PD-AAZ-499

XD-AAZ-499-A

UNCLASSIFIED

Regional Transport Development

690-0231.56

Interim Evaluation

UNCLASSIFIED

PD-AAZ-499

A.I.D. EVALUATION SUMMARY - PART I

1. BEFORE FILLING OUT THIS FORM, READ THE ATTACHED INSTRUCTIONS.
2. USE LETTER QUALITY TYPE, NOT "DOT MATRIX" TYPE.

IDENTIFICATION DATA

A. Reporting A.I.D. Unit:

Mission or AID/W Office USAID/ZIMBABWE
(ES# _____)

B. Was Evaluation Scheduled In Current FY Annual Evaluation Plan?

Yes [XX] Slipped [ ] Ad Hoc [ ]

Evaluation Plan Submission Date: FY 89 Q 2

C. Evaluation Timing

Interim [ ] Final [XX] Ex Post [ ] Other [ ]

D. Activity or Activities Evaluated (List the following information for project(s) or program(s) evaluated, if not applicable, list title and date of the evaluation report.)

Project No.	Project /Program Title	First PROAG or Equivalent (FY)	Most Recent PACD (Mo/Yr)	Planned LOP Cost (000)	Amount Obligated to Date (000)
690-0231.56	Regional Transport Development (Mozambique Railways)	1985	06/89	$5,540	$5,540

ACTIONS

E. Action Decisions Approved By Mission or AID/W Office Director

Action(s) Required	Name of Officer Responsible for Action	Date Action to be Completed
1. Determine status of missing commodities procured thru ZECO and complete procurement.	E. Rojas USAID/Zimbabwe O.Dinis CFM(C)	06/89
2. Determine status and completion of locomotive guarantees and warranties (ZECO) and close out ZECO contract.	E. Rojas USAID/Zimbabwe	08/89

(Attach extra sheet if necessary)

APPROVALS

F. Date Of Mission Or AID/W Office Review Of Evaluation: (Month) March (Day) 28 (Year) 1989

G. Approvals of Evaluation Summary And Action Decisions:

	Project/Program Officer	Representative of Borrower/Grantee	Evaluation Officer	Mission or AID/W Office Director
Name (Typed)	E.R. Rojas	F.F. Mendes	L.D. Taylor	A.B. Herrick
Signature	E R Rojas		L D Taylor	A B Herrick
Date	APRIL 12, 1989		14 April 89	APRIL 27, 1989

ABSTRACT

H. Evaluation Abstract (Do not exceed the space provided)

H. ABSTRACT

The Project was designed to support the program of the Southern African Transportation and Communication Commission (SATCC) which had identified the rehabilitation of the the Beira-Machipanda railway line corridor as a top priority project in its plan of action. The Regional Transport Development (Mozambique-Railways) project is being implemented by the Direccao Nacional des Portos e Caminhos de Ferro (DNPCF). This final evaluation, conducted four months before the Project Assistance Completion Date (PACD) of June 30, 1989 was undertaken to address: the achievement of the projects's purpose and outputs; effectiveness of AID's assistance; efficiency increases along the Beira corridor; economic impact of the project; and sustainability.

The evaluation team was made up of an IQC railway engineer and transport economist who provided the bulk of the report write up. Annex write-ups were provided by the Regional Commodity Management Officer and Regional Contracts Officer from REDSO/Nairobi.

The major conclusion of the evaluation team was that the project has been generally a success, in that the capacity and efficiency of the Beira-Machipanda railroad system had improved from project start up date of September 1985 due to the following:

- increase in the number of daily trains from 2.4 in 1985 to 3.6 in 1988.
- increase in number of available locomotives, the project having added 11. However some locomotives were delivered up to 18 months behind schedule.
- increase in locomotive utilization rates, both diesel and steam.
- increase in track capacity and ability to maintain it.
- increase in cargo annual tonnage from 280,000 tons in 1985 to 486,000 in 1988.
- strengthened capacity and capability of CFM(C) to maintain and repair steam and diesel locomotives. However the training received by CFM(C) personnel from the contractor responsible for CFM(C)'s training was not as successful as anticipated.
- strengthened capacity and capability of CFM(C) foundry to make locomotive parts for steam locomotives.

COSTS

I. Evaluation Costs

1. Evaluation Team

Name	Affiliation	Contract Number OR TDY Person Days	Contract Cost OR TDY Cost (U.S. $)	Source of Funds
J.F. Forman	Parsons Brinckerhoff Int.	26	60,100	Project
W.K. Gilbert	Parsons Brinckerhoff Int.	26	(incl. above)	Project

2. Mission/Office Professional Staff Person-Days (Estimate) 26*

*Includes REDSO/Nairobi staff

3. Borrower/Grantee Professional Staff Person-Days (Estimate) 4

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A.I.D. EVALUATION SUMMARY - PART II

SUMMARY

J. Summary of Evaluation Findings, Conclusions and Recommendations (Try not to exceed the three (3) pages provided)
Address the following items:

- Purpose of evaluation and methodology used
- Purpose of activity(ies) evaluated
- Findings and conclusions (relate to questions)
- Principal recommendations
- Lessons learned

Mission or Office:	Date This Summary Prepared:	Title And Date Of Full Evaluation Report:
USAID/Zimbabwe	March 15, 1989	Evaluation of the Mozambique Railways Improvement: February 1989

J. SUMMARY

The Beira-Machipanda railroad system is the most direct rail linkage to the northern half of Zimbabwe, and sections of Malawi, Zambia and southern Zaire. This system which is part of the central railroad system of Mozambique CFM(C) was badly in need of emergency repairs to track and locomotives. The poor state of the tracks led to frequent interruptions of the line, often due to derailments. Many locomotives were inoperable due to lack of replacement parts. These conditions largely contributed to cargo from the landlocked SADCC member states being shipped through South Africa rather than through Beira. In addition, the port of Beira was beginning to be modernized for container traffic together with deepening of the channel for larger vessels.

