE CASE OF
MOZAMBIQUE, THE CERTIFICATION SHOULD TAKE INTO ACCOUNT
THE ASSISTANCE THAT WILL BE PROVIDED DURING THE PROJECT
TO IMPROVE THE MAINTENANCE CAPABILITIES OF MOZAMBIQUE
RAILWAY.

(B) COMMINGLING. ALTHOUGH THERE IS NO REASON TO BELIEVE
A PROBLEM EXISTS, THE PROJECT SHOULD INVESTIGATE THE
NATURE OF ANY INVOLVEMENT BY COMMUNIST BLOC COUNTRIES IN
MOZAMBIQUE RAIL SYSTEM AND, WITH SUPPORT FROM THE RLA,
A COMMINGLING WAIVER IS REQUIRED. THE
PP SHOULD INCLUDE A BRIEF DISCUSSION OF THE FINDINGS.

DETERMINE WHETHER:

9. INITIAL ENVIRONMENTAL EXAMINATION. THE IEE CONTAINED
IN THE BID HAS BEEN REVIEWED BY THE BUREAU ENVIRONMENTAL
OFFICER AND SENT TO GC/AFR FOR CLEARANCE. A COPY OF THE
SIGNED IEE WILL BE FURNISHED TO USAID/HARARE.

10. ~~AA/AFR HEREBY DELEGATES AUTHORITY TO THE DIRECTOR,~~
~~USAID/HARARE, TO AUTHORIZE THE CAPTIONED PROJECT IN AN~~
~~AMOUNT NOT TO EXCEED DOLS. 50,000,000. THIS AD HOC~~
~~DELEGATION OF AUTHORITY SHALL BE EXERCISED IN ACCORDANCE~~
~~WITH ALL THE TERMS AND CONDITIONS OF DCA 551, EXCEPT FOR~~
~~THE DOLLAR AMOUNT LIMITATION. ANY WAIVERS REQUIRING~~
~~AA/AFR OR A/AID APPROVAL SHOULD BE FORWARDED TO AID/W~~
~~PRIOR TO PP APPROVAL.~~

11. AID/W UNDERSTANDS THAT OBLIGATIONS WILL OCCUR WITH
THE GOVERNMENTS OF MOZAMBIQUE, SWAZILAND, AND MALAWI,
AND WITH SATCC. WE SUGGEST THAT THE REDSO/F AND
~~SWAZILAND RLA'S COORDINATE AS TO THE RESPONSIBILITY FOR~~
~~THE MALAWI OBLIGATION. WHITEHEAD~~

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LOGFRAME - MOZAMBIQUE

ANNEX C

GOALS	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
To support the development of a stronger economic foundation for growth in Southern Africa.	SADCC countries face lower total transport costs.	National and regional statistics	Continued regional cooperation.
	Less FX spent for transport.	National accounts	Investments maintained by SADCC countries.
	Proportion of SADCC external trade using SADCC ports increases.		Investments not destroyed by hostile action.
	Savings in FX and LC from lower transport costs are available for other priority investments.		FX and other cost savings stimulate economic growth.
PURPOSE	END OF PROJECT STATUS		
To strengthen and expand the capacity and operational efficiency of regional rail transport in SADCC countries.	B. MOZAMBIQUE		
	1. Locomotive availability on CFM-S and CFM-C increase from 58% to 75% by 1992.	CFM Reports Project evaluation	Other donors address constraints on track condition.
	2. Total annual carrying capacity of the locomotive fleet of CFM-S AND CFM-C increases from 3.1 million tons/yr in 1988 to 5.8 million tons annually by 1992.	TA reports	Security and policy environments conducive to increased production and international trade.
	3. CFM(S) has ongoing capability to do all scheduled maintenance on locomotives.		
4. CFM accounts are current, reliable and providing useful financial information to management staff.			

OUTPUTS	MAGNITUDE	MEANS OF VERIFICATION	ASSUMPTIONS
1. Locomotives rehabilitation.	Rehabilitation of 8 GE U20C locomotives completed.	CFM Reports	Germany and other donors fully fund most formal training.
		TA reports	
		Project evaluation	Qualified TA can be found.
		Site visits	DANIDA, and other donors provide material and Italy provides TA needed for wagon rehab. in CFM-S.
2. Locomotive maintained	Approx. 66 (54 diesel, 12 steam)	Inventory records	
3. Maputo workshop rehabilitated and in use.	Wheel lathe and press rebuilt/replaced. Overhead cranes overhauled. Roof repaired. Compressor, tools and safety equipment provided.		
4. Beira Workshops rehabilitated and in use.	Diesel workshop completed and fully equipped with GE testing and repair equipment, compressor and generator.		

OUTPUTS	MAGNITUDE	MEANS OF VERIFICATION	ASSUMPTIONS
5. Improved workshops purchasing, inventory and stores control in place.	Timely ordering, stocking and disbursement, computerized data base, accurate annual inventory.		
6. Improved financial management and accounting system in place and in condition for a limited scope audit.	Budgets, income statements and fixed assets register and balance sheets current and (incl. allowance for depreciation) and being used as input to management decision-making process. Process begun to design a cost accounting system. The following shall be in such condition that they can be audited firm = (1) fixed assets account; (2) cash transactions and balances; (3) revenues account; (4) inventory account; and (5) procurement and purchasing transactions and procedures.		
7. CFM personnel trained, certified and in position for which trained	192 locomotive repair and maintenance technicians 24 procurement, inventory control and storeroom management staff 12 financial management staff 12 accountants		

INPUTS	FUNDING TARGETS (\$)	MEANS OF VERIFICATION	ASSUMPTIONS
1. Commodities	15,248,000	Evaluation Reports	Serviced site for TA housing provided by GPRM.
2. Construction (incl. housing)	1,650,000	TA Reports	
3. Technical Assistance	10,758,000	CFM Records	
4. Training	3,421,179	Disbursement Docs.	
5. Evaluation and Audit	250,000		
6. Inflation and Contingency	3,201,000		
TOTAL AID	34,528,000		
TOTAL GPRM	2,250,000		



UNITED STATES

ANNEX D

AGENCY FOR INTERNATIONAL DEVELOPMENT

OFFICE OF THE A.I.D. REPRESENTATIVE

U. S. Postal Address
MAPUTO - ID
U. S. Department of State
Washington, D. C. 20520

Rua Faria de Sousa, 107
MAPUTO — MOÇAMBIQUE
Caixa Postal 783
Telex: 6-180 USAID MO
Telefones: 744482, 744483

SECTION 611(E) CERTIFICATION

The Regional Rail Systems Support project will strengthen and expand the capacity and operational efficiency of regional rail transport in Malawi, Mozambique and Swaziland as well as the other SADCC countries. In Mozambique, the project will provide funding for locomotive and wagon rehabilitation, construction and repair of maintenance workshops, procurement and inventory control, spare parts for locomotive maintenance, and technical assistance.

Mozambique is committed to this project and has agreed to provide land for housing, counterpart staff and extensive security measures to protect the investments of AID and other donors in their rail networks.

The United States has previously provided funds to Mozambique and specifically CFM, for locomotive rehabilitation, workshop construction, and training. In addition, the U.S. Government has provided extensive food aid. To date, the Mozambican Government has been actively involved in the implementation of projects and has provided the necessary funds and counterparts to effectively maintain and utilize resources provided by the U.S. Government. For the foreseeable future, both the public and private sectors in Mozambique will continue to need external supplements to their financial and human resources.

In combination with the technical assistance being provided under the Regional Rail Systems Support project, I certify that the Mozambican Government has the financial and human resource capability to effectively maintain and utilize the U.S. Government resources which will be provided under this project.

James H. Purcell
AID Representative, a.i.

TECHNICAL ANALYSISA. Introduction

The three major railways, CFM-South, CFM-Central and CFM-North have a 1,067mm gauge throughout their entire length of 3,138kms. CFM-S is connected to the railways of South Africa (SATS), Swaziland (SR) and Zimbabwe (NRZ); CFM-C to the railways of Zimbabwe and Malawi; and CFM-N to the railway of Malawi. CFM-S and CFM-C are connected through Zimbabwe while CFM-N's present connection to the other two railways is only through coastal shipping. CFM(C) and CFM(N) lines are single track with the exception of passing bays and at stations. All rail lines of CFM-S consist of a single track except for the Ressano Garcia line which consists of a double track.

The National Directorate for Ports and Railways (DNPCF) provides umbrella management to the 3 largely continuous railways. CFM-S is responsible for the operation of three lines. The Limpopo line runs 534kms to Chicualacuala at the Zimbabwe border; the 79km Goba line goes to Swaziland; and the 88km Ressano Garcia line connects Maputo to South Africa. The lines to Goba and Chicualacuala are expected to be rehabilitated between 1988 and 1990. CFM-S has acceptable capability to maintain and repair diesel electrical locomotives and wagons at its workshops in Maputo. CFM-Central operates lines that run from the port of Beira to Mutare, Zimbabwe (317km) and to the Malawi border (313km) Nsanje with a spur to Moatize in Tete Province (254 km). Beira workshop has the capability to maintain and repair steam locomotives and wagons but for diesel locomotives it has only a running shed for use in daily maintenance. CFM-North currently operates only one 615km line from Nacala via Nampula. CFM-North has the capability in Nampula and Nacala to partially maintain diesel electric locomotives.

In order to establish a confidence level about the condition and estimated costs of the U-20C fleet scheduled for rehabilitation and maintenance and to identify the problems, the PP design team undertook a series of workshop visits to examine hardware and facilities. Along with those visits, interviews of the RITES team on site were conducted, maintenance records were examined and a detailed inspection of three rehabilitation candidate vehicles was conducted.

The shop inspections showed that the locomotives were being maintained to the established periodic routines but the lack of spare parts required longer stays in the service bays. The examination of records showed that in place, manual, record keeping system was reasonably accurate but it was too cumbersome to allow up to date status on parts.

The detailed physical examination of three random vehicles that are candidates for rehabilitation showed an almost 100% correlation between the rehabilitation requirements report received from CFM/RITES and the conditions found. This indicated that the estimates were done to sufficient detail and that a reasonable cost for a rehabilitation could be established based on the examined vehicles.

A recent IBRD-funded report indicates that the fleet is essentially as the PP team has determined it to be in CFM-S and CFM-C areas. Their comparison of rehabilitation costs between sending the locomotives to Zimbabwe and doing them at CFM-S indicated that both time and money would be saved if the rehabilitations are done in the Maputo shops. It is intended that the rehabilitation of the designated locomotives be done at the CFM-S shops in Maputo. The work will be done with local labor and assisted by the on site RITES team and project funded mechanical/electrical technicians.

The CFM-S shops have sufficient space to accommodate these major rehabilitations. The spares needed to support the shops during periodic maintenance procedures are part of the project and should be available to accommodate the rehabilitations. With these stores available as a back up, delays for ordering and delivery will be minimized.

B. Locomotives

Since 1985, steam locomotives have been phased out of CFM-S and CFM-N in favor of diesel electrics. The Beira line is the only one still using steam mainline and shunting locos. All diesel electric locomotives are manufactured by the General Electric Company in either the U.S.A. or Brazil. They are type U20C, 2150 Horsepower, and are used for main line operations. The Diesel shunters are Rumanian diesel hydraulics, 1200 horsepower, located at CFM-S and CFM-N. In addition, 2 British AEI 1200 horsepower diesel electrics are located on CFM-N. The steam mainline locomotives on the Beira line are Garrats of Belgian FUF and German Henschel manufacture. Steam shunters are of the German Henschel and the US Baldwin 80 series. The fleet size of CFM main line locomotives for the years 1987 - 2000 is shown in Table 1-E.

At Maputo the fleet consists of 46 G.E. locos including the locos which were abandoned on the Limpopo line. Because of track rehabilitation work on the Limpopo line, locomotives, previously abandoned, may be returned to the fleet for rehabilitation. (In July 1988, 5 were returned, from which 1 was scrapped) There are also 18 Rumanian shunters at Maputo, only 2 of which are currently operational. A program to make all Rumanian shunters operational was recently proposed for World Bank financing. This program would permit G.E. locos now being used for shunting duty to be returned to mainline use. The G.E. mainline locomotives (model U20C) and their operational status as of June 1, 1988, are set forth below:

<u>Railway</u>	Out of Service			
	<u>In Operation</u>	<u>Repairable</u>	<u>Scrap</u>	<u>Abandoned</u>
CFM-S	28	18	1	1**
CFM-C	6	2	-	8*
CFM-N	<u>7</u>	<u>6</u>	<u>1</u>	<u> </u>
	41	26	2	9

* All locos abandoned on Sena Line - Status unknown

** 1 locos abandoned on Limpopo Line - Status unknown

4 locos at Maputo workshop from Limpopo line - Status repairable

The phrase "in operation" from the above listing does not signify that the locomotives are available for daily train services. "Availability" is the true measure of readiness to haul freight or passenger trains. The difference between the number of locomotives "in operation" and those "available" is that locomotives undergoing schedule maintenance, servicing, held in workshops for missing parts, wheel truing, and other maintenance delays are considered "in operation" but "not available".

The locomotive availability rate of G.E's has increased due to better maintenance in recent years and was up to 58% in May 1988. For availability summary please refer to table 2-E. This is subject to increase as a result of locomotives for rehabilitation being returned to the fleet.

At Beira, the fleet consists of 17 mainline steam locos 6 shunter locos and 8 General Electric U-20Cs. Eight G. E. are abandoned on the Sena line and will be totally cut off until the rehabilitation work (1988-1993) on that line reaches them. Locomotive availability rates in May 1988 are 61% for steam and 58% for diesels with a lower availability for shunters increasing as locomotives are rehabilitated. Under Regional Transport Development AID's project (690-231.56), nine steam Garratts, two steam shunters and two General Electrics diesels were rehabilitated. The rehabilitation work on one mainline and one steam shunter was done in Beira. This USAID project is scheduled for completion in early 1989.

At Nacala, the fleet consists of 11 General Electric mainline diesel electrics, 1 Rumanian diesel hydraulic shunter and 2 Rumanian diesel electric shunters.

C. Goods Wagons

The 3 railways have goods wagons of various types and sizes with approximately 3000 at CFM-S, 3000 at CFM-C and 900 at CFM-N. Conditions of Wagons varies. However, most are in poor repair unless being reconditioned under a specific funded rehabilitation or roller bearing conversion program. In early 1989, a rehabilitation program for 1000 wagons belonging to CFM-C will begin under funding from DANIDA. However, this program will not include conversion from plain bearings to roller bearings.

A review of the wagons in the CFM-S yards and in the wagon shed indicate a complete renovation rather than minor repairs and paint renewal. An economic evaluation has been conducted to justify the rehabilitation and conversion to roller bearings of 500 to 950 wagons.

As a further verification concerning the justification for the rehabilitation/conversion of 500 to 950 wagons a workshop visit was conducted. At the workshop, an Italian team had finished the rehabilitation and roller bearing conversion of 130 high side wagons. These wagons were totally renovated and are expected to provide 15 to 20 years services to CFM. This same Italian team will be at the Maputo workshop to oversee future donor agency rehabilitation and roller bearing conversion programs.

It is likely that CIDA will provide funding for the rehabilitation/conversion of at least 500 wagons with the possibility of providing funding for up to 950 wagons. The Italian Government has indicated its interest in the continuance of funding an Italian team to oversee the rehabilitation/conversion of wagons by other donor agencies.

D. Maintenance Capability

1. Workshops

CFM-S has fully equipped diesel locomotive and rolling stock repair shops, running maintenance sheds and storerooms. However, the workshops are in a poor state of repair, mainly: roofing, side glazing, power supply, electrical circuits, and some machinery. Tools and materials are usually deficient in number and some overhead cranes require motor replacement and overhaul. Spare parts are being used more rapidly than expected and will be insufficient by mid 1989.

CFM-C has fully equipped steam locomotive and rolling stock repair sheds, running sheds and stores. However, for diesel locomotives they have only one running shed together with a now structurally complete but unfinished, unequipped diesel locomotive maintenance and repair shop. No machinery equipment or tools exist for this diesel shop and spare parts other than consumables are in very short supply.

MP

CFM-C presently suffers from major power outages (approximately 40% in 1988) which should be remedied in October 1988 when new back up generators are supplied by Sweden.

CFM-N has a diesel locomotive repair shop at Nampula which is under conversion from steam to diesel and a fully equipped running shed at Nampula.

2. Manpower and Training

This is dealt with both in the Institutional Analysis and in the Training Annex. Difficiencies exist in management and technical skills at both CFM-S and CFM-C. The Indian RITES group presently fills part of this gap, mainly in Maputo. However, their contract ends in December 1988. At Beira, 9 Spanish technical assistants are scheduled to arrive in July.

3. Workshop Productivity

At CFM-S, locomotive repair is presently supported by Indian RITES and schedules have been developed for maintenance, repair and rehabilitation. However productivity is on the low side and will soon be further limited by a shortage of spare parts. The wagon rehabilitation productivity has increased significantly under the recently completed program to rehabilitate 130 wagons, financed by Italy. That Program has demonstrated, with the planned continuation of Italian funded TA, that CFM-S should be able to meet the requirements of their project.