SATCC and the Government of the People's Republic of Mozambique (GPRM) requested assistance from USAID to help with the much needed rehabilitation of the tracks and locomotives. The project was designed and funded by USAID in August 1985 and the USAID Grant Agreement to GPRM signed in September 1985. Based on the Project Paper, bid documents were prepared in early 1986 for steam and diesel locomotive rehabilitation, technical assistance to railway workshop in Beira, on-the-job training of railway workers and procurement of commodities. The documents were advertized and a contract awarded to ZECO, Bulawayo, Zimbabwe in May 1986. In addition railway track ties were procured for use by CFM under a project inspector and NRZ track laying crews; track equipment was procured through an IQC; and conversion of port of the Beira railway workshop was done under a Host Country contract.

The purpose of the project is to improve the capacity and efficiency of the Beira-Machipanda railroad system. The final evaluation of the project was undertaken to determine if the capacity and efficiency of the Beira-Machipanda railroad system had improved over the period of the project and to make recommendations to USAID management and DNPCF together with lessons learned from the implementation of this project which could be used on future, similar transport projects in the region. A two-person team was recruited to undertake the majority of the evaluation work during the period January 30-February 25, 1989. The team consisted of a locomotive engineering speclialist and transport economist. The RCO and RCMO from REDSO Nairobi were also requested to make a written evaluation on pertinent areas of the project (see Annexes I and II).

Information was obtained on the project by:

1. Visits to ZECO office and workshop and NRZ located in Bulawayo, Zimbabwe.
2. Visits to CFM(C) railway offices and workshop located in Beira, Mozambique.
3. Visits to DNPCF, CFM(S) workshop and USAID/Mozambique located in Maputo, Mozambique.
4. Visits to Beira corridor freight-forwarding agents and users in Bulawayo, Kwekwe, Harare and Mutare, Zimbabwe and Beira, Mozambique.
5. Review of project monthly reports, quarterly implementation reports, Beira Corridor Authority Quarterly report, Annual traffic data published by NRZ and CFM, ZECO contract and project files.
6. Consultation on the Project Paper and other USAID documents in Harare.
7. Discussion and interviews with all appropriate DNPCF, CFM(C), NRZ, USAID/Mozambique, USAID/Zimbabwe and ZECO officials involved in the project.

Progress and status of the project was reviewed in relation to the stated goal and purpose.

FINDINGS

The evaluation team concluded that project has been generally a success based on the findings indicated below:

- Emergency track repair (141 km) was completed but not without assistance by National Railways of Zimbabwe (NRZ).
- Track equipment and tools were procured although they arrived late.
- The locomotive remanufacture of 9 steam locomotives and 2 diesel electric locomotives was completed by ZECO with a quality result. However delivery was delayed for one and one-half years which resulted in a financial penalty against ZECO.
- Increased availability of commodities at the Beira workshop and foundry was achieved. Procurement difficulties experienced by ZECO however resulted in late delivery of some commodities of up to one and a one-half years.
- CFM(C) technicians received 34 months of training as planned at the ZECO workshops however the training was not as successful as anticipated. This was due to poor planning and lack of qualified Portugese speaking trainers on behalf of ZECO.
- Training and technical assistance provided at the Beira workshop resulted in improved job understanding and know-how which allowed for the rehabilitation of two steam locomotives.
- First phase conversion of steam workshop area in Beira to diesel electric locomotive maintenance was completed within budget and on time.
- Trains per day increased from a pre-project level of 2.4 in 1985 to 3.6 in 1988.
- The train movement of 280,000 net tons annually in 1985 rose to a level of 486,000 tonnage in 1988 including increase in container traffic.

CONCLUSIONS

- The effectiveness of the improvements on the Beira rail-line has been strengthened by simultaneous efforts to revamp the related Beira port system.
- In measuring the impact of the rail system, it should be borne in mind that the port and rail systems are so inter-related to the extent that inadequacies of one system affect the efficiency of the other system. Total delivered costs, therefore will determine distribution of traffic among competing rail and port accesses.

RECOMMENDATIONS

1. Project Management

- Project controls must be established to maintain discipline in all phases/segments of activity.
- Supervisory project funded manager must be selected with technical and managerial strengths to implement, monitor and provide redirection in project tasks/activities as required.
- Contractors must be required by contract to develop detailed workplans and schedules, to provide weekly progress reports, and to accept inspection and project monitoring.
- Contracting agency (USAID) must assure that contractor has full knowledge and understanding of contract requirements.
- Selection process for contract award must include careful analysis of qualification for performance of contract requirements.

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2. Implementation

- status of missing commodities procured thru ZECO and complete procurement needs to be determined.

- status and completion of locomotive guarantees and warranties (ZECO) need to be determined.

LESSONS LEARNED

1. Poor procurement planning at project paper stage leads almost invariably to poor implementation.

2. Clearance by a Commodity Management Officer (CMO) should be required on any services contract which contains a large commodity procurement element.

3. Procurement responsibility should not be assigned to contractors who are probably incapable of complying with AID regulatory requirements.

4. Assistance by a CMO for host country conducted commodity procurements should have been established at PP stage.

5. A liquidated damages clause should be incorporated into a contract when the extent of damages and loss resulting from contractor non performance can be determined at the time of award.

6. Scope of Work for individual work orders should be consistent with the supplies/services authorized by the contract.

7. The establishment of a contracting officer's representative should be done only in carefully prescribed circumstances where the authorities are specifically identified with clearly established parameters.

8. In order for technical assistance/training to be effective in enabling national railways of developing countries to provide adequate workshop management and maintenance for their locomotive fleets (both current and future) follow-up training is required. CFM(C) has received technical assistance/training under this project however CFM(C) needs follow-up training to maintain and improve its workshop management and maintenance capabilities for its locomotive fleet.

ATTACHMENTS

K. Attachments (List attachments submitted with this Evaluation Summary; always attach copy of full evaluation report, even if one was submitted earlier; attach studies, surveys, etc., from "on-going" evaluation, if relevant to the evaluation report.)

Evaluation Report

COMMENTS

L. Comments By Mission, AID/W Office and Borrower/Grantee On Full Report

This complex project, with its cumbersome arrangements for implementation (for example; the major locomotive repair work being undertaken in Zimbabwe and technical assistance on locomotives taking place in Beira, Mozambique, were both to be supervised by a project manager living in Maputo, Mozambique), was overly optimistic in its assumptions of time required to complete the work and of the ability of implementing organizations to operate without heavy guidance from USAID. Because of pressure to complete project documents before the end of fiscal year 1985, the design was completed without important technical input from commodity management and contracting specialists. The technical and economic results of the project are substantial, however, in spite of delays and managment challenges.

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Annex II Memo from Robert B. Stader, REDSO/ESA/RCMO concerning Procurement methods used on Regional Transport Development Project 690-0231.56. (Including Scope of Work for RCMO)

Annex III Scope of Work - Mozambique Railways Final Evaluation

Annex IV Schedule for Mozambique Railways Evaluation

Annex V Bibliography and persons contacted

XD-AAZ-499-A
61912

PROJECT EVALUATION REPORT

MOZAMBIQUE RAILWAYS IMPROVEMENT

690-0231.56

REGIONAL TRANSPORT DEVELOPMENT

PROJECT

SUBMITTED TO: U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

HARARE, ZIMBABWE

PREPARED BY: PARSONS BRINCKERHOFF INTERNATIONAL, INC.

NEW YORK, NEW YORK, U. S. A.

SUBMITTED BY: J. F. FORMAN
W. K. GILBERT

DATE: FEBRUARY 1989

8'

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EVALUATION OF MOZAMBIQUE RAILWAY PROJECT (690-0231.56)

INTRODUCTION

This report describes results and conclusions of the above project final evaluation. Implemented during a three year period commencing September 1985, the project objective was to improve the capacity and efficiency of the Beira-Machipanda Section of Mozambique Railways-CFM(C).

The project consisted of sourcing US$2.54 million for the total remanufacture of 9 steam and 2 diesel electric locomotives, US$1.62 million for locomotive parts, US$0.6 million for track equipment/materials, US$0.45 million for conversion (1st Phase) of Beira steam workshop (one third) to a diesel electric workshop, US$0.25 million for TA/Training/Evaluation and US$0.08 million for vehicles for CFM(C).

The project provided for major efforts applied toward the railway operational improvements including; (1) Emergency track repairs, (2) Locomotive remanufacture, (3) First phase conversion of Beira steam workshop to diesel electric workshop, (4) Commodity purchases, (5) Employee training, and (6) Technical assistance.

Engineering elements of the railway improvements tasks, including all technical related items funded under the project were evaluated. To provide sufficient detail on these items of project effort, action was taken to develop data through interviews with key personnel that participated in pre-project, project and post-project periods. These included National Railways of Zimbabwe, Zimbabwe Engineering Company, Mozambique Railways South (CFM(S), Mozambique Railways Central CFM(C), USAID/Mozambique and USAID/Zimbabwe.

The evaluation team surveyed and investigated the Beira-Machipanda Section of CFM(C) Railways operation in February 1989 to determine results of project efforts, and to conclude lessons learned and recommendations for future actions to improve CFM(C) operations.

The review of engineering aspects provided sufficient insight into the project phases to permit determination of measures of effectiveness and to develop composites of lessons learned concerning methods and procedures applied in the implementation.

Significant items that contributed to the success and difficulties experienced during project implementation are summarized in the Findings, Conclusions and Recommendations section and are detailed in the Evaluation Results section.

PART I - ENGINEERING SEGMENT

FINDINGS

The project objective to improve the capacity and efficiency of the Beira-Machipanda Section of the Mozambique Railways - CFM(C) was achieved. The major efforts applied toward the improvements included:

- Emergency track repairs (141 km)
- Locomotive remanufacture - 9 steam and 2 diesel electrics
- First phase conversion of Beira workshop for diesel electric
- Commodity purchases of locomotive parts and workshop equipment
- Employee training
- Technical assistance

The overall results indicate improvements were achieved. However some of the efforts contributed a greater degree of improvement than others.

- The track repair was completed under an arrangement where CFM(C) was greatly dependent on National Railways of Zimbabwe (NRZ).
- The locomotive remanufacture was completed with a quality result, however delivery was delayed for one and one-half years. The delay resulted in a financial penalty against the contractor.
- First phase conversion of steam workshop area for diesel electric maintenance completed within budget and on time.
- Commodity procurement difficulties on part of contractor resulted in late deliveries of up to one and one-half years.
- Employee training at contractor's site was estimated to be fulfilled at 20%.
- Technical Assistance at Beira workshop resulted in improved job understanding and know-how which allowed for the rehabilitation of 2 steam locomotives.

CONCLUSIONS

The planned increase in average number of trains daily from 2.4 (1985) to 3.4 (1988) was achieved and could be exceeded. Over the period, changes in freight commodity mix as well as amount of imports/exports provide a much different overall result.

Also, the services that CFM(C) obtains from NRZ in freight movements and locomotives rented from other railroads have supplemented the increase in motive power resulting from the remanufactured locomotives.

To assure reasonable life for remanufactured locomotives, improvements in quality of maintenance and operations by CFM(C) personnel must be developed.

RECOMMENDATIONS

For completion of implementation of current project the following should be performed:

- Determine status of missing commodities procured thru ZECO.
- Follow up on status and completion of locomotive guarantees and warranties (ZECO).

For implementing and managing future projects designed to provide remanufacture services for existing locomotives/wagons or replacement with new, or to provide training for railway supervision and workshop personnel, USAID should consider the following:

- Project controls must be established to maintain discipline in all phases/segments of activity.
- Project manager must be selected with technical and managerial strengths to implement, monitor and provide redirection in project tasks/activities as required.
- Contractors must be required by contract to develop detailed workplans and schedules, to provide weekly progress reports, and to accept inspection and project monitoring.
- Contracting agency (USAID) must assure that contractor has full knowledge and understanding of contract requirements.
- Selection process for contract award must include careful analysis of qualifications for performance of contract requirements.