At CFM-C, steam locomotive maintenance and rehabilitation productivity is relatively high due to spare parts being funded by USAID and rolling stock maintenance and rehabilitation average. Diesel locomotives running maintenance is low and periodic maintenance non existent even though an adequate size labor force exists. Steam locomotive maintenance and repair will decrease at the end of 1988 as parts become unavailable, and in three years the availability will approach zero due to lack of spare parts, whereas diesel locomotive maintenance is totally dependent on the diesel workshop being completed and fitted with equipment and tools.

E. Proposed Project Actions and Justification

As shown in Table 3-E, requirements for CFM mainline locomotives based on traffic flows show a current surplus of 24 on all 3 railways. However, this surplus is expected to soon disappear, used mainly for construction purposes on the Limpopo, Goba, Sena and Nacala lines. In 1990, these lines would be practically complete, except for the Sena line, and estimated locomotive requirements show a deficit of zero with an availability rate of 70%. In 1995, with availability at 75%, there would be a deficit of 22, due to the total opening of the Sena line for coal and Malawi traffic and the planned retirement of the steam locomotives. In the year 2000, the deficit increases to 34 with an availability of 75%.

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The traffic forecast, strongly reinforces the need to maintain, repair and rehabilitate diesel locomotives in Maputo and to gradually transfer locomotives from and CFM-(S) to CFM-(C). This need for additional motive power in CFM-(C) also means that CFM-(C) should in the future gradually increase its capability to maintain and repair diesel locos. The forecast also suggests that the steam locomotives should not be retired until absolutely necessary. If the proposed three year program rehabilitates a minimum number of 8 diesel locomotives, then the program will have replaced a number of locomotives equal to the number which will need additional rehabilitation due to major accidents or sabotage. Only an increase in the number of locomotives that are rehabilitated above eight together with an improved maintenance and repair program will increase the fleets and their availability.

The program is expected to increase locomotive availability rates from 58% to 75% by the PACD of December 1992 and provide maintenance for all diesel electric locomotives in operation or in need of relatively minor repairs. The number of rehabilitated diesel electric locos could be increased to 14, which would equal CFM's estimated locomotive requirements through 1990. Should cost savings be found in the cost of technical assistance to be financed under this project, a portion of those savings might be applied to the purchase of additional spare parts for rehabilitation purposes.

The proposed methods of increasing the locomotive availability rate is to provide: spare parts for locomotive maintenance, repair and rehabilitation; repair of workshops and equipment; with new workshop tools and equipment, technical assistance and training.

1. Locomotive Power

A. Diesel

CFM-(S), with USAID assistance, will have total capability for maintaining, repairing and rehabilitating diesel locomotives. CFM-(C), with USAID assistance, will be able to maintain and do routine repairs other than general overhaul.

Due to anticipated locomotive constraints and the lack of diesel maintenance capability at Beira currently, it is proposed that CFM-(S) provide 6 serviced locos to CFM-(C) in the near future. The remainder of locos in CFM-(S) would be used for construction activities on the Limpopo and Goba lines as well as normal activities.

This project will provide \$9.5 million in spare parts for diesel locomotives, sufficient to maintain the current combined fleets of 54 in CFM-S and CFM-C for approximately 36 months.

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3 Year Program Maputo

	<u>Million \$</u>	
	<u>Periodic Maintenance</u>	<u>Rehabilitation</u>
Year 1	1.3	1.0
Year 2	1.7	1.5
Year 3	<u>1.7</u>	<u>1.3</u>
Total	<u>4.7</u>	<u>3.6</u>

3 Year Program Beira

Year 1	0.0	0
Year 2	0.4	
Year 3	<u>0.5</u>	---
Total	<u>1.2</u>	---

B. Steam Beira

CFM-C has total capacity for maintaining, repairing and rehabilitating steam locomotives. The average availability for shunters is 46%. This project will finance \$1.0 million for spare parts for steam locomotives, sufficient to keep the fleet operating for approximately 3 years.

Alternatives Examined

The major alternatives to improved fleet maintenance and rehabilitation were buying new locomotives. It was found that the average cost of major rehabilitation is \$300,000 per locomotive plus labor and workshop use of approximately \$150,000. The total average investment is \$450,000 for a locomotive with an expected life of 15 years compared to \$1,500,000 for a new locomotive with a 30 year life expectancy. In fact, economically, rehabilitation is a better investment so long as the cost is less than \$750,000.

Other factors also contributed to the decision to focus on rehabilitation and maintenance. First, the traffic forecasts indicate that there is currently a surplus of motive power in CFM-S, even given the current 59% availability rate. Second, even new locomotives would quickly suffer maintenance problems unless current facilities, equipment and skills for loco maintenance are upgraded. Third, continuing security problems make it absolutely critical that CFM develop its own capability to do major rehabilitation jobs.

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2. Workshop Tools and Equipment

A. Maputo

Equipment Rehabilitation Requirements

	<u>Millions \$</u>
Tire Boring Machine	.05
Replace Wheel Press	.60
Supply Magnaflux axle test equipment	.08
Overhaul Air Compressor	.20
Overhaul and repair wheel lathe	.20
Overhaul and replace motors overhead cranes as necessary	.15
5 Ton crane	.15
Tools wagon shop	. 0
Tools loco shop	<u>.20</u>
	1.63

B. Beira

Equipment Diesel Shed

	<u>Millions \$</u>
Generator Repair	0.05
GE testing equipment	1.00
Portable crane	0.03
Other equipment	0.30
<u>Tools</u>	
Diesel shed	0.10
Steam shed	<u>0.10</u>
	\$1.58

3. Workshop Repair

A. Maputo

In Maputo all workshop buildings suffer from years of neglect. Also, in 1977 an unusually bad hailstorm severely damaged the roofs and sides of the buildings. Existing openings in the buildings caused by hailstorms and wind have gone largely unrepaired for over 10 years. These openings have resulted in damage to parts and equipment, defects to the electrical systems and increased deterioration and loss of production. Since this project focuses on locomotives and wagons, building repairs will concentrate on the diesel locomotive repair shop, the locomotive running shed, wagon repair shop, wagon running shed and stores. Priority will be given to the locomotive repair shop, locomotive running shed and to the wagon repair shop, especially to repair of roofing, side walls and electrical distribution. Included in the locomotive repair shop is a nonoperable locomotive turntable which needs repair so that locomotives may be transferred to the bays by overhead gantry cranes. In addition, some existing equipment will be transferred from the machine shop to the wagon running shop to replace existing equipment in the wagon running shop.

Millions \$

Turntable repair and replacement of motor pit drainage repair and replacement (loco repair shop)	\$0.15
Roof and glazing repairs to 4 buildings, drainage rework, electrical rework, misc.	\$1.35

B. Beira

In Beira no workshop repair is needed at the steam locomotive, wagon and wheel shops. However, the diesel locomotive maintenance and repair shop begun under the previous AID project has still to be completed together with additional inspection pits and rail lines.

Diesel loco shed completion (addition of two bays and inspection track, completion of architectural finishes and electrical power and lighting)	\$0.15 million
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5. Computerization Workshop Operations

The project provides a major input of parts for locomotive maintenance, repair and rehabilitation. This work will increase the complexity and number of items being ordered, or handled and coordinated by the workshop Materials Planning Purchasing and Stores division. As all of these operations are presently done manually through card index and ledger and as present operations are at capacity, a small computer operation is necessary which will tie the three functions together.

It is proposed to have one Personal Computer at each of the workshop's Planning, Purchasing and Stores units. The basic program will be customized software with variations to suit the individual functions. If a commercial package is not available, the program could be set up by an independent computer programmer leaving the initial inputting of the base items plus the variations to be done by additional local CFM staff with overseeing by the T.A. person. It is proposed that the program, required personnel training, supply and servicing be done from computer firms in Harare, Zimbabwe.

Personal Computers with ancillaries	\$0.08 million
Programs	\$0.02 million

6. Technical Assistance

It is assumed that the Indian RITES team of 46 proposed for 1989 thru 1992 or 1994 will be funded by Kuwait or World Bank and declared at the donors meeting on July 28, 1988 or at their appraisal in September 1988. Part of the Indian RITES team will provide assistance critical to activities in Maputo and to a minor extent in Beira. The TA team currently proposed is shown elsewhere.

7. Technical Training

Technical training could be provided by General Electric Company at Maputo and Beira as direct training plus technical persons could attend General Electric training sessions at other railway organizations in Africa.

Other technical training	\$0.20 million
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The technical approach proposed is appropriate to the type and magnitude of the problems being addressed. It is appropriate to the facilities and skills available, reasonable in price and adapts to the unique security situation in Mozambique. Finally, it can be implemented with the type and magnitude of resources proposed.

MAINTENANCE SCHEDULES AND REQUIREMENTS

The maintenance inspection and overhaul schedule stipulated for CFM locomotives is presented below:

A. Repairs/overhauls GE U20C Diesel electric locos

<u>Type of repair</u>		<u>Frequency of overhaul</u>	
<u>Main Measure</u>	<u>or overhaul</u>	<u>or repair</u>	<u>and duration</u>
<u>By depot</u>			
Weekly	every week		Check oil levels, drain moisture in air spares 2 1/2 hrs.
2-monthly	every 2 months		Repeat weekly, clean oil bath filters, change fuel and oil filter - 6 hrs.
6-monthly	every 6 months		Repeat 2 monthly. Change oil filter, clean panel filters, blow dirt from TM, TG, etc. 8 hrs.
<u>By workshop</u>			
R1	18 months +/- 1 month 192,000km		Cleaning and regulating turbo-charger, compressor and injection: 4 days. Removal of cylinder head, change of piston
RP	3 YEARS +/- month or 384,000km		Perform operation R1 and repair of bogies etc. 12 days
R4	6 years +/- 4 months or 768,000km		Perform operation RP and removal of engine block and complete repair and test compressor etc. 30 days
RG	12 years +/- 6 months or 1,536,000km		Perform operation R4 and complete repair 45 days. Including check of crankshaft

B. Repairs/overhauls DH 125M Diesel Hydraulic Locos

<u>Type of repair or overhaul</u>	<u>repairs</u>	<u>Frequency of overhaul or Main measures and duration</u>
<u>By depot</u>		
C1	Daily or 150km or 18hrs/shtg	Checking of oil, fuel and cooling water level. Check of electropneumatic valves etc. 4hrs.
C2	14 days or 2,000km or 250hrs/shtg	Perform all operations C1, check injectors, check hydrostratic oil, lubricate joints, clean hydraulic oil filter: 6 hrs.
R1	Monthly or 40,000km or 500 hrs/km	Taking of oil samples (analyze) check hydrostatic oil level, check oil level at turbo charger, checking of tightness: 8 hrs.
R2	Quarterly of 8,000km or 1,000 hrs/shtg	Checking of diesel engine, hydraulic transmission, reversing gear, axle drives, cardan shafts and electrical installation etc. 12 hrs.
<u>By workshop</u>		
R3	2 ¹ / ₂ years or 80,000km or 10,000 hrs/shtg	Perform all operation C1, C2, R1, R2. Demounting and checking of piston, rings, connecting rod, bearings, cylinder, liners etc. 30 day.
RK	8 years or 260,000km or 40,000 hrs/shtg	Perform all operation from points C1, C2, R1, R2, R3. Drawing out boggie from under the locomotive, Demounting of inspection covers of axle drives, bearings, check of suspensions, pivot, shock absorbers. Check air, vacuum, cooling and preheating equipment. Check of dynastarter commutator brushes etc. 45 days.

C. Repairs/Overhauls - CFM steam locomotives

<u>Type of repair or overhaul</u>	<u>Frequency of overhaul or repairs</u>	<u>Target time taken to perform repair/overhaul</u>
<u>By depot</u>		
Repair and washout of boilers	Each 15 days	6 hrs
<u>By workshop</u>		
RC	40,000 - km	15 days
PR	80,000 - km	30 days
RC	180,000 - km	15 days
PR	160,000 - km	30 days
GR	240,000 - km	60 days

CFM MAIN LINE LOCOMOTIVES (Table 1-E)

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
CFM-South				
Fleet Size	46	46	45(a)	45
CFM-Central				
Fleet Size	20(b)	20	10(c)	10
CFM-North				
Fleet Size	13	13	11(d)	7(e)
<hr/>				
CFM(All)				
Fleet Size	79	79	66	62

Notes:

- (a) One G.E. locomotive will be scrapped in 1995/2000 (In CFM fleet since 1968).
- (b) 8 G.E. diesel-electric locomotives and 12 Garrat steam locomotives.
- (c) All steam locomotives will be scrapped. Eight G.E. diesel-electric locomotives on the Sena line are abandoned.
- (d) Two G.E. first serial locomotives will be scrapped (In CFM fleet since 1966).
- (e) Four G.E. 2nd serial will be scrapped (In CFM fleet since 1968).

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Table 2-E: Percentage of G.E. mainline and steam mainline locos available by type in Mozambique

	G E V20C CFM [67]				Garrat Steam (Main Line) CFM [12]			
	S [46]	C [8]	N [13]	Average	S	C [12]	N	Average
Oct 1987	57	38	54	56	-	20	-	20
Nov 1987	56	63	54	57	-	27	-	27
Dec 1987	53	63	62	59	-	20	-	20
Jan 1988	52	52	54	60	-	20	-	20
Feb 1988	61	74	54	66	-	11*	-	11*
Mar 1988	62	63	62	68	-	58	-	58
Apr 1988	77	39*	54	52	-	58	-	58
May 1988	56	69	62	63	-	61	-	61
Period Average	59	58	57	58	-	34	-	34

Source: CFM monthly performance reports

[] loco fleet in operation including locos which need major repair or rehabilitation and excluding 8 locos abandoned in Sena line which are inaccessible.

Lack of oil for engines

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MAIN LINE LOCOMOTIVE REQUIREMENT CFM Table 3-E

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
CFM(S) requirement	14	24	30	32
Fleet Size	46	46	45	45
CFM(C) requirement	12	25	29	32
Fleet Size	20	20	10	10
CFM(N) requirement	4	6	7	8
Fleet Size	13	13	11	7
CFM (All) requirement	30	55	66	72
Total Fleet Size	79	79	66	62
Fleet needed	55	79	88	96
Availability assumed	54%	70%	75%	75%
<hr/>				
SURPLUS/DEFICIT	+24	0	-22	-34

NOTE: Fleet needed = requirement divided by availability

ECONOMIC EVALUATION

General

The project is divided into two principal components:

- i) Commodities, workshop renovation and technical assistance to improve locomotive availability.
- ii) Technical assistance to improve financial and inventory management systems.

Project component (i) has tangible outputs and quantifiable benefits which will be analyzed separately in this evaluation. In component (ii) the improvements to corporate management through improved financial accounting systems will be apparent in terms of systems procedures and skills introduced. The benefits from this depend very significantly on a wider program of action which will be supported by many sponsoring agencies in the future. Component (ii) will not be evaluated in this section.

Project Investment Appraisal (Locomotives)

Improvements to locomotive availability will occur in CFM(S) and CFM(C) due to the program. Maintenance standards will be raised and spare parts will be supplied to support both the rehabilitation of non-operational locomotives and for regular or scheduled maintenance. The project is intended to improve availability from 58 per cent, which was obtained by CFM-S in 1987 to 75 per cent by the end of the Project in 1992. This will have the effect of reducing the fleet to locomotives required to service the traffic on offer. Traffic forecasts and estimates of locomotive requirements have been produced in table AF1. The information has been obtained from:-

- i) Motive power, rolling stock and operation plan for CFM-Centra June, 1987 (SATCC project No. R-OP-1 Beira Corridor 10 year plan).
- ii) SATCC Regional Traffic Remand forecasts February, 1988.
- iii) Study for the Total Rehabilitation Operation and Maintenance of the Limpopo Railway Line May, 1988.
- iv) Informacao Estatistica No. 4 December, 1987 Direccao Nacional dos Portos E Caminhos de Ferro, Maputo.
- v) Consultants estimates.

Table AF1.

CFM Traffic and Locomotive Forecasts

	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>	<u>NOTES</u>
CFM(Sul)					
Traffic tonnes per year	2061	3807	6075	6718	RSA 50% Moz 12% in 2000
Passengers 000's	2513	4220	4892	5671	Growth 3% p.a.
Trains/day	10/16	16/21	26/32	28/35	Freight/total each day
Locomotive requirement	14	24	30	32	1987/90 excl construction
Locomotive fleet (ML)	46	46	45	45	Mainline only
<hr/>					
CFM(C)					
Traffic Tons/year 000's	481	998	1713	2269	Assume Sena line open
Passengers 000's	1354	1479	1715	1988	Growth 3%
Trains/day	5/9		7/14	9/23	11/26
freight/total each way					
Locomotive requirement	12		25	29	32
10yr plan by 1992					
Locomotive fleet (ML)	8/20	8/20	10/10	10/10	Diesel/total ML
<hr/>					
CFM (N)					
Traffic Tonnes 000's	53		62	406	431
Malawi 60%					
Passengers 000's	214	348	634	761	Growth 3%
Trains/Day	1/2	2/3	3/4	4/5	Freight/total
Locomotive Requirement	4	6	7	8	
Locomotive Fleet	13		13	11	7
GE Mainline					
<hr/>					
CFM (ALL)					
Traffic tonnes/year	2759	5153	8422	9748	
Passengers	4081	4459	5170	5992	
Trains/day	16/27		25/38	38/59	43/66
Freight/passenger					
Locomotives Requirements To be available.	30		55	66	72
Locomotive Fleet Diesel	67	67	66	62	Assume no write offs
Steam	12	12	0	0	No steam after 1995
Assumed availability	58%	70%	75%	75%	
Fleet size needed	55	79	88	96	
Surplus deficit	+24	0	-22	-34	

Note: For detailed explanation of CFM fleet sizes see Annex E.