SUGESTIONS FOR FUTURE PROJECTS

For strengthening and improving CFM(C) Railway capacity and efficiency, USAID could consider the following:

- Develop a project to provide additional steam locomotives to increase CFM(C) fleet. Proficiency of existing workshop is greater for maintenance of steam locomotives than for diesel electrics.

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- Develop a project or participate with other donors to provide on-site training for all levels of CFM(C) personnel, from managers to mechanics. Training must include courses in supervisory responsibilities, managing the workforce, understanding of people, improving productivity, setting work goals, measuring results and instilling discipline. Training for workshop personnel must include skill development with theoretical and practical instructions according to the individuals trade level. Skills required for improvement in quality of maintenance include: preventive maintenance, test operations, calibration, trouble shooting, disassembly, repair, reassembly, use of tools and test equipment, and component overhaul, repair and servicing.

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EVALUATION RESULTS

I. STEAM LOCOMOTIVE REMANUFACTURE

Sourcing of steam locomotive remanufacture in Africa is subject to constraints that limit the available sources. Railway workshops utilize their existing capacity for such work on their own equipment, and do not have excess capacity to provide such services to other railways. This factor limits the source to workshops of industrial companies. Four companies exhibited interest in the project, but only one was responsive. The selection of Zimbabwe Engineering Company (ZECO) as rebuilder of steam locomotives was appropriate. The firm is basically a fabrication, welding, structural manufacturer with years of experience in production of quality products. With such capability, ZECO has provided services of overhaul, rehabilitation and remanufacture to African railways and industrial owners of steam locomotives. ZECO's performance of these services has been very acceptable to such customers as NRZ.

Observation during a tour of ZECO workshop confirmed their capacity and capability to perform necessary tasks required in disassembly, fabrication of replacement components, reconditioning of salvageable components, machining, reassembly, adjustment and operational testing of steam locomotives. Their weaknesses (limitations) are mainly in performance of machining operations on moving parts such as wheels, axles, cranks, reversing shafts, connecting rods, pistons and cylinders. Under the circumstances the selection of ZECO even with these limitations was prudent.

Delivery by ZECO of remanufactured locomotives to CFM(C) was unacceptably late. Contractual schedule required delivery of completed locomotives Four Months after receipt at their Bulawayo workshop. The locomotives selected for remanufacture were operational (see Exhibit 1) during the period prior to delivery as follows:

Locomotive	Average Avail.(%) 12 months Prior to Delivery	Average Avail.(%) 13 to 24 months Prior to Delivery
952	0	12
953	0	0
957	0	8
960	15	8
961	0	0
962	9	15
971	0	0
972	3	7

Note: The availability percentages are quoted from CFM(C) records. Locomotives showing 0% availability were reported as out of service for five or more years. History of shunter No. 91 not available.

Each of the steam locomotives was inspected by CFM(C) prior to issuance of remanufacture contract and the condition of 169 specific component items were recorded as good, average or bad. This record was included as attachment J-1 (see Exhibit 2) of the contract. ZECO's Director/Division Manager - Traction and their Work Planning Estimator did not visually inspect the above listed locomotives during their pre-contract visit to Beira-CFM(C). The locomotives were at Gondola and observed only from aircraft at an altitude of two to three thousand feet.

With the locomotive conditions observed during disassembly at ZECO as described by Allan Brown- Division Manager - Steam Locomotives, the four month remanufacture cycle was impossible to meet.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVES

The nine steam locomotives remanufactured under contract between USAID and ZECO dated May 16, 1986 were at ZECO's workshop for periods of from eleven to nineteen months, far exceeding the contractual four month cycle. The quality of the remanufactured locomotive was acceptable as certified by signed component and test certificates and provisional and final acceptance certificates. The adjustments and minor corrections made by CFM(C) at Beira/Gondola upon receipt of remanufactured locomotives cost 3,424,593 meticais (US$5,165) which indicates an acceptable quality level (see Exhibit 3). However, time delays due to these corrections caused difficulties. The contractual warranty of 12 months from date of provisional acceptance has not expired and continues to cover locomotives 953, 952, 961, 91, 971, and 972. Warranty action on these locomotives is available for period of one year from date of provisional acceptance (see Exhibit 4). Costs for additional repairs under warranty, may occur.

The objective of obtaining remanufacture services in accordance with contractual specification and quality was met. The delivery cycle for the remanufacture work of four months was not met.

B. FACTORS AFFECTING STEAM LOCOMOTIVE REMANUFACTURE SUCCESS

The success and difficulties experienced during locomotive remanufacture phase were directly related to:

1. Limited sources for remanufacture in Africa.

2. Lack of pre-contract locomotive inspection by contractor.
3. Lack of locomotive specifications, drawings and patterns.
4. Lack of work planning by contractor ZECO.
5. Competition for workshop space and labor at ZECO.
6. Limitations of ZECO machining capability.
7. Lack of full-time-on site U.S.A.I.D. Project Manager.

C. CURRENT STATUS AND ACHIEVEMENT

All nine steam locomotives were remanufactured, delivered, accepted and placed in service. The availability during the first week of February 1989 was less than thirty-two percent. One locomotive experienced a boiler explosion due to lack of water and has been out of service for three months to date. The other locomotives experienced a high degree of out-of-service time for repair work (see Exhibit 5).

D. CONCLUSIONS

1. Selection of ZECO was a prudent action.

2. Selection of locomotives for remanufacture should not be sole responsibility of CFM(C).

3. This type of project requires a strong, effective, production oriented full-time on-site Project Manager.

4. ZECO accepted a contract without knowing all the facts.

5. The contractural delivery time should have been twelve months instead of the 4 months indicated in the ZECO contract.

E. RECOMMENDATIONS

1. Projects of this type must have tight control, monitoring, emphasis on production and daily on-site action on problem resolution.

2. The Project Manager's responsibilities must include assuring that contractor performs pre-planning of work to a schedule acceptable to the contracting party.

3. The Project Manager must be a full-time on-site director of day-to-day actions assuring project is on schedule or that corrective action will return project to schedule with minimum lost time.

4. The on-site (80 to 90 percent) Project Manager will monitor work implementation and coordinate action with contracting parties.

5. Contractor must satisfy himself on condition of equipment to be rehabilitated or remanufactured with pre-contract inspections.

6. Contractor must be required to submit progress reports weekly on all major tasks.

II. DIESEL ELECTRIC LOCOMOTIVE REMANUFACTURE

Sourcing of diesel electrics remanufacture in Africa is limited to those railway workshops with experience and capacity for such work. The only railway workshop in Africa (other than South Africa) that could successfully perform total rebuilds of diesel electrics is NRZ. Recently General Motors opened a workshop/parts store at Francistown, Botswana. Also, General Electric has acquired a site for a workshop/parts store at Francistown and will start construction on acceptance of first project.

The CFM(C) lot of steam and diesel electric locomotives for remanufacture could have been split as separate contracts with the steam contract handled by ZECO and the diesel electric by the NRZ. Capacity at NRZ at the time of contract negotiation and award may not have been totally available. However action could have been taken to convince the NRZ Chief Mechanical Officer to accept the two CFM(C) diesel electrics for remanufacture.

ZECO's experience prior to 1985 on rehabilitation of diesel electric locomotives was limited to structural fabrications. It should be noted that locomotive D-33 was at ZECO's workshop in 1980-81 for derailment damage correction. Acceptance by ZECO Management of the contract to remanufacture two GE U30C diesel electric locomotives was not a prudent action, even though they had also accepted maintenance/repair work of Botswana Railway General Motors locomotives.

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If ZECO was the only responsive contract bidder with capacity but with very limited capability, the contract could have been designed to include a provision for the original equipment manufacturer (OEM) to provide technical assistance to ZECO at ZECO's expense. The T.A. requirements would have been in the form of a Diesel Electric Engineer/Mechanic for a period of one year in ZECO's Bulawayo workshop.

ZECO's performance of disassembly, component rebuild or replacement, reassembly and test was extremely poor. The two locomotives DE-26 and DE-33 were among the first to be delivered to the ZECO workshops (June 1986) and the last to be returned to CFM(C), provisional acceptance February and June 1988 (a nineteen month and twenty-four month cycle).

The OEM (General Electric) provided guidance in determination of replacement parts, also in arranging the unit exchange of such items as traction motors, alternators and other system major components. Note: Unit exchange is the procedure of replacing the components in disrepair with OEM remanufactured components, for a price based on condition of disrepair. The OEM representative located remanufactured traction motors at Kenya Railways and negotiated for delivery to ZECO.

This is another segment of the locomotive work that needed a full-time on-site Project Manager representing the contracting agency, to stay on top of the day-to-day events requiring immediate action.

The delivery of remanufactured diesel electrics locomotives to CFM(C) was unacceptable. Contractural schedule required delivery of completed units <u>four months</u> after receipt at Bulawayo workshops. The diesel electrics were not operational prior to shipment from Mozambique.

The diesel electrics were inspected by CFM(C) prior to issuance of remanufacture contract and condition of 51 components on DE-33 and 85 components on DE-26 was indicated. The majority of the components were noted as requiring replacement due to damage beyond repair or missing. The inspection information was listed in detail and included as attachment J-2 to the contract. Both units were inoperative for a period of four to six years prior to 1985 and had experienced derailments and other damage during late 1970's. ZECO, based on the above available information and with the DE's delivered to their workshop in June 1986, could have proceeded to arrange for required replacement parts/unit exchange parts for early delivery.

The four month contractual delivery requirement was impossible to meet. However with the required T.A. and with early attention to procurement of components/parts, a delivery of twelve months could have been realized.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVE

The two diesel electric locomotives were at ZECO's workshop for nineteen months and twenty-four months, far exceeding the contractual four month cycle. The quality of the remanufacture was acceptable as certified by signed component and test certificates and provisional acceptance certificates. The adjustments and minor corrections made by CFM(C) at Beira/Gondola upon receipt of the remanufactured locomotives were minimal, indicating an acceptable level of quality. The contractual warranty will not expire on DE-26 until June 1989, however the locomotive was severely damaged in a head-on collision September 20, 1988 and is not repairable by CFM(C). DE-26 is expected to be remanufactured under a subsequent USAID project. The warranty on DE-33 has expired. Availability of DE-33 has been above expected 65% level. This project's remanufacture of diesel electric units (two) has provided ZECO the opportunity to set up a shop to perform such work in the future.

B. FACTORS AFFECTING DIESEL ELECTRIC LOCOMOTIVE REMANUFACTURE SUCCESS

1. Limited sources for diesel electric remanufacture in Africa.

2. Lack of work planning by contractor.

3. Competition for workshop space and labor.

4. No prior diesel electric experience in ZECO (except structual).

5. Lack of full-time on-site USAID Project Manager.

6. Limited early action on replacement component/part procurement.

7. See final report by CFM(C) inspectors concerning remanufacture of diesel electric locomotives. Exhibit 8.

C. CURRENT STATUS AND ACHIEVEMENT

Only one (DE-33) diesel electric is operational at this time. The availability of that locomotive during the first week of February 1989 was 85%. However, considering that two units were covered under the contract, actual availability of the two diesel electrics is only forty-three percent, due to no fault of ZECO.

D. CONCLUSIONS

1. In addition to those listed for the steam locomotive section of this report, the results of the diesel electric remanufacture indicate strongly that work of this complexity would best be guided by technical assistance from a fully qualified diesel locomotive engineer. With the limited sourcing possibilities in Africa, contracts are awarded to firms much less qualified than desired. When such circumstances exist, arrangements to provide qualified technical assistance and strong project management from the contracting agency is of extreme importance.

2. Selection of ZECO as contractor for the diesel electric remanufacture provided an opportunity for them to set-up shop for future diesel electric work. This resulted in a "Project Expense" of late delivery.

E. RECOMMENDATIONS

1. Future diesel electric work contracts awarded to ZECO need arrangements for providing technical assistance.

2. Follow up on status and completion of locomotive guarantees and warranties.

III. BEIRA-MACHIPANDA PERMANENT-WAY MAINTENANCE

The Beira line track condition was recognised as very poor and was in need of almost total rehabilitation. Damage due to insurgents action as well as lack of periodic maintenance resulted in the need for emergency repair of 141 km of track sections spaced over the entire line.