4/1

The difference between the numbers of units needed with and without the project have been calculated for CFM(S) and CFM(C) in table AF2

Table A F2: Mainline Locomotive Requirements
With and Without the Project
 for CFM(Sul) and CFM(C)

	Fleet Needed	Without the Project		With the Project		Difference in Size
		Availability %	Size	Availability %	Size	
1987	26	54	48	54	48	0
1990	49	58	84	70	70	14
1995	59	57	104	75	79	25
2000	64	57	112	75	85	27

Prerequisite to this projection is that CFM will use their foreign exchange earnings to sustain the improvements in availability after the project is completed in 1992. It is proposed that this issue will be subject to a covenant in the grant agreement. Sensitivity to a reduction in availability will be examined in this analysis.

Project Costs

Project costs relating directly to the improvement in locomotive availability and the phasing of this expenditure over the project period are presented in Table AF3. The total costs associated with improving locomotive availability will be \$ 21.8 million. This includes a proportion of project and AID management costs and housing. The costs associated with materials for wagon repairs, general and financial management support are excluded from this analysis.

Technical Assistance costs will be reduced if RITES provided the 4 mechanical and electrical technicians to the workshops instead of USAID and that this was funded as part of the proposed RITES team for 1989 to 1992. The reduction in T.A. costs of \$ 3.6 million could then be used for extra spare parts to repair possible accident damaged locomotives and regular maintenance beyond 1992. This alternative course of action appears attractive and is examined in the sensitivity analyses that follow.



Table AF3

Project Costs Related to Improving Locomotive Availability

\$ Million

Year	Spare Parts		Fixed	Technical	Housing	Total
	Rehab'	Maint'	Equip'	Assist'	Costs	Costs
1988	0	0		0	0	
1989	0.4	0.6	2.0	1.275	0.05	4.325
1990	0.9	3.5	1.05	2.65	0.05	8.150
1991	0.9	2.6		2.65	0.05	6.200
1992	0.4	1.4		1.275	0.05	3.125
Total	2.6	8.1	3.05	7.850	0.20	21.800
Notes	1	2	3	4	5	

Notes: 1 Spare parts to rehabilitate 8 locomotives at a rate of \$ 325.000/unit.

2 Spare parts for regular maintenance of main line locomotives.

3 Construction and installation of fixed and other equipment.

4 Technical Assistance \$M

- Workshops 6 T.A. x 3 years @ \$ 300,000/yr	5.4
- Stores, inventory purchasing 3 x 4/3 x 300	1.2
- Short term T.A.	0.2
- Other-Project management total 2.1m of which locs	0.6
- AID management	0.9m of which locs 0.45
<u>TOTAL T.A.</u>	<u>7.85</u>

- 5 Housing - the cost of housing has been estimated to be \$100,000 per person per unit. The life of each unit is 20 years; 10 persons involved in locomotives will be housed. Using straight line depreciation the annual costs of housing can be taken as \$ 50,000 per year.

Recurrent Costs

These costs can be divided between local labor, services, building maintenance and overhead costs in the workshops and the continuation of offshore funding for spare parts. In addition it would be appropriate to assume that the investment of RITES is a recurrent cost at least during the duration of the project but also for a further period of 3 years to 1995.

Local Costs

The lack of cost center or departmental accounting data has required that assumptions be made on local recurrent costs which in reality make up a very small proportion of total recurrent cost, due mainly to extremely low labor rates.

- The treatment of local and foreign costs in this analysis has been to consider the entire project in US dollars and not to shadow price the foreign exchange to local metacais. This is justifiable since most of the income and expenditure of CFM is in foreign exchange, due to the "transit" orientation of the business.
- Labor costs will be adjusted to reflect the shortage of skilled technicians in the workshops where overall average earnings of around \$550 per year make them, probably the lowest paid in the region. A shadow price factor of 2.0 applied to a proportion of the labor costs is introduced to reflect the differential between the market value and actual price of skilled labor.
- Overheads are treated as an overall average addition to labor costs of 15 per cent.
- Building and infrastructure maintenance is essential, especially during the wet season when drains become blocked and power supplies are affected; sustained workshop output depends upon this maintenance occurring. Since virtually no maintenance occurs at present costs can only be estimated in this analysis.

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The recurrent local costs are to be taken as:

<u>Labor</u>		\$ 000's/year
Beira Steam Workshop	118	
Diesel Workshop	22	
Maputo Diesel Workshop	<u>206</u>	
Total	346 @ \$ 550/year	195.8
Overhead	@ 15%	29.4
Services & Utilities	@ 10%	<u>19.6</u>
		244.8
Additional cost due to Shadow price of Skilled labor		
- 346 x 0.2 --- 70 @ \$ 550/year		<u>38.5</u>
Total economic cost of labor + o/h + services		<u>283.3</u>

Building & Infrastructure Maintenance

Maputo - Labor	say 50 @ \$ 550	27.5
Materials	say sum	50.0
Beira - Labor	say 40 @ \$ 550	22
Materials	say sum	<u>40</u>
Total Building Maintenance		139.5

Further growth in traffic and the fleet size of 2.7 per cent p.a. (average) will increase the labor component since labor costs can be judged as variable. Building maintenance costs will be considered as fixed throughout the evaluation period.

Offshore Costs

To sustain the improvements intended in the project certain conditions will need to be met which will have a cost implication.

- i) Technical assistance provided by RITES (or equivalent) be provided throughout the project.
- ii) RITE's T.A. continues for 3 years after the project is completed i.e. to 1995.
- iii) That foreign exchange earned by CFM is partly used to finance spare parts for locomotives after the project is completed.

The recurrent foreign costs can be taken as:

- i) RITES (or equivalent)
The present cost of the RITES contract financed by the KFAED is \$3.9m for 52 x 3 T.A. years (1985-1988) i.e. cost per T.A. year = \$ 25,000.
future cost per T.A. taken as \$ 38,000/year assuming 15 per cent p.a. inflation.

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T.A. years required Maputo 12, Beira 9, total T.A.
cost/year 21 x \$ 38,000, say \$800,000;

- ii) this would continue from 1992 to 1995;
- iii) spare parts are required at a rate of \$ 2.4m p.a. to sustain the fleet at its present size, of which provision for non scheduled maintenance is \$0.4m p.a. Over the evaluation period the fleet size is assumed to grow at 2.7% p.a. (overall average).

Recurrent costs of maintaining the CFM fleet (excluding Norte) is summarized below in table A F4.

Table A F4 Recurrent Cost \$ 000's

Year	Local		Foreign		Total
	Labor	Other	T.A.	Spares	
1988	(283)				
1989	291	140	800	0	1231
1990	298	140	800	0	1238
1991	306	140	800	0	1246
1992	315	140	800	0	1255
1993	323	140	800	2400	3663
1994	332	140	800	2464	3736
1995	341	140	800	2531	3812
1996	350	140	0	2599	3089
1997	350	140	0	2670	3160
1998	350	140	0	2741	3231
1999	350	140	0	2815	3305
2000	350	140	0	2891	3381

Notes - spares will be provided by USAID until 1992.

Project Benefits

The project will reduce the locomotive fleet size by improving availability levels. Benefit will accrue through savings in locomotive provision and maintenance costs to Mozambique and be distributed to users such as Zimbabwe, Swaziland and to a lesser extent Botswana as well as Mozambican local freight and passenger traffic and South Africa. The distribution of benefit is conditional upon costs being accurately reflected in the tariff structure. To this end implementation of a cost based tariff structure is essential.

Locomotive Provision Costs

\$ 000's

Capital cost exworks \$1.7m cif \$1.85m	
Annualized at 10% p.a. over 25 years	204
Depreciation (straight line)	<u>74</u>
Provision finance and depreciation costs	278

Maintenance Costs

Specific expenditure details on locomotives were not available so the maintenance costs per locomotive km were not known. However, the average annual maintenance costs per locomotive can be determined by dividing the total annual recurrent cost by the locomotive fleet size. In 2000 the total recurrent cost is estimated to be \$3.381 (ref. table A F4) for a fleet size of 85 (ref. table A F2)

Average annual recurrent cost/locomotive	<u>39</u>
Locomotive provision and maintenance costs/loco.	<u>\$317p.a.</u>

Cost savings

The benefit stream is the product of the difference in locomotive fleet requirement with or without the project (table A F2) multiplied by the locomotive provision and maintenance costs as presented below in table AF5.

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Table A F5	<u>Aggregated Annual Cost Savings</u> \$ million	
Year	Difference in fleet requirement	Cost Savings x \$317,000
1989	0	0
1990	14	4.438
1991	16	5.072
1992	18	5.706
1993	21	6.657
1994	23	7.291
1995	25	7.925
1996	25	7.925
1997	26	8.242
1998	26	8.242
1999	27	8.559
2000	27	8.559

Note Intervening years to 1990/1995/2000 have been interpolated.

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The investment appraisal is based on the assumption that implementation will occur in mid 1989 with the first of the rehabilitated locomotives being completed by the end of the year. By the end of 1990 availability should have increased by 12 per cent from 58 per cent to 70 per cent due to the impact of vital spare parts and the addition of 3 more rehabilitated locomotives. Benefits at the end of second year of the project will therefore be higher. From the end of the project in 1992 if 75 per cent availability is obtained the fleet requirement will be 18 units less than if the project was not done. Thereafter, sufficient resources are costed and included, covering technical assistance and spare parts to sustain 75 per cent availability until 2000. With this basic scenario, and taking 1989 as the start year for the analysis the IRR was found to be 17.7 per cent. Refer table AF6.

Sensitivity Analysis

There are many significant external factors; that will influence the result of the investment appraisal.

- i) Security Problems have been and will continue to pose a serious threat to the viability of CFM and undermine the performance of initiatives taken. This project will be no exception. Locomotives have been seriously damaged at a rate of 3 per year and have required totally rebuilding. (In a study conducted by RITES the conclusion was that rehabilitation is not economic if it costs more than \$572,000). The project provides sufficient funds to rehabilitate 8 locomotives over the three year period 6 of which are needed at time of writing. The project also provides \$0.4 m/year for repairing non maintenance scheduled locomotives which has been extended as a recurrent cost of 1992. That budget may still not be sufficient to keep up with the rate of the work needed.

If, from 1989, locomotives continue to need major accident repairs at a rate of 3 each year then the numbers of locomotives available for service will be reduced accordingly. The effect will be to either purchase new locomotives to meet demand or reduce capacity and not meet demand. The former option is evaluated. Locomotive provision costs are taken as \$278,000 per unit per year (including depreciation) which, assuming that a loss of 3 units per year occurs evenly throughout the project, would increase recurrent costs by \$834,000 per year starting in 1992 at the end of the project. The effect of replacing severely damaged locomotives with new units would be to totally reverse the viability of the project. Alternatively, the equivalent effect would be to reduce the fleet size by 24 units by year 2000 (3 units lost/year between 1992 and 2000) which in turn would reduce availability to pre-project levels.

Table A F6
PROJECT INVESTMENT APPRAISAL (Locomotives)
Scenario - Basic Case

\$ 000's

<u>Year</u>	<u>Project</u> <u>Costs</u>	<u>Recurrent</u> <u>Costs</u>	<u>Total</u> <u>Costs</u>	<u>Cost</u> <u>Savings</u>	<u>Net</u> <u>Benefit</u>
1989	4325	1231	5556	0	-5556
1990	8150	1238	9388	4438	-4950
1991	6200	1246	7446	5072	-2374
1992	3125	1255	4380	5706	1326
1993		3663	3663	6657	2994
1994		3736	3736	7291	3555
1995		3812	3812	7925	4113
1996		3089	3089	7925	4836
1997		3160	3160	8242	5082
1998		3231	3231	8242	5011
1999		3305	3305	8559	5254
2000		3381	3381	8559	5178

Result : IRR 17.69%
 NPV @ 10% \$6.370 million

Table A F8

PROJECT INVESTMENT APPRAISAL (Locomotives)
Scenario - Major Accident Locomotives to be Rehabilitated
and 1 out 4 Replaced by New

\$ 000's

<u>Year</u>	<u>Project Costs</u>	<u>Recurrent Costs</u>	<u>Total Costs</u>	<u>Cost Savings</u>	<u>Net Benefit</u>
1989	4325	1231	5556	0	-5556
1990	8150	1238	9388	4438	-4950
1991	6200	1246	7446	5072	-2374
1992	3125	1255	4380	5706	1876
1993		4446	4446	6657	2211
1994		4519	4519	7291	2772
1995		4595	4595	7925	3330
1996		3872	3872	7925	4053
1997		3943	3943	8242	4299
1998		4014	4014	8242	4228
1999		4088	4088	8559	4471
2000		4164	4164	8559	4395

Result : IRR 14.17%
 NPV @ 10% \$3.231 million

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To counteract or compensate for major accident repairs an extra amount of \$0.575 million would need to be spent annually on rehabilitation beyond 1992 to sustain availability levels at 75 per cent (assuming 3 units affected each year, which cost an average of \$325,000). In addition it is likely that 1 out of every 4 locomotives would be written-off to be replaced by a new unit and an extra 6 units would be needed between 1992 and 2000, annual average provision costs would be \$208,500 ($6 \times 278,000 / 8$). Therefore, recurrent costs would increase by \$0.783m/year to cope with major accident damaged locomotives. This produces a far more preferable solution reducing the rate of return to the project to 14.2 per cent (17.7% basic case) and the NPV @ 10% p.a. to \$4.747 m. As shown in table AF8. The Agency would be strongly recommended to protect its investment beyond 1992 if the security/major accident problems continue and locomotives are severely damaged. The costs of spare parts for reparation would be \$0.9 million/year and new locomotives \$10.2 million over 8 years. Initially, reparation costs could be funded from this project's budget if the workshop technical assistance (2 electricians and 2 diesel mechanics) were supplied as part of the RITES team for 1989 to 1992 and beyond if necessary. The RITES team are likely to be funded by a multilateral agency either KFAED or the World Bank. This possibility is evaluated next.

- ii) Technical Assistance supplied by RITES has been estimated in this design to cost \$38,000 per T.A. year, by comparison the same T.A. supplied by USAID will cost approximately \$300,00 per T.A. year. If the proposed RITES team included 4 additional electricians and mechanics and USAID used that budget to finance spare parts for the severely damaged locomotives after 1992 then approximately 4 years of spare parts for rehabilitation could be supplied.

Table AF9

PROJECT INVESTMENT APPRAISAL (Locomotives)
Scenario - Spare Parts for T.A. by RITES

\$ 000's

<u>Year</u>	<u>Project Costs</u>	<u>Recurrent Costs</u>	<u>Total Costs</u>	<u>Cost Savings</u>	<u>Net Benefit</u>
1989	3725	1383	5108	0	-5108
1990	6950	1390	8340	4438	-3902
1991	5000	1398	6398	5072	-1326
1992	3425	507	3932	5706	1774
1993	900	2915	3815	6657	2842
1994	900	2988	3888	7291	3402
1995	900	3064	3964	7925	3961
1996		2098	3098	7925	4827
1997		3160	3160	8242	5082
1998		3231	3231	8242	5011
1999		3305	3305	8559	5178
2000		3381	3381	8559	5178

Result : IRR 27.77%
 NPV @ 10% \$8.648 million

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The effect would be to reduce the project cost by \$3.6 million between 1989 and 1992 and extend the project cost by \$0.9 million per year from 1992 to 1995 inclusive. Recurrent costs would increase due to 4 additional T.A. by \$152,000/year - and for the purpose of this analysis, until 1995. The result is to increase the IRR to 21.8 per cent (Basic 17.7 per cent) and the N.P.V. at 10 per cent p.a. to \$8.684 million. As shown in table AF9. The Agency should actively negotiate with the host country, the multilateral sponsor and RITES to implement this option.

- iii) The sensitivity to project cost increase by 10% and 25% has been tested. The results (shown below) indicate that the project is reasonably robust and able to stand a 25 per cent cost increase.

increase	IRR	NPV	TABLE
+ 10%	15.0%	\$4.475 million	AF10
+ 25%	11.6%	\$1.570 million	AF11

(Note that this analysis is applied to the locomotive part of the program only i.e. to \$21.80 m out of the total program).

- iv) The sensitivity to a reduction in traffic projections would manifest itself by changes in cost savings. Two possibilities have been examined.

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Table An F10

PROJECT INVESTMENT APPRAISAL (Locomotives)

Scenario - Project Costs + 10%

\$ 000's

<u>Year</u>	<u>Project Costs</u>	<u>Recurrent Costs</u>	<u>Total Costs</u>	<u>Cost Savings</u>	<u>Net Benefit</u>
1988	0	0	0	0	0
1989	4757	1231	5988	0	-5988
1990	8965	1238	10203	4438	-5765
1991	6820	1246	8066	5072	-2994
1992	3437	1255	4698	5706	1014
1993		3663	3663	6657	2994
1994		3736	3736	7291	3555
1995		3812	3812	7925	4830
1996		3089	3089	7925	4830
1997		3160	3160	8242	5082
1998		3231	3231	8242	5011
1999		3305	3305	8559	5254
2000		3381	3381	8559	5178

Result : IRR 14.96%

NPV @ 10% \$4.475 million

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Table A F11

PROJECT INVESTMENT APPRAISAL (Locomotives)
Scenario - Project Costs + 25%

\$ 000's

<u>Year</u>	<u>Project Costs</u>	<u>Recurrent Costs</u>	<u>Total Costs</u>	<u>Cost Savings</u>	<u>Net Benefit</u>
			0	0	
1989	5406	1231	6637	0	-6637
1990	10187	1238	11425	4438	-6987
1991	7500	1246	8996	5072	-3924
1992	3906	1255	5161	5706	454
1993		3663	3663	6657	2994
1994		3736	3736	7291	3555
1995		3812	3812	7925	4113
1996		3089	3089	7925	4836
1997		3160	3160	8242	5082
1998		3231	3231	8242	5011
1999		3305	3305	8559	5254
2000		3381	3381	8559	5178

Result : IRR 11.58%

NPV @ 10% \$1.570 million

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- (1) Border closures with South Africa would increase traffic along the Beira and Maputo corridors by approximately 30 per cent according to SATCC estimates. This would increase the rate of return provided capacity was available to meet demand. The additional numbers of locomotives required to meet this demand would be 23 in 1990 and 30 in year 2000. Obviously project benefits would increase considerably in this case.
- (2) Should traffic projections be less than assumed in this analysis due to continued failure by the SADCC states to attract investment into trade and industry, then the project would be seriously affected. In testing the sensitivity of the project to reduced traffic projections the following assumptions are made:
 - a) that present traffic will continue to grow to those levels expected in 1990 due to some diversion from South African routes to the newly rehabilitated corridors;
 - b) 1990 levels will remain constant until 1995.
 - c) From 1995 growth will occur at 1.5 per cent p.a. For the purposes of this analysis it has been assumed that the cost savings are a proxy to traffic growth (provided capacity available is sufficient to meet demand). The effect of reducing traffic levels is to reduce the project IRR to 3.5 per cent (Basic 17.7 per cent) and the N.P.V. to - \$4.02 million, refer to table AF12. The project is, therefore, not worth doing if traffic levels are sustained at about those projected for 1990 levels which may well be the case unless investment is made in trade generating sectors.

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Table AF12

PROJECT INVESTMENT APPRAISAL (Locomotives)
Scenario - Reduced Traffic Levels to 1990 Levels
to 1995 then 1.5% p.a. growth

\$ 000's

Year	Project Costs	Recurrent Costs	Total Costs	Cost Savings	Net Benefit
1989	4325	1231	5556	0	-5556
1990	8150	1238	9388	4438	-2800
1991	6200	1246	7446	5072	-2166
1992	3125	1255	4380	5072	692
1993		3663	3663	5072	1409
1994		3676	3676	5072	1396
1995		3690	3690	5072	1382
1996		2939	2939	5148	2210
1997		2980	2980	5225	2245
1998		3021	3021	5304	2283
1999		3065	3065	5383	2318
2000		3108	3108	5463	2355

Result : IRR 3.5%
 NPV @ 10% \$4.02 million

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Table

A F13 Summary of Project Evaluation Results (locomotives)

Scenario	IRR %	NPV @ 10%
i) Basic	17.7	\$6.370 million
ii) Severely damaged locomotives to be replaced by new	Negative	-
iii) Severely damaged locomotives to be rehabilitated and 1 in 4 replaced	14.2	3.231
iv) Transferring TA (3.6 million) to spare parts with RITES doing the TA	21.8	8.68
v) Project Costs + 10%	15.0	4.475
vi) Project Costs + 25%	11.6	1.570
vii) Traffic levels constant 1990-1995 item increasing at 1.5% p.a.	3.5	-4.02

Summary of Results

Investment in Mozambique on Railways is fraught with uncertainties and risks. Concerning security, accident cost escalation and demand fluctuations, the range of sensitivity analyses is intended to demonstrate the effect of these externalities on the locomotive project. The results of these sensitivity analyses are presented in table AF13.

Overall the project is fairly robust. Replacing severely damaged locomotives with new units should not be encouraged at all by acceding to demands for new locomotives over and above those required to meet demand. The greatest cause for concern is the sensitivity of the project to traffic levels.

The Traffic demand used in this design has been conservative, using the most recent forecasts supplied by SATCC (SATCC Demand Projections March, 1988 draft). The forecasts are based on two considerations, firstly that most existing overseas trade from LDC's using the RSA ports will be diverted to Mozambique ports as facilities are improved. Secondly that growth will occur in some areas of production, particularly agriculture and mining. The sensitivity test assumed that most of the diversion will have taken place by the end of 1990 as the Goba, Limpopo and Beira railway lines become fully rehabilitated. However, there is growing scepticism by the international community that most SADCC economies can achieve the growth targets forecast while prevailing fiscal and economic policies militate against that occurring. The scenario that traffic will not grow very much between 1990 and 1995 may well be realistic and after then growth would only be modest. Traffic projections in the basic analysis also rely increasingly on the Mozambican and South African coal exports towards 2000. The distribution of benefits is examined next.

Distribution of Project Benefits

The project benefits should be distributed to the users through lower tariffs which should reflect lower costs, provided an accurate traffic costing system is in place. Should Mozambique price according to "what the market can bear" then the international users would not derive any benefits in lower transport costs and there would be no regional economic benefit.

The basis for distributing benefits would be a function of usage which for this evaluation will be net tonne km (NTK). Table A F14 and An F15 show net tonne km by user country for each of CFM(C) and CFM(Sul). CFM(N) is not taken into account as the project excludes assistance to CFM(N).

Table AF14 CFM(C) Net Tonne km by User Country

	x 000's			
	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Zimbabwe	78,299	142,650	189,249	207,952
Zambia	26,628	28,530	31,700	34,870
Malawi	20,922	30,138	84,365	84,365
Mozambique	14,110	58,480	244,770	372,510

Note that the Sena Line is expected to open to traffic in 1992 and that coal from Moatize will then start to be conveyed the 575 km to Beira for export.

Table AF15 CFM(S) Net Tonne km by User Country

	x 000's			
	<u>1987</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Mozambique	44,028	66,862	114,986	126,342
Zimbabwe	36,872	349,218	453,096	521,478
Swaziland	27,880	82,212	93,160	104,720
Botswana	0	10,440	20,880	20,880
South Africa	80,696	127,160	267,520	292,600

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Note that the diversion of Zambian traffic from Resano Garcia to Limpopo in 1990 makes a large difference to the net tonne terms generated. This effects CFM(Sul) trading position significantly. Coal from South Africa using the Matola coal terminal in Maputo port is expected to rise significantly from 1995.

Table AF16 Usage of CFM (Sul & Centro) by User Country

	ntk x 1000							
	1987		1990		1995		2000	
	ntk	%	ntk	%	ntk	%	ntk	%
Zimbabwe	115,171	35	491,868	54	642,345	45	729,430	42
Swaziland	27,882	8	82,212	9	93,160	6	104,720	6
Zambia	26,628	8	28,530	3	31,700	2	34,870	2
Malawi	20,922	6	36,138	4	84,365	6	84,365	5
Botswana	0	0	10,440	1	20,880	1	20,880	1
S. Africa	80,696	25	127,160	15	267,520	19	292,600	17
Mozambique	58,138	18	125,342	14	304,235	21	498,852	28
Total	329,437	100	901,690	100	1,444,205	100	1,765,717	100

From Table AF16 it can be seen that Zimbabwe is the prime beneficiary, based on usage, for all years. Mozambique traffic benefits increasingly as the country's economy grows, particularly through coal exports.

Table A F17

	Benefit Distribution of Locomotive Project		
	1990	1995	2000
Land Locked Countries	71%	60%	56%
Mozambique	14%	21%	28%
South Africa	15%	19%	16%

The locomotive project can be judged to be regional in terms of economic benefit and is, therefore eminently suited for inclusion in the Southern African Regional Program.

TRAINING AND STAFF DEVELOPMENTI. Background: Education in Mozambique

At independence in 1975 over 90% of the population was illiterate. Major strides have taken place since then in school enrollments and adult literacy programs. However, Mozambique's education and literacy levels are still low. Today, literacy is officially estimated at about 30% and school enrollments are officially estimated at about 50%. Of this figure less than five percent of the school age population attend secondary school. Less than 100 students graduate from the university per year, and only a handful of these are in engineering. In the last two years one university engineering graduate has been employed by CFM.

II. Present Staff Situation at CFM

Currently there are approximately 15,500 workers in the CFM (excluding the port). Their division according to the three lines are as follows: CFM (N) - 4,862, CFM (C) - 5,558, and CFM(S) - 5,080. A more detailed breakdown of the work force for CFM(C) and (S), the two lines to be assisted by this project, appears in tables I and II. A great decrease in CFM personnel took place between 1982 and 1985 when the total work force declined from about 25,000 to about 16,700. This number has steadily declined since 1985. However, it is believed that there are still more railroad workers than necessary. It is also worth noting that the workforce is old, with nearly sixty percent above age 40 (see Tables I and II). The bulk of CFM workers are semi-skilled laborers working on track and in the workshops. Supervisors and artisans make up about 10-15% of the workforce. Mid and upper-level managers comprise less than 5%. There are 91 expatriates working in technical, supervisory, management and teaching (26 are at the Railway Schools) positions. Fifty-two of these are from the Indian R.I.T.E.S. team and play an important role in keeping CFM running in several areas including finance/accounts, permanent way, and locomotive rehabilitation and repair.

This annex is primarily based upon several recent and generally thorough reports on CFM, each of which focused on aspects of organization and manpower. These were: "Analysis de Besoins de Formacion et Orientacion," by Sofrerail, et. al (Oct., 1986); the Beira Corridor Organization and Manpower Development Plan by Norconsult (1987); draft Locomotive Study for DNPCF by R.I.T.E.S. (May, 1988); study on the Limpopo Line by Mott, Hay and Anderson (June, 1988); and a series of manpower studies completed by S.E.D.E.S in 1986. These documents were supplemented by interviews with DNPCF officials, consultants and other reports and records.

Approximately 80% of the workforce have not gone beyond the fourth year of formal education (see Tables I and II). A sizeable minority of employees (at least 40%) are illiterate. One consequence of this situation is that CFM has very few accredited artisans. It is estimated that less than 20 new apprentices are produced per year. According to a 1986 field study less than 20 workers at CFM South and Central had 12 years of schooling. Nevertheless, according to most qualified observers, the quality of CFM's skilled and semi-skilled workforce is not the major problem. CFM's most serious manpower problem is in its lack of qualified supervisory, management and technical staff. CFM has yet to fill the gaps created by the departure of the Portuguese at independence. Railway supervisors lack formal education as well as management/supervisory training.

EMPLOYEES BY AGE AND EDUCATIONAL LEVEL

	0	1	2	3	4	5	6	7	8	9	10	11	12	T
20														
25	7	10	18	40	354	106	270	57	8	20		2	1	893
30	9	26	43	76	343	90	180	38	11	7		2	2	827
35	15	45	59	93	279	30	66	12	8	9				616
40	33	75	98	160	426	37	90	18	12	11		3	4	967
45	31	83	103	135	323	27	35	7	5	13			2	764
50	45	116	112	199	247	9	20	7	4	4		1		764
55	36	123	124	120	157	10	10	3	1					584
60	37	91	76	93	85	3	4	4		2				395
65	8	31	30	24	30	3				1				127
T	221	600	663	940	2244	315	675	146	49	67		8	9	5937

CFM - CENTRO

EMPLOYEES BY AGE AND EDUCATIONAL LEVEL

	0	I	2	3	4	5	6	7	8	9	10	11	12	T
20							3							3
25		4	13	29	149	86	252	4	2	7	1			547
30	5	29	26	72	170	15	91	15	7	6	1		2	472
35	17	67	81	136	312	26	51	12	6	5	3		2	718
40	52	114	123	154	361	28	25	8	4	3	1			873
45	88	154	124	128	281	21	13	2	2					813
50	145	186	119	134	196	5	5	4	3	1				798
55	153	180	88	79	122	4	4	1		1				632
60	102	197	77	50	47	2		1		1				477
65	69	92	28	15	16	1			1					225
T	631	1023	679	797	1651	221	417	17	25	24	6		4	5558

There is also a problem of retention of skilled employees. Salaries for skilled and supervisory employees are low when compared to the private sector and other railways in the region. A new revised salary scale will soon be published (see Table III). However, even this is well below the private sector. Consequently, as employees are trained-up quite a few leave for other employment. Recent experimental incentive programs developed by the R.I.T.E.S. team for the diesel workshops and the Italian team for the wagon workshop seem to be overcoming this problem for these two shops.

Table III
CFM Salary Scale (1988)

Grade	Monthly	Hourly
I	12,800	06.07
II	14,500	75.52
III	16,300	84.90
IV	18,000	93.75
V	20,500	100.77
VI	23,500	122.40
VII	27,000	140.03
VIII	31,000	161.40
IX	35,000	182.29
X	40,000	208.33

III Staffing Situation at the Diesel Workshops

The staffing situation at the diesel workshops in Maputo and Beira reflect the condition of CFM as a whole in that the manpower levels are well below officially established requirements. Furthermore, virtually all those in technical and supervisory positions are under qualified both in terms of formal job requirements and actual skills needed to do their job. For example, in the Maputo diesel workshop in the highest supervisory and technical skill category only 20 of 88 positions are filled. In the lower skilled and semi-skilled category, the situation is better, with 206 of 321 positions filled. Even allowing for some inflation of positions there is a critical shortage, particularly in the supervisory and highly skilled positions. Moreover, most of those 20 Mozambicans holding these supervisory and technical positions lack the needed skills to perform well.

IV. The Current Railway Training Program

In 1983 the DNPCF adopted a new structure for railroad training comprised of three parts:

- The DNPCF Projects Office which constituted the executive body,
- The National Railway Training School in Inhambane, and
- The Regional Training Centers.

The Projects Office has the following functions:

- Ongoing evaluation of CFM personnel training needs.
- Defining program objectives.
- Coordination with national training institutions.
- Setting recruitment policies and criteria.
- Coordination of all technical assistance and training projects.
- Support for the National Training School in Inhambane.

Formal training for CFM staff is undertaken at Inhambane and the Regional centers at Maputo (CFM-S) and Beira (CFM-C). A railway school for CFM-N is planned for Nacala.

The National Railway Training School in Inhambane

In 1974 the National Railway Training School was established at Inhambane. However, it remained largely inactive until 1985 when the French and the Portuguese governments provided \$9,000,000 to develop the school. Recently \$12,000,000 has been secured from the

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same two governments along with the EEC to continue assistance to the Inhambane school and greatly expand the regional training centers. Each year approximately 200 persons are tested for enrollment at Inhambane and of these less than 100 are accepted. They all must have at least a 6th grade education and must pass academic, technical and aptitude tests. Entrants follow a two year program of course work including railroad subjects (eg. Commercial, Operating, Signaling, Permanent Way, Shunting and Traction), and general subjects (eg. Mathematics, Physics, Chemistry, History, drawing, Portuguese, and English). In the third year they receive on-the-job training. The school has a staff of 38 of which half are expatriates. It graduates about 20 students per year at the level IV (beginning, supervisory positions), and another 35 at level III. (Class A Operator).

The Maputo and Beira Training Centers

These centers specialize in short courses on railroad subjects ranging from one to nine months. In 1987, 321 CFM-S staff members attended courses at the Maputo center of which 289 passed; at Beira 269 passed of the 290 attendees. Under phase II of the French, Portuguese, EEC project even more training is planned at these centers. It is anticipated up to 1,000 employees could be accommodated yearly at each center by 1990. A large scale literacy program is also envisaged for the centers. Each center will be provided with technical assistance, teaching material and equipment, and renovation/construction as necessary.

Training of Upper Level Staff

Presently there is no program for training managerial staff. As stated previously most of these managers lacked the educational and experiential background necessary when they were promoted into these positions at independence. Because of language and pressures of work they have not been able to take advantage of overseas and regional training opportunities. However, in the near future they should be able to benefit from the DE - Consult regional railway training program, which will be described later in this annex.

On-the-Job Training (O-J-T)

O-J-T is the most prevalent form of training at CFM and probably the most effective. In almost all areas where expatriates are currently supporting the existing system, some on-the-job training is taking place. The R.I.T.E.S. organization in the diesel workshops are providing limited on-the-job training. The Italians who are undertaking rehabilitation of the wagon fleet, are providing very structured O-J-T supplemented by classroom instruction.