A review of the repair plan, efforts and difficulties experienced in implementing this phase of the project work showed a lack of capability within the CFM(C) organization.

The degree of urgency to improve the track condition required a track crew to proceed eastward replacing the badly deteriorated wooden ties (sleepers) and at least one tie in every fourth tie. According to monthly reports and minutes of meetings, CFM(C) had many difficulties in accomplishing their task. Lack of food, communications equipment, clothings, shoes, tools and equipment caused delays as did problems due to National Resistance Movement (MNR) attacks.

NRZ provided considerable help to CFM(C) and according to NRZ performed an estimated 90% of the track work. In November 1986 an agreement was reached between CFM(C) and NRZ, the trackwork from Machipanda to Gondola as well as the required repairs from Gondola to Beira, were completed by NRZ. The steel sleepers furnished by NRZ were used, however their condition was acceptable. The project funded a portion of the steel sleepers and also a track inspector for the CFM(C) team.

NRZ had a work crew of 250 people, CFM(C) had agreed to provide a crew of 50 men to work with the NRZ crew to learn work methods. CFM(C) did not live up to their agreement. The Deputy Director of CFM(C) indicated the major reasons were lack of discipline in the workforce, no living accommodations available, no food, no clothing/shoes, but mainly a lack of discipline.

The Machipanda to Beira trackwork was 98% completed in October 1987 by NRZ workcrews with the help of US$4.0 million funded by Austria. NRZ indicated that for a period of eighteen months of trackwork, the CFM(C) crew of 50 men did not participate in the actual work nor did they spend time to learn work methods.

The reballasting of some track in Machipanda-Gondola section is not totally completed, NRZ has the ballast available and will complete in near future.

The records of derailments and accidents provided by NRZ for Mutare-Gondola section and CFM-(C) for Machipanda-Beira section are included as Exhibit 6. A summary of this data which unfortunately does not cover the full period of interest (1984-1989) is shown as follows:

Note: NRZ track work crews (4 gangs - 25 men each) are currently performing track repair on the Limpopo line and other sections of the CFM rail systems. Contract covering NRZ work expires in 1989.

CFM(C) DATA
1987

	DERAILMENTS		ACCIDENTS	
SECTION	NUMBER	HOURS LOST	NUMBER	HOURS LOST
BA-DN	9	82.5	21	86.1
DN-NTA	14	47.9	21	249.5
NTA-GN	11	34.8	67	316.9
GN-MP	20	198.5	29	170.8
TOTAL	54	363.7	138	823.9

NOTE: BA - BEIRA
DN - DONDO
NTA - NHAMATANDA
GN - GONDOLA
MP - MACHIPANDA

CFM(C) DATA
1988

	DERAILMENTS		ACCIDENTS	
SECTION	NUMBER	HOURS LOST	NUMBER	HOURS LOST
BA-DN	4	24.8	8	28.0
DN-NTA	3	13.1	2	5.0
NTA-GN	2	5.5	62	315.4
GN-MP	12	91.8	48	230.8
TOTAL	21	135.2	120	579.4

The charted data CFM(C) of accident occurences in 1986, 1987, and 1988 indicates:

1986 - 4.7/month
1987 - 11.5/month
1988 - 10.0/month

The NRZ data covering period of 1983 thru Jan 1989 for Mutare-Gondola section indicates:

	Collisions	Derailments	Sabotage
1983	0	3	1
1984/85	No records	No records	No records
1986	1	3	2
1987	0	5	2
1988	2	3	4

Statistics of gross tons of freight and number of trains show a definite trend upward on number of trains per day from 2.4 (1985) to 3.6 (1988).

.12

However, the record discrepancies between CFM(C) and NRZ data on derailments, accidents and numbers of trains or gross tons does not permit definite answers. Many specific actions have contributed to the improvement of traffic flow:

1. Work by NRZ on correcting track deficiencies.
2. NRZ operating trains to and from Gondola, using NRZ locomotives and crews.
3. CFM(C) use of remanufactured steam and diesel electric locomotives.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVE

The Machipanda-Beira line trackwork has been repaired with steel ties, welded track, new fasteners and ballast. The work was performed mainly by NRZ crews with the use of two tamping machines and a plasser machine. Delays caused by late availability of materials and equipment were partially off-set by NRZ participation in performing the work. The procurement of trackwork machines required for efficient track repair was delayed. The machines including rail drill, rail saw, sleeper drill, motor trolley and tree saws had to be procured thru the American Manufacturers Export Group (AMEG). The delivery of this equipment was about two years late. The Austrian contribution of US$4 million financed the arrangement between CFM(C) and NRZ for NRZ major participation in the total rehabilitation of (315 km) the Beira-Machipanda track. The number of derailments and accidents have decreased from 1987 to 1988.

The training of CFM(C) personnel in the performance of track maintenance work has not been done. The improvement of work ethic discipline has not been achieved. If CFM(C) is to maintain track with their own work crews, a program of training will be required.

B. FACTORS AFFECTING EMERGENCY TRACK REPAIR SERVICES

The successes and difficulties experienced during the emergency track repair segment of the project were directly related to:

1. Lack of trained, disciplined personnel from CFM(C).
2. Delays in acquiring track materials.
3. Delays in acquiring tooling and equipment.
4. The availability of NRZ track crews resulted in timely completion and quality work. Also, NRZ was able to rent track machines to use instead of waiting for late procurements (AMEG).

5. Additional of Austrian funding contributed to overall improvement of Machipanda-Beira track.

C. CURRENT STATUS AND ACHIEVEMENT

The track repair work on the entire Beira line was completed in October 1987, with exception of re-ballasting of some short sections. NRZ indicates that ballast material is available and the work will be completed in immediate future. CFM(C) and NRZ will follow-up.

D. CONCLUSIONS

1. The selection of NRZ with their experienced, trained, disciplined work crews was most effective in completing trackwork on timely basis.

2. CFM(C) needs to develop crews to work-efficiency levels equivalent to NRZ trackwork crews.

3. Materials, tool, equipment and work crew personnel needs must be scheduled and available as required.

4. Close monitoring and implementation of timely corrective action by a project manager is essential to project success.

E. RECOMMENDATIONS

1. Program of on-the-job training of CFM(C) track work crews should be implemented without delay and used to take advantage of the opportunity to work with NRZ trackwork crews.

2. Overall training of management, supervision and labor needs attention.

IV FIRST PHASE CONVERSION OF BEIRA WORKSHOP FOR DIESEL ELECTRIC

Conversion of a section of the existing steam locomotive workshop to provide capacity for diesel electric light/medium maintenance work had been essentially completed. The contractual designated work was defined in the agreement between DNPCF and CETA-Engineering Works which was executed in Maputo, on 25th April, 1987. The work was completed with the exception of window installation and some painting.

Eighty percent of the workshop designated area for diesel electric locomotive maintenance is unoccupied at this time. CFM(C) indicated that area will not be utilized as designed until the tools and equipments are available and installed. The schedule for completing these items is 1991. Approximately US$400,000 of tools and equipment is scheduled to be installed by June 1989. The remaining tools and equipment will be installed by mid 1991.

The layout of the workshop area for diesel electric locomotive maintenance requires an excessive amount of overhead cranes. Capacity of the shop was established as four locomotives, however there are only two exit/entrance tracks. Since the work shop design is the responsibility of CFM(C), the working arrangement undoubtedly had their approval even though the layout is inefficient.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVES

The objective of this project segment was to complete the phase one scope of workshop conversion at Beira for future use (1991) as a diesel electric locomotive maintenance shop. The scope as specified in the before mentioned CETA contract was completed in October 1987. The quality of construction, on the surface, appears adequate. The structural integrity is not measurable after construction. Repair of roof, installation of windows and balance of painting remain to be completed. The objective was achieved as specified. The unfinished workshop with no tools and equipment has not improved the CFM(C) capability to perform diesel electric locomotive maintenance and no other donor came forward to complete the work. This workshop area is expected to be unoccupied and will be an ineffective utilization of space until the tools and equipment are available and installed (1991).

B. FACTORS AFFECTING DIESEL ELECTRIC LOCOMOTIVE WORKSHOP SUCCESS

1. Design layout not efficient for handling locomotives, bogies and components.

2. Excessive amount of overhead crane work required in operation.

3. Interim period up-to-three-year, between completion of phase 1 and beneficial occupancy with tools and equipment, is much too long.

C. CURRENT STATUS AND ACHIEVEMENT

The Phase 1 work is essentially complete and will provide the area for initial utilization as maintenance (light/medium) workshop for diesel electric locomotives when tools and equipment are available and installed.

D. CONCLUSIONS

The Phase 1 work was essentially completed as planned.

E. RECOMMENDATIONS

Workshop design, planning, equipment and construction require continuity and co-ordination with a timely implementation of each phase.

V COMMODITY PURCHASES/PROCUREMENT

The contract attachments J-3, J-4, J-5, J-6, J-7 and J-10 listed a total of 407 items to be procured, ranging from welding rods to a five-passenger highway vehicle. Contractual delivery schedule required delivery of all items to Beira/Gondola by November 1986. Contract for procurement services was accepted by ZECO in May 1986 which allowed a procurement cycle of only six and one-half months. Contractor was required to follow applicable federal acquisition regulations and AID acquisition regulations.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVES

All items listed on the J-3 thru J-7 inclusive and J-10 have been received except for items 87 thru 98 and 142 thru 144 listed on J-3. These items are case hardened rods, stainless steel rods and velonide boards. This material may have been lost in transit, however investigations are underway to locate the missing material. Items received are summarized as follows:

	Before July 31, 1987	Before June 28, 1988
J-3	33%	92%
J-4	26%	100%
J-5	15%	100%
J-6	0%	100%
J-7	33%	100%
J-10	100%	100%

The contractual procurement cycle time of six and one-half months was much too short particularly when adherence to Federal and AID regulations was required. However, ZECO's procurement cycle in actuality was about twice what it should have been. As of September 1987, ZECO still had 16 items to price and order.

Since neither AID nor CFM(C) had capabilities or organization to perform required procurement work, the selection of ZECO was the obvious alternative.

B. FACTORS AFFECTING COMMODITY PROCUREMENT SUCCESS

1. Unfamiliarity of ZECO personnel with the Federal and AID procurement regulations.

2. Source limitations and shipping/transport time.

3. Insufficient monitoring of ZECO's procurement efforts by USAID Project manager.

4. Insufficient progress reporting by ZECO.

C. CURRENT STATUS AND ACHIEVEMENT

All but 14 items of approximately 450 (407 plus additional items) have been delivered. Missing items (3% of total) may have been lost in transit. ZECO and CFM(C) are following-up.

D. CONCLUSIONS

Procurement services could have been obtained from an agency in the USA with more experience probably costing more than the amount paid to ZECO; however the deliveries and handling of the commodities would have been improved. Since the items were to be regionally procured however, ZECO was probably the best suited for providing procurement services.

E. RECOMMENDATIONS

1. When services of this type are contracted out, close monitoring by contracting agency is required.

2. Determine status of missing commodities procured thru ZECO.

VI. TRAINING OF CFM(C) EMPLOYEES (Technical Assistance)

The objective of the project was to improve the educational level of CFM(C) workshop personnel to ultimately increase scope, quality and production of Beira steam and diesel electric locomotive maintenance operations as well as foundry operations. The prime contractor (ZECO) accepted the responsibility to provide specific training as described in Section C. 10, per schedule Section F.1 and per requirements defined in attachment J-8 of the contract executed May 16, 1986. Twenty-five CFM(C) people were to be included in the training conducted at ZECO's Bulawayo workshop. The duration of training ranged from 21 days for foundry supervisor to 60 days for diesel mechanics. ZECO was responsible to provide instructors, facilities, training materials and equipment to meet project training objective. Technical assistance (training) was also planned for Beira workshop.