A limited amount of on-the-job training is also taking place in the accounts, stores and purchasing areas, where the R.I.T.E.S. organization is supporting certain systems. R.I.T.E.S. are also involved in management training in the diesel workshops.

Generally, however, the O-J-T has not been as effective as it could be for several reasons: often the expatriate technicians are not skilled trainers; the expatriates' terms of reference emphasize the production rather than training aspects of their work; the Mozambican workers do not have the pre-requisite skills necessary to learn the job; the Mozambican workers are transferred before they can acquire the skills from their expatriates counterparts.

Other Training Locations

Training also takes place outside the CFM. It is provided at various levels and in areas which are not specifically related to railway operations. A small number of staff have taken up courses in the University, while attendance at night schools, which cater for a relevant range of subjects, are also available.

Language classes are also in progress and a major effort is being made to provide CFM staff with a working knowledge of English. While CFM receives a negligible number of University graduates, it does have an active scholarship program with the three year industrial and commercial technical institutes. Each year CFM sends up to 25 candidates to each of the institutes where they receive training in engineering, mechanics, electricity, chemistry, accounting and customs operations.

In addition to the facilities provided in Mozambique, a number of Railway staff are undergoing training abroad. Currently 14 CFM staff are in Universities, professional or technical schools abroad.

V Project Training Plan

Overall Training Needs for CFM

Training is needed for all levels of CFM staff. As indicated previously CFM staff lacks formal as well as job skill qualifications. CFM requires a long-term staff training program that will provide increased training in the following areas:

Literacy

Technical areas - levels II - VII on the CFM staff scale
(III - X on the new scale)

Supervisory training

Management training for senior and mid-level managers

Specialized senior staff training in such areas as computers, finance, inventory control, costing, purchasing, etc.

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These needs are detailed in the recent studies previously referenced. Clearly, it will take at least ten years of intensive effort in training, and organizational reform to bring CFM to an acceptable standard of efficiency. The training plan proposed for this project is of a more limited scope. It is designed to support project investments in diesel locomotive maintenance and rehabilitation by insuring CFM-S, has, by the end of the project, trained manpower to continue this work. Since improved financial systems are essential for the success of the workshops activity, the finance section is also included in the training plan.

This is an appropriate strategy considering CFM's present state. Before we can effectively deal with the larger organizational and management problems of CFM (i.e. objectives strategy costing, overall efficiency, productivity), we can insure subsystems work and are institutionalized. With proper staff and training in the diesel and wagon workshops, the CFM-S accounting section we can insure:

1. our investment is protected,
2. adequate technology transfer takes place to continue operating beyond the end of the project, and
3. the operational efficiency of regional rail transport in SADCC is significantly increased.

The training plan focusses on structured on-the-job training for CFM-S personnel in the diesel locomotive workshops and CFM-S accounting personnel. Training is not proposed for the wagon-shops because the Italian T.A. team is providing extensive OJT. It is also anticipated other donors will provide necessary T.A. and training for the Beira workshop. Training in accounts is proposed for CFM-S only because CFM-C accounting system is considered relatively strong, while CFM-S is very weak in this area. Also most of the AID Commodities and T.A. will be directed to CFM-S. The training plan has the following output goals:

1. Every T. A. person provided in the diesel workshops and the CFM-S accounts division will have an adequately trained counterpart.
2. At least half of the diesel workshop and accounts positions (i.e. level IV - VII) are filled by competent personnel. This compares to the present situation in which only 25% of these positions are filled by mostly underqualified staff.
3. Mozambican staff will be able to perform all levels of diesel locomotive maintenance (R-1 through R-K) without expatriate assistance or supervision.
4. Mozambicans in the accounts section of CFM(S) will be able to do all cost accounting, stores, yearly close-outs without expatriate assistance or supervision.

Training will consist of the following elements:

- A. Structured on-the-job training. This is the most important element of the training plan. Skill transference does not take place by physical proximity alone, even when both parties are working on the same task. The work objective which is production is contrary to the training objective which takes time away from production. Therefore a structured approach to OJT will be used. All counterparts and other personnel with training potential will follow a competency based training program with periodic reviews and assessments.
- B. Supplemental classroom instruction. Three classrooms will be established at the Maputo workshop. In these small groups will be taught necessary remedied skill and theoretical foundations using small homogeneous groups. The entire workshop and accounts section can get up to eight hours of classroom work per week.
- C. Close coordination with Railway and Regional training schools. Many workers will need longer term skill training and even literacy training which by 1989 should be available at the Maputo and Beira centers. Higher level regional training and English language training will also be available through the De-Consult scheme discussed later in this annex.
- D. Other formal short term training. A small amount of funds are provided for work attachments at other railroads in the program i.e. NRZ and Kenya Railways and attendance at the General Electric diesel training course. This course can be arranged to be offered on site or in a nearby country for three to six weeks for a range of locomotive employees. Of course, translators would be necessary.
- E. Incentive scheme. Training, to be effective, must be desired by those being trained. Often CFM employees have been reluctant to accept structured on-the-job training. Also, too often, despite bonding, employees leave CFM after training. Therefore, an incentive scheme is essential. This should be at a minimum the awarding of certificates to employees after they master a set of skills. Public recognition should also be used as an incentive. For the employees with the most potential, however, a more structured incentive scheme is proposed. These employees would sign a training contract in which benchmarks would be set leading to a promotion in grade. The employee would also contract to remain on-the-job for a period of time after his promotion.

Training Technical Assistance

A three person team for Maputo is required - in mechanical and electrical engineering, and finance. One of the three programs would be designed as the senior trainers responsible for the direction and supervision of the entire training program.

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Scope of Work

The team would assess the competency, gaps, and aptitudes of the personnel in their respective fields. In collaboration with the technical assistance they would develop specific training plans with benchmarks and rewards for selected personnel. They would follow-up to ensure plans are being carried out and coordinate with other training programs (i.e. the railway training schools, and regional training schemes). Finally, they would develop or revise teaching materials, handbooks and manuals for use on the job and in supplemental classroom activities.

In the workshops some specific areas of training will include engine theory and function, engine repair, circuitry, generator operations, problem diagnosis, motor traction, pneumatic systems, use of tools and equipment and safety.

In finance and accounting the following areas will be included: basic bookkeeping/accounting (e.g., double entry bookkeeping, control accounts, clerical procedures, etc.), stores accounting, and cost accounting.

Qualifications

For the locomotive workshop, the trainers must be fluent in Portuguese with both training and diesel locomotive repair experience. Former experienced diesel engineers or workshop supervisors with teaching experience should be preferred candidates. The Finance trainer also must be fluent in Portuguese and know all aspects of general accounting, including stores. An accountant with railroad and training experience should be sought for this position.

For the trainers to be effective it is essential they have the cooperation and support of the other T.A. Scheduled periodic meetings of the entire T.A. workshop team, including RITES, to discuss training issues should be built into the project implementation plan.

A mini school should be setup at CFM for supplementary classroom work. It should consist of three classrooms, each big enough to hold up to twenty five students and an office work room for the teachers. It would be essential for the two workshop trainers to work together so at least two of the three classrooms and offices should be adjacent to each other. We have been assured by CFM management that rooms are available for classroom use.

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Furnishing and Equipment

The following furnishings and equipment will be needed for three classrooms and one office/workroom in Maputo:

1 desk top, plain paper, photocopier, spares, and supplies	5,000
2 electronic stencil-mimeograph machines	6,000
2 overhead projectors and spares	500
80 student desk chairs	4,800
2 mobile A.V. tables	200
2 floor model projection screens	250
4 chalk boards	400
4 flip chart easels	200
3 steel desks (office desks)	1,400
3 classroom desks	600
3 desk chairs	150
3 executive desk chairs	1,200
4 air conditioners	3,000
2 82" high steel storage cabinets	1,500
4 82" high steel book shelf units with glass front	2,000
Audio visual displays	2,000
Supplies: paper, stencils, clips, charts, notebooks, binders, pencils, chalk, etc. (3 years supply)	<u>40,000</u>
	69,200
shipping and handling 25%	17,300
Miscellaneous, contingencies and renovations	<u>13,500</u> 100,000

Assumptions/Conditions

Three important conditions must be met for the training plan to succeed:

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1. Trainable counterparts will be provided (i.e. are literate and have some technical aptitude).
2. CFM management will allow the use of a training incentive scheme.
3. Classroom will be provided. CFM management has assured the PP team that all three conditions will be met. In fact, other donor experiences lend credence to the good intentions of CFM management, which has supported production incentive-schemes and provided classrooms for the Italian T.A. team in the wagon workshop. For the most part, counterparts have been provided, although they have on occasion been transferred or otherwise removed (drafted or resigned).

VI. Other Donors

Other donor activities will complement the Project's training plan. It has already been noted that the Italians have developed a similar training scheme for the wagon workshop, and intend to introduce a training incentive scheme. The French, Portuguese, EEC program to assist the CFM Railway Training Schools has also been previously described. It should be stressed that it is essential that the project trainers closely coordinate with the training centers in order to make full use of the formal technical, supervisory and literacy training available at Inhambane and Maputo.

The other donor training scheme that will be of immense value to CFM and the project is the DE-Consult regional railway training schemes.

The Deutsche Eisenbahn - Consulting Group (DE-Consult) has devised a comprehensive regional training scheme to improve the efficiency of railways in SADCC. The first phase (i.e. the first three years) of the program is expected to be fully funded at the level of 8.5 million U.S. dollars by several donors including the FRG, U.K., Canada, Switzerland and Australia. Programs are scheduled to begin in September, under the direction of a SADCC national railroad training specialist assigned to SATCC. The Program consists of eight elements:

1. The appointment of a railway training expert at SATCC and assistance to the SATCC working group on railway training (\$629,000);
2. Management Courses (\$2,989,000);
3. Instructor's Training (\$830,000);
4. Portuguese/English and English/Portuguese Language Courses (\$500,000).

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5. Specialist Courses for Managers (eg. marketing, traffic costing, informatics, finance) (\$541,000);
6. Training Aids (\$2,044,000);
7. Technical Courses for Engineers (\$500,000);
8. Production of Handbooks and Manuals (\$565,000).

CFM will be able to benefit from these programs particularly in the areas of management, specialist and technical courses which will complement training which is essential for the advanced training of many of the managers.

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INSTITUTIONAL ANALYSIS1. Overview of Mozambique Railways

The Mozambique Railways (CFM) consist of 6 separate railroad lines. The three largest are CFM-South [CFM(S)], CFM-Central [CFM(C)], and CFM-North [CFM(N)], and the balance are rather short lines. All six lines are physically independent in that they do not interconnect within Mozambique, and managerially independent in that they are all autonomous.

General Role of CFM(C)

CFM(C) consists of the Port of Beira and the rail lines radiating from Beira to the borders with Zimbabwe (Machipanda Line) and Malawi (Sena Line) as well as to the coal fields of Moatize within Mozambique. Because of the sabotage, and long periods of inadequate maintenance, only the main line to Zimbabwe has been open in recent years. The security problems on this functioning railway line continue to plague operations, which are restricted to the daytime. A major military presence exists in the Beira Corridor to keep the line open, diverting scarce resources from more productive uses. Although recently added locomotive armor has provided protection for the drivers, seriously damaged locomotives are backlogged and will continue to impair operations without improvements in line security. It is assumed in this project design that the security situation will continue to improve.

Because of the non-reliability of service and limitations on serviceable motive power, much of the international transit traffic which traditionally and logically flowed through Beira, has found alternative, more costly outlets through South African ports. According to CFM traffic statistics for the first six months of 1987, the traffic remaining (extrapolated to annual rates), amounts to 450,000 tons/year. Of this amount 83% is transit traffic and 17% national. Of the international traffic, 76% is descending traffic to Beira, originating in Zimbabwe (49%), Zambia (26%), and Malawi (25%).

This traffic is handled in two daily through freight trains to/from Zimbabwe, of 30 car maximum length; these operate every day of the year, in principle. While there is considerable promise for future traffic growth, the present volumes are absurdly low in relation to an overall payroll of 5,983 persons (1986 figures) on the railway side of CFM(C), and an additional 1000 in the port, not including extensive casual labour. (Also additional to these figures are the Beira Corridor Authority (BCA) staff and contractors who are undertaking the rehabilitation of the infrastructure).

General Role of CFM(S)

CFM(S) consists of the Port of Maputo and the rail lines radiating from Maputo to the borders with Swaziland (Goba Line), South Africa (Ressano Garcia Line), and Zimbabwe (Limpopo Line). Because of rebel activity, and serious track deterioration, service on the

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Limpopo Line had been halted entirely until very recently, and the ongoing rehabilitation of the infrastructure has been adversely affected. Services on the Goba Line have been maintained at reduced levels, and the Ressano Garcia Line has been affected relatively little.

For the same reasons as described for CFM(C), shippers have found alternate routings for export traffic. Overall volumes through Maputo in 1986 were reduced to approximately 24% of their 1981 levels. According to CFM traffic statistics for the first six months of 1987, (extrapolated to annual rates), 2.1 million tons were handled by CFM(S) of which 61% is international traffic, fully 96% is descending traffic into Maputo Port (including Matola) originating in Zimbabwe (40%), South Africa (33%), and Swaziland (27%). Although the Maputo traffic figures in tons are better than Beira by a factor of 4.7, this is still very low traffic for a total staff (port and railways) of 13,736. This figure does not include casual labour at the port, nor does it include the "Brigada de Melhoramentos do Sul" (BMS) which, through staff and contractors, is effecting the total upgrading of the Limpopo Line infrastructure.

2. Organization of Mozambique Railways

At the highest level, the national railways of Mozambique fall under the Ministry of Transport and Communications (MTC). The following National Directorates report to the Minister:

- Ports and Railways
- Road Transport
- Regional Cooperation and Investments
- Maritime Transport and Waterways
- Administration and Maritime Safety
- Post and Telecommunications
- Civil Aviation

In addition to the National Directorates which are primarily modal in nature, are a series of Directorates, which are staff offices (finance, planning, human resources, etc.) which serve all the National Directorates. The Directorates also report directly to the Minister, but portions of their staff are under the supervision of individual National Directorates.

National Directorate Level

The National Directorate for Ports and Railways (DNPCF) oversees the six rail operating enterprises (CFM(S), CFM(C), etc.) and supervises portions of a number of staff Directorates which are common to all the operating enterprises. The national directorate and staff directorates are all in Maputo, as are the offices of CFM(S), while CFM(C) is based in Beira.

12.

The personnel breakdown for DNPCF is as follows:

<u>DNPCF STAFFING [1]</u>	
Executive Office	10
Finance	23
Planning Studies	25
Human Resources	16
Informatics (Computer)	<u>17</u>
TOTAL	91

[1] These figures are for year 1986 and are taken from the Sofrerrail report, to which the project team was referred by DNPCF Deputy Director Fonseca. These figures include the staff in the Directorates which directly serve DNPCF.

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Senior officers of DNPCF are:

<u>NAME</u>	<u>TITLE</u>	<u>BACKGROUND</u>
F. Ferreira Mendes	National Director	Mechanical Engineering
Rui Fonseca	Deputy National Director	Civil Engineering
Luis Ah Hoy	Deputy National Director	Economics

DNPCF and the Ministry exercise policy control over all activities of CFM. In addition, there is a high degree of dependence on DNPCF and other ministries for the effectuation of CFM projects. A case in point is the purchase of foreign spare parts (for example) needed for implementing this project. While each CFM railroad controls its own local purchasing, CFM(C) and CFM(S) are obliged to channel all foreign procurement through the CFM Director in Maputo. Foreign purchasing funded with foreign aid (as with all donors' programs) is actually performed and controlled by DNPCF. In order for these orders to be effected, the Minister of Finance must approve them, through the Finance Directorate of MTC. Finally, the foreign exchange must be made available through the Bank of Mozambique. The large number of steps and concurrences indicates that long lead times are the rule.

Operating Railroads

At the next level are the regional railways, the actual operating enterprises. In the case of each of the three major enterprises [CFM(S), CFM(C) and CFM(N)], each encompasses both railway and port operations within one management structure. There is a general director for each enterprise, and two deputy directors, one for ports, and one for railways. Under the Railway Director are two main units, Transportation and Maintenance, with subunits and staffing levels as detailed in the table below. Also reporting to the Railway Director are Staff offices, similar to those at DNPCF, but adding a Commercial Department and a Road Trucking Department.

CFM(S) AND CFM(C) RAILWAY STAFFING [*]

<u>UNIT</u>	<u>CFM(S) STAFF</u>	<u>CFM(C) STAFF</u>
<u>DIRECTOR RAILWAYS</u>		
Direction	4	32
Finance	57	87
Human Resources	113	134
Informatcs	39	-
Commercial	244	24
Road Trucking	<u>230</u>	<u>111</u>
Total	687	388
<u>TRANSPORTATION</u>		
Operations	627	288
Motive Power	549	726
Shunting	<u>853</u>	<u>1094</u>
Total	2029	2108
<u>MAINTENANCE</u>		
Permanent Way	1257	1742
Workshops	933	1587
Signal	<u>174</u>	<u>158</u>
Total	2364	3487
GRAND TOTAL	5080	5983

[*] Sofrerail report, year 1986; excludes port operations.

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Senior officers of the operating railways are:

<u>NAME</u>	<u>TITLE</u>	<u>BACKGROUND</u>
F. Ilidio Diniz	General Director,CFM(S)	Economics
M. Dimande	Deputy Dir.Railways,CFM(S)	Elec. Engr
Gabriel Mabunda	General Director, CFM(C)	Accounting
Oscar Diniz	Deputy Dir. Railways, CFM(C)	Economics

Main Workshops

Each operating railroad has its own main workshop within the Railway Maintenance organization, CFM(S) in Maputo and CFM(C) in Beira. Each has the following main maintenance divisions:

- Steam Locomotives (Beira only)
- Diesel Locomotives
- Carriages and Wagons
- General Production
- General Maintenance (Electrical and Mechanical)
- Materials Management (Purchasing and Stores)

In addition, workshop staff support offices consist of design, administration, accounting, security and production analysis.

Performance of CFM(C) and CFM(S)

A very rough measure of railway performance can be gleaned from examining traffic to personnel ratios, and this exercise is often productive. Vastly oversimplified, traffic figures are a proxy for total revenues, and manning (total payroll) represents a proxy for total costs. While the absolute values of these ratios may have little meaning, particularly as compared with these ratios on other railroad properties, their values relative to one another are instructive.

The figures below show relative indicators for CFM(C) and CFM(S):

<u>6 months to June '87</u>	<u>CFM(C)</u>	<u>CFM(S)</u>
Load Tons	.227 million	1.036 million
Ton-Kms	64.5 million	70.8 million
Staff on Payroll	6,922	13,736
Average Haul	284 km	68 km
Tons/employee	65	153
Ton-kms/employee	9,318	5,154

The average haul on CFM(C) is seen to be over four times that of CFM(S), where the absence of Limpopo traffic has upset the equilibrium of the railway. On the other hand, CFM(S) handles 2.35 times the tons for each employee in comparison with CFM(C) indicating either greater efficiency or less overmanning on the part of CFM(S), or some combination of the two.

The ton-km figures, which more closely represent the revenue derived, show a clearer picture. CFM(C) delivers 1.8 times the ton-km per employee as CFM(S). The actual revenue derived stems from a number of factors: Port charges, which are assessed on the basis of both value and weight or volume; and rail charges, assessed principally on the basis of ton-km and goods classification. While a study of these factors and a detailed assessment of the financial accounting systems in use is of definite need, the measure described may serve to explain why CFM(C) is presently "profitable" (earns a cash surplus) and CFM(S) is not. In this light, opening of the Limpopo Line can be seen to have a very powerful effect on the performance of CFM(S).

3. Analysis of Institutional and Management Capabilities

CFM is a large organization by any standard and is clearly an important element in the Mozambique economy. The overall employment of CFM, including ports, has been as high as 40,833 as recently as 1982. Counting only the railways side, the staffing was 21,565 or 53% of the 1982 total. The exit rate for railway personnel has been and is high: By 1985, CFM railway employment declined by 22% to 16,706 persons. Of that total, approximately 2/3 are employed by CFM(S) and CFM(C), the two enterprises addressed in this Project Paper.

While the large number of employees is an obvious strength of the CFM organization, the fact that the railway remains overstaffed for the traffic it carries makes this a commercial weakness. It is not unusual, however, for a national railway to serve as an "employer of last resort" and social factors within Mozambique may justify this condition, which improving traffic demands will hopefully render temporary. That the employment trend is downward is an indication that CFM is at least addressing the problem in a positive way -- not replacing exiting employees. Overall changes at CFM, as in Mozambique in general, will require more than a few years -- a long term process will be required for major progress. Such a timeframe must be kept in mind while considering the capabilities of the railway.

In the limited time available for this investigation, it was not possible to examine every operating unit of DNPCF and CFM(S) and (C) in any detail. Available information is often in conflict and direct source materials (from CFM's own documents) are difficult to obtain. The evaluations contained in this report are based on field visits to DNPCF offices, CFM(S) and (C) offices, documentation provided by the above units, and reports from the donor community and their contractors.

This investigation has concentrated on the elements of the organizations that deal most critically with the components required to successfully complete this Project: the provision of parts, skilled and unskilled labor, facilities, and equipment; and the physical and financial control of these inputs. Nonetheless, nothing observed in the investigation, nor any of the many reports reviewed, supports the contention that there are within the organizations units which far exceed the general standards of performance described herein. In fact, the lack of performance standards -- which appears universal -- makes assessment difficult indeed.

In Mott, Hay and Anderson's recent work on CFM(S) the investigations concluded that, with regard to the purchasing and stores functions, it was not possible to measure performance due to the complete absence of performance indicators. They concluded that substantial overstocking exists, and found the inventory records unreliable. In a random inspection of 13 items used in G.E. diesel locomotive maintenance, 61.5% of the stock balance cards did not agree with the actual stock.

Similarly, in the area of operations, Mott, Hay and Anderson were unable to locate any copy of the Book of Rules, Drivers Handbook, or Signalmans Handbook on CFM(S). The most recent Employees Timetable (which contains much necessary procedural and definitional information) which could be located was a 1983 version, with very limited information. This was the only publication in the Operating Department from the present-day CFM(S) organization.

While conditions in the workshops may be more severe than in the general offices, it is believed that the factors discussed below apply substantially across the board. This is borne out by detailed examination of the Sofrrerail personnel capabilities report. In the discussion which follows, examples are given which emphasize conditions in the workshops.

Educational Level

A major problem for the railway is the educational level of its workforce. The overall literacy rate in Mozambique is low, and the railway suffers accordingly. In addition, the age distribution of the railway workers is top-heavy. The table below summarizes several indicators in this regard:

	<u>CFM(S)</u>	<u>CFM(C)</u>
Basic educational level, 4th grade or less	79%	86%
More than 40 years old	44%	53%
Age 40 or less and education better than 4th grade	18%	12%

It is the latter category of workers which is most likely to benefit from programs of training. The low percentage of such employees is an indication of the difficulty the railway will face in developing from within.

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Technical Skills Available

In addition to the level of basic educational background, the railways suffer from a severe shortage of employees with specialized skills. This is true at all levels of the organization. The total number of graduate engineers on the railway is probably under a dozen, and all but one or two are in senior management positions. There are a great many unskilled and entry-level employees (clerks, draftsmen, auxiliary helpers, etc.) and an almost total lack of mid-level managers.

To illustrate this situation in the case of the Beira workshop, consider the table below:

<u>CFM Level</u>	<u>Job Title</u>	<u>Composition</u>
I	Helper	62.0%
II	Assistant Operator	24.6%
III	Operator, 2nd Class	8.0%
IV	Operator, 1st Class	<u>NIL</u>
		94.6%
V-XX	Supervision & other	<u>5.4%</u>
		100.0%

Source: Sofrerail report, 1986.

As a result of the lack of available skills within the organization, there is a significant amount of "overgrading" present within CFM. This situation arises when an employee is filling a position of a higher job classification than his actual skill level. The table below illustrates the incidence of overgrading in a number of areas:

<u>Category</u>	<u>Percent Overgraded Employees</u>	
	<u>CFM(S)</u>	<u>CFM(C)</u>
All Employees	16%	15%
"Direction" only	13	20
Workshops only	20	10

Source: Sofrerail report, 1986.

Employee Retention

There is a significant exit rate at CFM, on the order of 700 persons/year at CFM(S) according to General Director Diniz. While there is a need to shrink the payroll at present, there is some evidence that it is the most desirable employees who are leaving, including those who have undergone training within the railway or through training programs out-of-country. This factor makes the skill level shortage a continuing problem which may be resistant to solution. A bond arrangement has been suggested, whereby a trained

employee leaving CFM prior to a predetermined period following completion of training would be required to repay a pro-rata portion of the cost of training. CFM management is not keen on this idea and downplays the importance of exiting employees.

The main reason employees are leaving appears to be better wages elsewhere, although working conditions may play a role as well. Pay scales at CFM are not favourable compared with the private sector, but are intended to be in line with other government positions. Examples of CFM wage rates are:

<u>CFM Group</u>	<u>Job Title</u>	<u>Meticais</u> <u>Per month</u>	<u>\$US Per</u> <u>hour [2]</u>
I	Helper	12,800	.14
IV	Operator, 1st class	18,000	.19
XIII	Senior Technician Inspector	54,400	.59
XX	(Highest technical level)	108,000	1.17

While detailed commercial pay scales were not available to the project, local information indicates that prevailing wage rates in the private sector are on the order of 50% higher, or more, for semi-skilled and skilled categories of labor.

[2] 205.8 hrs/mo @ 450 meticaiss/\$US as of June, 1988 exchange rate. These are maximum levels; starting salaries are 8% lower. Source: CFM Salary Table, March, 1988.

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In addition to salary levels, working conditions and fringe benefits must play a role in employee retention. Railroad workshops are inherently messy, but the general level of cleanliness at CFM is low. The inspection pits at Beira are semi-submerged. Lighting levels at Maputo are very low, consisting of natural light almost entirely. The same is true at Beira, where the limited electric lighting in the offices is often not functioning due to outage of the electric transmission line and failure of the emergency generators in the port. Meanwhile, an emergency electric generator of 750 HP capacity in Beira workshops has been inoperative and left unrepaired for a period of three years. Protective clothing, hard hats, gloves, goggles, and safety shoes are totally absent. Workers do not appear to have the small hand tools required in some cases. Further, meals are no longer provided to the employees at the workshops whereas they had been a number of years ago. Retention of the most capable employees must be seen as a challenging task.

Employee Productivity

There is a general impression engendered of overall laxity at CFM and in the workshops. Work output is low. At the Maputo diesel shed (running maintenance facility) 32 persons were present but not engaged during our inspection. Despite the many available man-hours, filthy conditions prevail. Absenteeism appears to be a significant problem. To improve these conditions, the RITES team from India Railways proposed an incentive scheme to CFM(S) which has been implemented only in the Maputo Diesel Workshop with excellent results to date.

The essence of the scheme is to establish standard time units (STU's) for each major repetitive operation in the workshop, in units of 1/2 gang-days. Non-repetitive operations have STU's established by estimators. Bonus points are earned by a gang if they perform well as follows:

<u>Performance</u>	<u>Bonus</u>
Work completed in 80% STU or less	+30%
Work completed in 90% STU	+25%
Work completed in STU	+20%
Work completed in 110% STU	+10%
Work completed in more than 110% STU	NIL

These bonus points are converted into a meticaís bonus by multiplying the bonus percentage times the aggregate salary of a standard gang for the number of STU's established for the operation. The pool is shared in by the gang members on a scale according to their pay classification. A number of additional factors make the incentive scheme attractive:

- Supervisors also earn bonus based on the averaged performance of the gangs under them. This money appears to come from another pool.

- Gang members earn bonus in proportion to the time they were at work during the month, thus serving to reduce absenteeism.
- Strict quality control is exercised to prevent workers from cutting corners to save time.
- In addition, if a locomotive fails in service because of a failure of a rehabilitated component procedure done by the diesel shop, the responsible team must rework the failed component, for which no output credit is given. This effectively puts a penalty on inadequately done rehabilitation work.

At present, the average incentive being paid is approximately 20%, which means the workshops are producing at the standard time unit level. The incentive program is felt to be a success by CFM and RITES and is to be extended to the wagon repair shop. The incentive scheme is a good one as a "Win-Win" situation arises: the workers are receiving higher paycheques and productivity is increased, i.e., the labor cost for a given unit of output is decreased.

CFM's Overall Management Structure

As outlined above, the organization of CFM is somewhat diffused. The financial, commercial, personnel, and informatics functions are partially in the Railway Director's office, but partially in the Ministry (DNPCF and staff Directorates). The railways planning office exists mainly at the Ministry level. This is particularly a problem for CFM(C) because its commercial department (for example) is in Maputo, at the moment relatively inaccessible from Beira and an all-day drive under normal conditions. Three hundred and forty one employees of the road trucking unit (3% of all CFM(S) and CFM(C) staff) are lodged within the two railroads although they are primarily performing non-railway related functions for other MTC units.

CFM has developed a reorganization plan which would remove the road trucking unit and bring the staff support offices under more direct CFM control. These changes will undoubtedly be beneficial to CFM and may help to re-establish the commercial spirit of the railway. But it appears clear that the problems at CFM are not primarily related to the organization chart. Such a chart, it should be noted, was never made available to the project team and in its complete development may not exist, i.e., a chart showing all functions; the responsible person; permanent, acting, vacant status; and the reporting relationships between the units. In and of itself this indicates a very low priority given to organizational and management development on the part of CFM and its parents, DNPCF and MTC.

While broad management reforms and reorganizations are pending, and numerous management studies are in prospect at CFM, certain immediate objectives for the railway to concentrate on can be identified. Based on the site visits, meetings, and reports reviewed, we conclude that the three most significant needs which appear to exist at CFM are:

- Development of a cadre of skilled mid-level managers.
- Development of business plans and goals, objectives, and performance measures.
- Delegation of authority and assignment of responsibility for meeting planned performance.

Mid-Management Cadre

In order for significant progress to be made at CFM, a cadre of mid-level managers needs to be developed. Senior management alone cannot make the number of decisions required to progress on the many fronts desirable, and the present situation proves a distraction from senior management's role of long-range strategy development. At the present time, many of these functions are performed by the RITES team, now funded by Kuwait through 1988. If the RITES proposal is accepted and funded, their continued presence will be assured until 1993. The present RITES team personnel level is 52, and is proposed to drop to 46 for the five-year renewal period. Until management development and technical skills development at CFM have progressed, the RITES team is vitally needed to sustain the progress made to date at CFM. The other expatriate assistance presently being provided to CFM (on the order of 250 persons), is also very significant to bolstering the CFM organization.

Business Plan: goals, objectives, and performance measures

CFM needs to formalize the directions in which it wishes to progress, in terms of their priority to the railway system. The heavy program of infrastructure development now underway is clearly the immediate priority, as it represents rebuilding for survival. But development of a plan to run the rebuilt railways with CFM personnel, and improve efficiency and financial return has yet to be established. On a broad front, goals, objectives, performance measures, and target performance levels need to be established. CFM should increasingly be run by the numbers.

Management Development

As part of an overall program of organizational development, a system of accountability needs to be instituted. Authority must be delegated to field managers to carry out necessary activities in areas where responsibility has been assigned to them. In parallel with such a development, improved accounting systems and management information systems need to be developed. These would be outputs of a straightforward organizational study which would establish mission

and function statements for each unit; job descriptions for all employees especially supervisory employees; responsibilities and reporting relationships; and authority delegated.

4. Development of Recommended Program of Management Assistance

Broad programs of management and organizational assistance required for CFM have been called for in other reports as well. In fact, for CFM(C) the three management studies just getting underway (PRM-1A, B and C) should put in place plans upon which CFM(C) could act. Similar projects should be instituted for CFM(S) and, indeed, it would be preferable to perform one study for all three railroads. Mott, Hay and Anderson are recommending a Workshops Organization and Methods Study which is a needed subset of an overall study.

It is possible that under the present plans CFM(S) can profit from the work to be undertaken in the Beira Corridor project. In addition, EEC is sponsoring a regional organization and management study including a determination of manpower training needs. Canada (CIDA) has prepared a study (still in draft and not available at time of writing) of CFM(S)'s requirements for management training. It is our conclusion that additional studies to those scheduled, while desirable, are not required to be preconditions to the workshop development and locomotive rehabilitation program which is the primary focus of this project. The results of the programmed studies and CFM's actions in response to them should be monitored with keen interest. Additional technical assistance which might be funded as a result of those studies would definitely complement this effort.

Turning to the Workshop/Locomotive project, significant management assistance will be required. It is assumed that the RITES team will be refunded for an additional five-year period. This is of such importance to the success of the project that it is made a condition precedent to disbursement under the grant.

While not at the condition precedent level of importance, the program of technical assistance provided by other donors is believed sound, is supported by the project team, and is assumed to be in place from the standpoint of this project design:

- Italian wagon technical assistance to CFM(S);
- Workshop Organization and Methods Study, CFM(S), as recommended by Mott, Hay and Anderson;
- RENFE technical assistance to CFM(C).

In addition to the programs outlined above, technical assistance to achieve significantly greater locomotive rehabilitation output (14 locomotives vs. 8) will be required. While the RITES team has effectively geared CFM(S) up to a capacity of approximately 3 major locomotive overhauls per year, a total of approximately 4 2/3 per year will be required by this project, a 55% increase. Additional locomotive electrical and mechanical technical support will be required for this increase in output.

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Further, the increased consumption rate of spare parts will tax the CFM(S) organization and will require enhancement. The RITES proposal for 1989-1993 contains five positions in the materials management (purchasing, stores, and computer support) area (in addition to training in India for CFM personnel), and two in informatics:

<u>Number</u>	<u>Title</u>	<u>Level</u>	<u>Assigned</u>
1	Sr. Level M.M. Advisor	A	DNPCF
1	Sr. Level Materials Mgr.	B	CFM
1	Materials Controller	C	CFM(C)
2	Materials Controllers	C	CFM(S)
1	Sr. Informatics Splst.	A	CFM
1	Sr. Informatics Splst.	B	CFM

In addition to those positions, the funding for which is assumed, additional technical assistance is required and made a part of this project. This will provide 3 computer support technicians and mini-computer hardware for 3 work stations within CFM(S) workshops at Maputo, and at DNPCF.

The greatly increased workload in the shop, coupled with the increased parts consumption and reorder rate, will require careful and vigorous project management. The project management team in place will have to react quickly to problems in the workshop, parts shortages, equipment failures, and acts of sabotage, and must try to anticipate such events and their impact on the shop production line to the extent possible and develop workaround plans to maintain the production rate. It is proposed that the project management functions described above will be specified duties, among others, of the Deputy Project Manager.

There is also an urgent need to maintain close and continuing coordination among CFM(S), RITES, BMS, and the other donor organizations seeking cooperatively to rehabilitate the entire CFM(S) infrastructure and vehicles. Beyond these hardware-oriented needs, there is an urgent need for advice to the CFM(S) Director of Railways (or a Task Force established by him) on general management development issues, including the development of business plans on a one- and five-year basis; the setting of goals, objectives, performance measures, and target performance levels; the development of the general educational and technical skill levels of the workforce; and the strengthening of the mid-management cadre at CFM(S). These tasks are strongly management-related and transcend the immediate goals of this project, yet they must become established practice within CFM(S) if it is to emerge from

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rehabilitation as a viable, ongoing concern. Since this latter goal underlies the project rationale, it is deemed necessary that such support to CFM(S) be provided as a part of the project management component of the project. It is proposed that the railway management advisory functions described above be specified duties, among others, of the Project Manager (Chief of Party).

With the technical assistance provided as an integral part of this effort, and assuming the continued funding of the RITES team, DNPCF and CFM are judged able to effectively implement the Project.

COMMODITY LIST (MOZAMBIQUE)

Diesel/Electric locomotive spare parts to support periodic maintenance and locomotive rehabilitation at CFM(S). The listing is on file at the USAID office in Harare, Zimbabwe for review on request.

Diesel/Electric locomotive spare parts and steam locomotive spare parts to support periodic maintenance at CFM(C). The listing for the diesel electric periodic maintenance spares is included in the above noted listing for CFM(S).

The steam locomotive spare parts to support the maintenance at CFM(C) are listed and this listing is on file at the USAID office in Harare, Zimbabwe for review on request.

Maputo Shop Renovation

- The power distribution system has deteriorated to the point that when it rains the power is cut off. When the roof and side glazing repair is completed, the power and switchgear should not deteriorate any further, however, they will require attention to function properly.
- The diesel/electric locomotive running maintenance shed needs roof cladding and side glazing.
- The wagon shop roof requires renewal and the side glazing needs replacement. The concrete floor slab is cracked and chipped which needs repair for safety reasons.
- The locomotive repair shop needs roof repair and the side glazing needs replacement. The power distribution system has water damage and must be considered dangerous.

Engine Shop

The roof needs repairing, the ridge cap needs replacing and the broken and missing side glazing needs replacement.

Machine Shop

The roof needs repair and the side glazing needs repair. The power circuits and switchgear need inspection and replacement where necessary.

Beira Workshop Renovations

The diesel electric shop which was started on a previous AID project needs to be completed. The floor is unfinished, 2 work pits and associated track are lacking and power and lightening needs to be installed.

Workshop Tools and Equipment

Maputo - The Maputo shop has a central compressed air system which supplies air to all of the shops. The units which comprise this system are 2100 SCFM electrically driven compressors, however, these units are in working order. It is intended to furnish one new 2100 SCFM unit which will provide centralized shops air. The remaining unit will be refurbished as a back-up.

The Maputo shop has a wheelpress that is inadequate for their needs. It is intended that this project would furnish a new 400-ton vertical wheel press of sufficient capacity to handle all wheels and axles.

The Maputo shop has a wheel lathe which is in need of repair. This unit should be refurbished both mechanically and electrically. The gearing, ways and bearings need inspection and refurbishing and the control circuitry needs an overhaul. Most of the relay circuits are old and frayed which will require a control box refurbishment. This project will provide funding for the wheel lathe refurbishment.

The locomotive shop is designed to function utilizing an in-floor turntable to feed the high side bay cranes to disburse the work. Without this turntable it is practically impossible to utilize the major repair bays. This project will provide funding for waterproofing and refurbishment of this turntable.

The waterproofing is required to keep the unit dry, the electrical circuits free from water and prevent rusting and deterioration of the turntable structure. After waterproofing, the turntable must be reconstructed by individual replacement of deteriorated structural members. The power and control circuits will have to be refurbished to allow for proper operation.

The Beira workshop is in need of a 3-ton portable crane to be used in the running repair shed for rapid in and out changeover of bad components. The Maputo running repair also needs a 5-ton crane for this purpose. It is intended to furnish both these cranes on this project.

The Maputo and the Beira workshop are both in need of the GE recommended special tools and Beira needs GE specialized equipment to perform the recommended periodic maintenance. There is also a great need for the expendables such as tool bits, welding rods, chisels, files and other similar consumables. It is the intent of this project to furnish the required special tools and expendables to Beira and Maputo to fulfill this need.

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OTHER DONOR ASSISTANCE TO CFM

The RRSS project design has been and will continue to be heavily influenced by what other donors have already done to support the railway sector in Mozambique, and by what they are expected to do in the future. The international donor community has demonstrated massive and consistent support to the sector. By mid 1988 they had committed more than \$500 million to more than 25 railway projects, focused on the Nacala, Beira and Maputo rail/port systems. (Beira - \$197 million, Nacala - \$193 million, Maputo - \$96 million and regional assigned to Mozambique - \$19 million). An additional amount of more than \$100 million is expected to be committed by the end of September. The activities of 18 donors are summarized in Table J-1 and have been taken into account in the design of this project. Those which most directly relate to the proposed AID project are noted with an asterisk.

Canadian CIDA financed two studies utilized in preparing the Project Paper and has committed Canadian Dollars 20 million to rehabilitation of the Limpopo Line. The first was a study cofinanced by Great Britain and discussed below. The second was a study of Motive Power and Rolling Stock Operations for CFM Central. Together with Germany, Sweden and Norway CIDA has recently initiated an English language training program for CFM managers and instructors. That will enable the CFM employees to obtain maximum benefit from regional training activities planned under this and other projects. In early 1989 Denmark will begin a three year project to rehabilitate approximately 1,000 wagons for CFM(C), about one half of which will be converted to roller bearings. DANIDA is considering procurement of approximately \$600,000 worth of steel plate and structural steel for wagons of CFM(S). NORAD has similarly indicated its intension to provide an additional KR1 million (\$150,000 - \$175,000) for the wagon rehabilitation activity. The NORAD funds are not tied to specific items. The GPRM will be responsible for concluding agreements with DANIDA and NORAD prior to AID signing contract related to the wagon conversion component.

The European Community will soon undertake a financial management and tariff study and an organizational, management and manpower study for the Beira Corridor Authority. Both studies seek to promote cost-based tariff structures and more commercial management practices for railways within region. Future EEC commitments will be directed to materials for track renewal, the sleeper factory and the quarry and tools for locomotive repair.

In addition to the programs already noted, Germany funded the DE-Consult region Study on Railway Training Programmes which examined the needs for railway training throughout the SADC region and proposed several projects currently being discussed with donors. New commitments include DM 3 million for KfW to assist in track renewal by NRE and a new signal system. The United Kingdom, in

addition to financing Phase I rehabilitation of Limpopo Line, has recently cofinanced with Canada a "Study for the Total Rehabilitation, Operation and Maintenance of the Limpopo Railway Line". The study proposes a program of investments in infrastructure, motive power, rolling stock, training and technical assistance totalling approximately \$200 million. A donor's conference is expected in late July at which time additional support for CFM(S), (including operations, financial management, staff training, stock control and information management) is expected. AID's current proposal has been closely coordinated with the results of that study.

Italy's wagon rehabilitation program in CFM(S) recently reconditioned 130 high-sided wagons including conversion to roller bearings. While the AID rehabilitation program will be slightly more comprehensive. The Italian funded activity demonstrated an existing capability upon which the AID program will build. In fact the wagon conhesion component of the project will utilize reinforced technical assistance funded by staly.

The Kuwait Fund for Arab and Economic Development has funded the technical assistance being provided by Rail India Technical and Economic Services (RITES) since 1982. The RITES team has provided up to 52 full time advisors (mostly concentrated in CFM(S) providing advisory services and training in railway mechanics, signalling, materials and information management, and finance. While the transfer of technology to Mozambicans has not been as rapid as hoped, the team is generally considered to have done a good job in keeping CFM(S) running. The PP design team has determined that continued services from RITES or a similar organization is essential to the success of the proposed activity. The RITES current contract expires December 31, 1988 though adequate funding is available for an additional two to three months.

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OTHER DONOR SUPPORT

AFRICAN DEVELOPMENT BANK	**	Interest in equipment for locomotive and wagon workshops.
ARAB FUND	--	Emergency repairs on Beira Line.
AUSTRALIA	--	Track upgrading and rehabilitation on Beira - Machipanda.
	--	Track maintenance Beira Line.
AUSTRIA	**	Interest in costs of rehabilitation by NRZ.
BOTSWANA	**	Concrete sleepers sufficient to rehabilitate 100km of the Limpopo Line (US\$3.1 million).
CANADA	--	Study of Limpopo rehabilitation.
	**	Study of CFM(S) requirements for management training (esp. Limpopo reopening, workshops and general support).
	--	Provision of sleepers and rails for Nacala Line.
	**	English language training for Portuguese managers and instructors.
	**	Study of Motive power and Rolling stock operation plan for CFM(C).
	**	Up to Canadian Dollars 20 million for rehabilitation of the Limpopo Line.
DENMARK	**	Rehabilitation of 1,000 wagons for CFM(C), and interest in wagons for CFM(S).
	--	Management team for Beira Corridor Authority.

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- ** Support for wagon conversion (under AID program).
 - ** Workshop Organization and Methods Study.
- EUROPEAN
COMMUNITY
- Rehabilitation of Nacala Line.
 - ** Railway training school at Inhambane.
 - Organizational, management and manpower study for BCA.
 - ** Financial management and tariff study for BCA.
 - ** Equipment for Limpopo track renewal, sleeper factory and quarry and equipment for CFM(S) locomotive workshop.
- FINLAND
- Rescue cranes and rerailling equipment for Beira Line.
- FRANCE
- Rehabilitation of Nacala-Nampula.
 - Rehabilitation of Nampula-Cuamba.
 - ** Railway training school at Inhambane.
- GERMANY
- Rescue equipment and 3 breakdown cranes (nationwide).
 - ** English language training for Portuguese managers and instructors.
 - ** Funding for renewal of track of Limpopo Line by NRZ and installation of signal system between Maputo and Infalene.
 - ** Funds for studies and project preparatio for CFM(S).
 - ** Regional railway training study.
 - ** DM 25 million to SATCC for equipment/material support.
- UNITED
KINGDOM
- Management, workshops and telecommunications assistance on Nacala Line.
 - Telecommunications on Nacala Line.
 - 80 ton breakdown crane for CFM(C).
 - ** Rehabilitation of Limpopo Line Chicualacuala-Maputo: UK Pounds 14 million (includes manufacture of sleepers, mining of ballast, and rehabilitation of rail yard track surrounding the Maputo workshops).
 - ** Study on rehabilitation, operations, and maintenance of Limpopo Line.

HOLLAND -- Telecommunications on Beira-Machipanda Line.

ITALY ** Reconditioning 130 high-sided open wagons in CFM(S) plus wagon shop work and staff training.
-- Assistance on rehabilitation of CFM(N) Nampula-Cuambo.
** Feasibility and rehabilitation of the Goba Line.
-- Study of Maputo and Beira port networks.
-- Quarry, ballast stone and sleeper production for Dondo-Moatize Line.
-- Railway communications and controls for Machipanda-Beira and Beira-Inhamitanga.

KUWAIT ** Spare parts and tools to refurbish U20C locomotives for CFM(S).
** Technical assistance for CFM(S) workshops.

PORTUGAL -- Rehabilitation on Nacala Line.
** Railway training school at Inhambane.
-- Sena bridge on Dondo-Moatize Line (under discussion).
** Technical assistance to rehabilitation of Limpopo Line.

ROMANIA -- Provision of 30 diesel hydraulic locomotives and 30 passenger coaches.

SWEDEN/
NORWAY -- Rehabilitation of Beira-Gondola Line.
** Support for wagon conversion (under AID program).
** English language training for Portuguese managers and instructors.

SPAIN -- Technical Assistance to CFM(C).
-- Signalling and telecommunications for Beira Line.

WORLD BANK ** Rehabilitation and spare parts of diesel hydraulic locomotives.
-- Study of potential over capacity of regional rail networks.

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Either the KFAED or the World Bank are expected to fund a future RITES contract and a signed contract for those services is a Condition Precedent to the AID grant. Kuwait has also provided spare parts and tools for maintenance and repair of the GE U20C locomotives.

In September, Spain is scheduled to begin a three year, (31 person-years) project providing technical assistance to CFM(C) in a variety of railway management fields. They are also helping with railway signalling and telecommunications.

Finally, the World Bank has financed technical assistance and spare parts for diesel hydraulic locomotives and has scheduled a feasibility Mission for September, 1988 to examine the technical assistance needs for CFM. Preliminary indications are that the Bank may concentrate on TA for human resources development and management information systems and at CFM(C).

Several donors including the EEC, France and Portugal are also providing financial and technical assistance support to CFM's Railway Training School at Inhambane.

The above summary illustrates the magnitude and range of donor activities in the rail sector. Mozambican and regional railway officials currently spend significant portions of their time meeting with and responding to international donors and their consultants - time diverted from other managerial responsibilities. One meeting held with ten donors during the PP design demonstrated the need for improved donor coordination and communication.

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COMMINGLING ASSESSMENT

The PP design team examined all Communist Bloc involvement in railway activities in Mozambique. Their findings are described in the following two paragraphs.

A few Mozambicans are currently on long-term (5 years) training at a railway school in Hungary. Two or three others have received long-term training on railway operations in East Germany. In 1979-1980, 32 Romanian (diesel hydraulic) locomotives as well as 60 passenger coaches were purchased, of which 20 were for use in CFM(S). Romanian technical assistance staff left in 1983 and a shortage of spares soon developed to the point where only two locomotives are now operating in CFM(S). A new project providing spare parts and TA for repair and rehabilitation of these locomotives was recently started under World Bank financing. A GDR-financed track repair project covering the CFM(C) line to Malawi was suspended 3 years ago due to security problems. The activity has recently recommenced, but with Italian and OPEC funding rather than GDR support.

Mozambicans previously trained by Romanian advisors will work on and be trained under the AID project. It is conceivable that Mozambican technicians trained in East Germany or Hungary may also work on and be trained under this Project. The old Romanian locomotives will be repaired in the workshop being improved by AID assistance. AID-funded advisors will not work on the Romanian locomotives, since all such work will be carried out under World Bank funding. However, it is possible that future maintenance work on the Romanian locomotives could be conducted by Mozambicans trained under the AID Project, although that is not the primary purpose of their AID-funded training. Based on SADC documents concerning donor funding and AID's direct knowledge of current railway projects in the region, no bloc funded railway project is currently on-going or planned in Mozambique.

The RLA has reviewed these facts in light of AID's rules on comingling contained in Handbook 1B, Ch 9, and his opinion is as follows:

For comingling to exist, all of the following factors must be present:

- (1) AID assistance must be used to promote or assist the foreign aid projects or activities of a communist bloc country;
- (2) The bloc project or activity involved must be a project that receives sufficient bloc assistance as to be generally identified with the bloc within the cooperating country;
- (3) AID assistance must come directly into a bloc project --

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the fact that the output of a completed AID project may be used in a bloc project does not constitute commingling;

- (4) AID-funded training of cooperating country technicians must not be specifically to work on bloc projects; however, "the policy does not preclude training technicians in cooperating country agencies dealing with bloc assistance."

With the possible exception of (a) the Romanian Locomotives, and (b) the Mozambicans currently on long-term training in Hungary, there are apparently no bloc railway projects in existence in Mozambique. As to the first possible bloc project, the Romanian locomotives, this project ceased either with the last concessional purchase in 1980 or with the departure of Romanian technical advisors in 1983. In any event, rehabilitation of these locomotives will be carried out under separate World Bank funding. Given these facts, it is clear that no commingling will occur with respect to the Romanian locomotives. Further, because those locomotives are not part of a current bloc project and because AID-funded training of Mozambican locomotive mechanics is not specifically or primarily to enable them to work on those locomotives in any event, any incidental work on such locomotives by such technicians is not commingling.

With respect to the training occurring in Hungary, even if such training were considered to be a bloc project -- a difficult argument without related visible Hungarian rail activity also occurring inside Mozambique -- and even if the trainees are from and will return to CFM(C) and CFM(S), there will be no commingling because those trainees are not part of the AID project. Moreover, as quoted above, AID's commingling policy explicitly does not preclude training technicians in cooperating country agencies dealing with bloc assistance.

The RLA conclusion, therefore, is that there is no evidence that commingling will occur in the project.

ILLUSTRATIVE SCOPES OF WORK

1. Deputy Chief of Party -- Financial Management Specialist
 - A. Duration -- 3 years
 - B. Qualifications
 1. 12-15 years of financial experience reflecting increasing levels of responsibility and management experience.
 2. Extensive experience in the review, analysis and design of financial and cost accounting systems in various types of organizations.
 3. High level of exposure to broad managerial issues, able to identify, establish, and reach corporate strategy, goals and objectives.
 4. Ability to manage host country nationals and short-term consultants. Good inter-personal skills and experience in working in an overseas environment.
 5. Ability to identify short-term technical needs, draft necessary scopes of work and supervise and evaluate the performance of consultants.
 6. Experience in developing or operating financial and cost accounting systems on personal or micro computers.
 7. Experience in teaching or training host country counterparts in managing and operating accounting systems.
 8. Excellent writing skills. Ability to develop procedure manuals and training materials.
 9. Academic or professional credentials--Degree in finance or accounting, preferably at the Masters level. Certified Public Accounting or its equivalent. Reasonably proficient in Portuguese or a similar language.
 - C. Location -- CFM(S) Headquarters, Maputo
 - D. Tasks
 - Coordinate the development and implementation of the tasks assigned to the Director of Finance and the Purchasing and Inventory Specialist.
 - In conjunction with the design of the systems by the above personnel, establish budgeting formats and procedures to ensure consistency and reliability; specify and implement improvements to cost accounting systems including documentation, procedures, and training of personnel.

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- Develop traffic costing methods in coordination with the Commercial Director which will ensure that tariffs can be accurately related to the long run variable costs of the services provided.
- Ascertain the organizational needs for financial data, particularly for top management. Specify and develop the necessary reports.
- Introduce job evaluation and staff assessment procedures to the financial department. Develop to the extent practical with the training advisor and personnel, incentive programs for employees which will increase the educational and productivity levels of the finance, procurement, purchasing, and inventory departments.
- Contribute to the production of a corporate strategy and provide necessary inputs (financial projections, targets, and performance indicators).
- Provide a summary report on the effectiveness of the technical assistance involvement in the financial, purchasing, procurement and inventory departments. The report should describe all the technical assistance inputs that have taken place during the program; comment on the financial changes which have occurred during the program; describe the organizational changes made, including skills assessment, training, etc.; evaluate current strengths and weaknesses and recommend necessary follow-on assistance.
- Manage as necessary the day-to-day operations of the technical assistance program, coordinate and liaise with USAID, CFM, and DNPCF to ensure the objectives of the technical assistance program are being met, and

2. Financial Management and Accounting Specialist - CFM(S)

A. Duration -- 3 years

B. Qualifications

1. 12-15 years of financial experience reflecting increasing levels of responsibility and management experience.
2. Extensive experience in the review, analysis and design of financial systems in various types of organizations.
3. High level of exposure to broad managerial issues, able to identify, establish, and reach corporate strategy, goals and objectives.
4. Ability to manage host country nationals and short-term consultants. Good inter-personal skills and experience in working in an overseas environment.
5. Ability to identify short-term technical needs, draft necessary scopes of work and supervise and evaluate the performance of consultants.
6. Experience in developing or operating financial system on personal or micro computers.
7. Experience in teaching or training host country counterparts in managing and operating accounting systems.
8. Excellent writing skills. Ability to develop procedure manuals and training materials.
9. Academic or professional credentials--Degree in finance or accounting, preferably at the Masters level. Certified Public Accounting or its equivalent. Reasonably proficient in Portuguese or a similar language.

C. Location -- CFM(S) Headquarters, Maputo

D. Tasks

- Review the organizational structure of the accounting and finance divisions. Recommend necessary changes to effectively improve reporting, lines of communication, data flow, etc. Determine the number of necessary staff required to meet the organizational needs and work with CFM and DNCPCF to recruit and train the personnel.
- Review the organizational links with other government organizations, including DNPCF and develop clear organizational and operational procedures and guidelines to ensure adequate communication links between all the organizations.

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- Review and analyze the existing accounting systems used by CFM(S). Recommend necessary changes to streamline procedures, processes, etc. Determine which systems lend themselves to computerization using PC or micro computer based applications. Coordinate development of systems with short-term TA and CFM.
- Review CFM's accounting plan. Develop fundamental accounting standards, financial statement formats, chart of accounts, instructions or procedure manuals, systems manuals, etc., which are consistent with the Government of Mozambique's general accounting plan, and provide the necessary accounting information to effectively monitor and control the financial operations of CFM(S). The systems developed should be easy to operate, simple to understand, easily maintained, and capable of providing top management with key performance indicators which will assist them in monitoring the performance of the organization.
- Negotiate an end to the historical capture of accounting data with CFM and DNPCF. After receiving approval to end the historical accounting exercise, establish a cut-off date wherein an estimation of all accounting balances will be made.
- Provide estimations for all accounting sheet balances, including accounts payable, accounts receivable, cash and bank balances, fixed assets, etc. These balances should form the opening balances for the simplified accounting system which will be maintained to handle current transactions while the comprehensive review and development of the accounting systems and procedures manuals are being developed.
- Restructure each accounting system systematically. Introduce and develop basic accounting systems which will ensure that current revenue/expenditure and asset/liability data can be recorded and captured using a double entry accounting system. Establish priorities for developing the new systems.
- Provide basic bookkeeping and accounting training and education to the clerical accounting personnel assigned the responsibility for maintaining the systems identified above. Coordinate development and design of training courses and on-the-job experience with the financial management trainer.
- Analyze fixed asset accounting systems and current capitalization policies. Recommend necessary changes and adjustments. Verify existing fixed asset inventory. Develop a PC based software application which can be effectively maintained by CFM(S) to track fixed assets.

- Review the organization's internal controls. Implement as necessary improved controls within the organization to ensure effective accountability.

The two Financial Management Specialists will be responsible for:

1. Overall day-to-day control and operations of the accounting functions of CFM.
2. Identifying and prioritizing areas where new systems are to be introduced.
3. Ensuring the new systems are practical and relevant to the operating environment.
4. Liaising with the overall controlling body of CFM.
5. Instituting changes in accounting procedures and controlling the implementation of the changes.
6. Ensuring staff are receiving adequate training.
7. Coordinating the efforts of all technical advisors in the accounting functions.

3. Mechanical Technician(s) - 2

A. Duration - 3 years

B. Qualifications

The mechanical technician shall have as a minimum a two year technical school certificate in Mechanical Technology including diesel studies and machine shop practices, and 4 years experience in an industrial diesel repair facility. The school certificate can be replaced by 2 more years of closely related experience.

The ability to communicate in Portuguese is mandatory.

C. Location - Maputo Locomotive Maintenance and Repair Shop

D. Tasks

The mechanical technician shall work in the locomotive shop and shall advise and assist CFM technicians in all areas of mechanical work for scheduled maintenance of diesel electric locomotives.

The mechanical technician shall assist CFM technicians in:

- (1) assessing mechanical damage or malfunction on any locomotive in the shop for non scheduled maintenance or repair;
- (2) repairing any mechanical damage or malfunction;
- (3) investigating any anomaly or malfunction occurring anywhere in the system where assigned.

The mechanical technician shall provide on the job training to CFM technicians by demonstration of the proper procedures and techniques to adequately maintain and repair U20-C GE locomotives.

The mechanical technician shall work safely at all times and shall by demonstration and direction cause the CFM technicians to do the same.

The mechanical technician shall instruct the CFM technicians in the proper use of special tools and equipment as they apply to the shops.

The mechanical technician shall assist the CFM technicians in the maintenance of any peripheral machines or devices when he is qualified to and available.

The mechanical technician shall maintain a daily log which identifies work done by locomotive as well as recording equipment use.

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4. Electrical Technician(s) - 2

A. Duration - 3 years

B. Qualifications

The Electrical Technician shall have as a minimum a two year Technical School Certificate in electrical power and control and 4 years experience in an electric or diesel electric maintenance or repair facility. The school certificate can be replaced by 2 more years of closely related experience. The ability to communicate in Portuguese is mandatory.

C. Location - Maputo Locomotive Maintenance and Repair Workshop

D. Tasks

The electrical technician shall work in the locomotive shop and shall advise and assist the CFM technicians in all aspects pertaining to the electrical portions of scheduled maintenance of locomotives.

The electrical technician shall assist the CFM technicians in:

- (1) assessing electrical damage or malfunction on any locomotive maintenance or repair;
- (2) repairing any electrical damage or malfunction.
- (3) identifying and investigating any anomaly or malfunction occurring anywhere in the system where assigned.

The electrical technician shall provide on-the-job training to CFM and technicians by demonstration of the required procedures and techniques needed to properly maintain and repair the U20-C GE locomotives.

The electrical technician shall work safely at all times and shall by demonstration and direction cause the CFM technicians to do the same.

The electrical technician shall instruct the CFM technicians in the proper use of special tools and equipment as they apply to the shops.

The electrical technician shall assist the CFM technicians in the maintenance of any peripheral machines or devices on which he or she is qualified to and available.

The electrical technician shall maintain a daily log which identifies the work done by locomotive as well as recording equipment use.

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5. Purchasing and Inventory Specialist - CFM(S)

A. Duration -- 3 years

B. Qualifications

1. 12-15 years of financial experience reflecting increasing levels of responsibility and management experience.
2. Extensive experience in the review, analysis and design of financial systems in various types of organizations.
3. Extensive experience in the design, review, analysis of procurement and inventory systems in various types of organizations.
4. High level of exposure to broad managerial issues, able to identify, establish, and reach corporate strategy, goals and objectives.
5. Ability to manage host country nationals and short-term consultants. Good inter-personal skills and experience in working in an overseas environment.
6. Ability to identify short-term technical needs, draft necessary scopes of work and supervise and evaluate the performance of consultants.
7. Experience in developing or operating procurement and inventory tracking systems on personal or micro computers.
8. Experience in teaching or training host country counterparts in managing and operating financial/procurement/inventory systems.
9. Excellent writing skills. Ability to develop procedure manuals and training materials.
10. Academic or professional credentials -- Degree in finance, materials management, purchasing, or accounting, preferably at the Masters level. The applicant should have demonstrated professional skills or qualifications. For example, the equivalent of a Certified Public Accountant, Certified Management Accountant, Purchasing Agent, etc. Reasonably proficient in Portuguese or a similar language.

C. Location -- CFM(S) Headquarters, Maputo and
CFM(S) Locomotive Workshop, Maputo

D. Tasks

- Review the organizational structure of the purchasing, procurement, and inventory divisions. Recommend necessary changes to effectively improve reporting, lines of

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communication, data flow, etc. Determine the number of necessary staff required to meet the organization's needs and assist CFM and DNPCF to recruit and train the personnel.

- Review the organizational links with other government organizations and other CFM offices, including accounting and finance, and develop clear organizational and operational procedures and guidelines to ensure adequate communication links and accountability.
- Review and analyze the existing purchasing and procurement procedures used by CFM(S), CFM(C) and DNPCF. Recommend necessary changes to streamline procedures, processes, etc., especially those critical to the success of the spare parts procurement exercise. Determine which systems lend themselves to computerization using PC or micro computer based applications. Coordinate development of these systems with short-term TA.
- Review CFM's purchasing and bid evaluation procedures. Recommend necessary changes to ensure that CFM maximizes its ability to obtain the lowest prices for the specifications of materials ordered.
- Review CFM's inventory plans and procedures, including receiving, distribution, stocking, reordering points, valuation, etc. Develop fundamental inventory standards, including stock cards, receiving and distribution systems, economic order points or quantities, recording of inventory, stock counts, etc. Develop standard formats, instructions or procedure manuals, systems manuals and guidelines which are consistent with the Government of Mozambique's general accounting plan, and provide the necessary accounting information to the Finance Department as well as adequate internal controls over stores. The systems developed should be easy to operate, simple to understand, easily maintained, and capable of providing management with key performance indicators.
- Develop a PC based software application for tracking inventory, minimizing discrepancies, updating and maintaining accurate valuations and levels, and ensures adequate control over AID-funded spare parts. The basic system should be developed and implemented prior to the arrival of the AID-funded spare parts and should be able to be modified, expanded and implemented throughout CFM as time permits.
- Provide basic bookkeeping, inventory, and procurement training and education to the clerical accounting personnel assigned the responsibility for maintaining the systems identified above. Coordinate development and design of training courses and on-the-job experience with the financial management trainer and engineering staff.

- Review the internal controls over purchasing, procurement, and inventory. Implement as necessary improved controls to ensure effective accountability.

The Purchasing and Inventory Specialist will be responsible for:

1. Overall day-to-day control and operations of the purchasing, procurement, and inventory functions of CFM.
2. Identifying and prioritizing areas where new systems are to be developed and introduced.
3. Ensuring the new systems are practical and relevant to the operating environment.
4. Liaising with DNPCF and CFM(S) and CFM(C).
5. Instituting changes in purchasing, procurement, and inventory and controlling the implementation of these changes.
6. Ensuring staff are receiving adequate training and sufficient personnel are allocated or hired by CFM to manage effectively the above operations.
7. Coordinating the efforts of all advisors in the above functions.

6. Training Accountant

A. Duration -- 3 years

B. Qualifications

1. 5-10 years experience in accounting and in training.
2. At least 3 years experience in training environment.
3. Experience in establishing training needs and developing training plans in accounting and financial management, including the use of computerized accounting systems..
4. Ability to teach and experience in training low level clerical functions.
5. Good inter-personal skills.
6. Ability to work as a member of a team.
7. Ability to speak Portuguese.

9. Academic/Professional - CPA or equivalent.

C. Location - CFM(S) Headquarters, Maputo

D. Tasks

- Review the existing accounting system used by CFM(S) and conduct a training needs analysis survey to establish problem areas.
- Develop a training plan focused on priorities established by Financial Controller.
- Identify candidates for courses.
- Develop course material and timetables.
- Provide training in bookkeeping and accounting, including training in the use of computers.
- Provide training identified by the financial management specialist on the contract team.
- Establish evaluation and monitoring procedures for accounting trainers.

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7. Mechanical Technical Trainer for Locomotives

A. Duration - 3 years

B. Qualifications

1. Eight (8) years of experience as a diesel locomotive mechanical technician which 3 years shall have been as a diesel locomotive mechanical trainer in an industrial diesel repair facility.
2. Ability to teach or train host country nationals. Good interpersonal skills, patience and experience in working in an overseas environment.
3. Ability to identify diesel locomotive mechanical repairs.
4. Good writing skills. Ability to develop training manuals and training materials.
5. Minimum two years technical school certificate in Mechanical Technology including diesel studies and machine shop practices.
6. The ability to communicate in Portuguese is mandatory.

C. Location -- CFM(S) Locomotive Workshop, Maputo

D. Tasks

- Work in diesel locomotive workshop and shall be responsible for providing all diesel electric locomotive training to CFM mechanical technicians in the areas of mechanical work for scheduled maintenance and rehabilitation of GE diesel electric locomotives.
- Provide necessary training to enable CFM diesel technicians to: (1) Assess mechanical damage or malfunction on any diesel locomotive in the shop for non scheduled maintenance work or repairs; (2) repair any mechanical damage or malfunction; and (3) identify and investigate any anomaly or malfunction occurring anywhere in the system where assigned.
- Work safely at all times and shall by demonstrating and direction cause the CFM mechanical technicians to do the same.
- Instruct the CFM mechanical technicians in the proper use of special tools and equipment as they apply to the work shops.

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- Assist CFM mechanical technicians in the maintenance of any peripheral machines or devices which the trainer is qualified.
- Maintain a daily log which identifies work done by locomotive, recording use and maintenance rehabilitation procedures.

8. Electrical Technical Trainer for Locomotives

A. Duration - 3 years

B. Qualifications

1. Eight (8) years of experience as a diesel locomotive electrical technician of which 3 years shall have been as a diesel locomotive electrical trainer in an industrial diesel repair facility.
2. Ability to teach or train host country nationals. Good interpersonal skills, patience and experience in working in an overseas environment.
3. Ability to identify diesel locomotive electrical repairs.
4. Good writing skills. Ability to develop training manuals and training materials.
5. Minimum two year technical school certificate in electrical power and control, including diesel electric studies and electrical shop practices.
6. The ability to communicate in Portuguese is mandatory.

C. Location - CFM(S) Locomotive Workshop, Maputo

D. Tasks

- Work in diesel locomotive workshop and shall be responsible for providing all diesel locomotive training to CFM electrical technicians in the areas of electrical work for scheduled maintenance and rehabilitation of GE diesel electric locomotives.
- Provide necessary training to enable CFM electrical technicians to: (1) assess electrical damage or malfunction; and (3) identify and investigate any anomaly or malfunction occurring anywhere in the electrical system where assigned.
- Work safely at all times and shall by demonstrations and direction cause the CFM electrical technicians to do the same.
- Instruct the CFM electrical technicians in the proper use of special tools and equipment as they apply to the work shops.
- Assist CFM electrical technicians in the maintenance of any peripheral machines or devices which the trainer is qualified.

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Maintain a daily log which identifies work done by locomotive, recording equipment use, and maintenance rehabilitation.