A. COMPARISON OF ACTUAL ACHIEVEMENT VS. OBJECTIVES

Interviews with ZECO personnel directly responsible for the training of CFM(C) personnel at Bulawayo workshop and interviews with CFM management, including the Beira workshop manager, provided information for this evaluation. The CFM(C) personnel arrived in Bulawayo as scheduled, available for on-the-job training.

The foundryman supervisor was scheduled for training on properties and structure of castings, types of castings, defects and remedies, overall foundry technology, materials calculations, dressing process and foundry economics. This curriculum was planned for 21 days of instruction. Upon the completion of this period, the learning was very incomplete per CFM(C). To meet the training objective, the foundryman was sent to the workshop of F. Issels & Son, Ltd. in Bulawayo. The carpenters were also trained at F. Issels & Son, Ltd, to learn construction of molds, tools and equipment used in making molds, measuring devices and mold drawing interpretation. Overall, the training in these two classifications was adequate, however, the time duration was more that double what was planned and cost considerably more.

The other personnel to receive on-the-job-training were scheduled for 60 days of theoretical and practical instructions according to their trade levels. The intent was to improve their understanding of maintenance and operation of steam and diesel electric locomotives. The first month at ZECO was reported to be a complete waste of time. No classroom type instruction took place, only observation of performance of tasks in workshop was accomplished. During the second month after numerous complaints from CFM (C), a two hour explanation of machine drawings was given by a draughtsman and three days of general instruction by other personnel.

Overall, the training was estimated to be fulfilled at 20%. However, it should be noted that the traning provided by the extension of the T.A. of the foundryman supervisor and electrical supervisor at the Beira foundry resulted in the rehabilitation of 2 steam locomotives.

B. FACTORS AFFECTING THE LIMITED SUCCESS OF TRAINING OF CFM PERSONNEL

1. ZECO not prepared to meet training requirements,
2. Not required to submit training plan;
3. Limited qualifications for instructing;
4. ZECO workshop personnel had no time to perform training;
5. Only one ZECO Foreman spoke Portuguese;
6. Very limited understanding of English by CFM people.

C. CURRENT STATUS AND ACHIEVEMENT

The program of training is complete. However the objective has not been fully met.

D. CONCLUSIONS

An important objective in locomotive workshop operations is to improve the quality of maintenance which would result in increased locomotive availability for current and anticipated increases in freight and passenger business. Job perfomance of maintenance personnel improves through the repetition of servicing, inspecting, repairing and trouble shooting tasks. Especially important and critical to rapid return of locomotives to service is the time spent in troubleshooting, quickly performing confirmation tests and correcting the defect properly the first time. Key factors in trouble shooting are training and experience. Through repetitive experience and successful repairs, the skills and confidence of the worker will increase.

Skills required for proper servicing of locomotives include preventive maintenance, test operation, calibration, troubleshooting, disassembly, repair, reassembly, use of tools and test equipment and component overhaul, repair and servicing.

The level of skills and maintenance work understanding of CFM(C) workshop personnel should be evaluated to determine current training needs. The basic education level of people should be determined and together with the training needs, a curriculum and schedule could be established. Qualified instructors (bilinqual), training aids, classrooms, instruction manuals should be arranged. Personnel to be trained will require orientation of training and results expected. Training takes time but it can be effective.

E. RECOMMENDATIONS

1. Contracts including requirements for training of personnel, should be awarded only to qualified agencies/companies.

2. Training is best accomplished at employee's workshop site.

3. Instructors, instruction manuals, training aids, equipment models, tools, work equipment and classrooms are all required for effective training.

4. Monitoring (frequent) is required to measure progress and to provide direction to modify curriculum and teaching methods.

5. Project manager (contracting agency) must give attention to items 3 and 4.

F. SUGGESTIONS FOR FUTURE PROJECTS

The recommendation at this point is that a program of training be funded and organized for CFM(C), as part of the World Bank Project. Action should be in the immediate future and training conducted at workshop site. Classroom work should be supplemented with on-the-job-training, with repetition of instruction used effectively.

VII. MANAGEMENT OF PROJECT

Success of a project is directly related to the management and control exercized during the implementation. Projects whether small or large, need monitoring and direction to assure timely completion of tasks, within budget and to apply corrective actions when programs get behind schedule.

The dollar value of the Mozambique Railway component of the Southern Africa Regional Transport Development is a comparatively low amount of US$5.54 million. However, the project tasks were planned for action in a number of locations including Bulawayo, Harare, Gondola, Beira and Maputo. To provide timely management and direction, a program even of this level with diversified tasks requires frequent measures of progress, with emphasis on all participating agencies, companies and services recipients meeting project commitments.

The need for Project Management was recognized early-on in this program and the assigned responsibility was defined to include; "Preparation of work schedules, monitoring project implementation and coordination with DNPCF, CFM(C), Prime contractor and USAID. Also, check monthly progress reports and invoices of prime contractor. Especially, he is to check required work as locomotives are stripped down and continously up date work schedules and finance schedules in detail." This definition was included in minutes of the May 1986 Project Implementation Committee Meeting at which the Committee recommended Luis Santos for the position.

The candidate's experience and training and his language capability apparently qualified him, as a Project Manager. The project was completed satisfactorily, however not in the planned manner nor with the required degree of control.

A. COMPARISION OF ACTUAL ACHIEVEMENT VS. OBJECTIVES

The project objectives were to obtain remanufacturing services of a competent, experienced company to totally recondition nine steam and two diesel electric locomotives on schedule and within budget; procurement services for a variety of commodities; training and technical assistance to improve CFM(C) equipment maintenance and operations skills; track repair and upgrade of the Machipanda-Beira Line; and to complete first phase conversion of steam workshop area to diesel locomotive.

- The remanufacture work was completed with acceptable quality, but delayed over a year.
- The commodities have been delivered, but delayed up to a year and one-half.
- The training was carried out but was only about twenty percent effective.
- The technical assistance in Beira has been reasonably effective, as CFM(C) was able to rehabilitate two steam locomotives under supervision of one (1) foundry man and one (1) electrical supervisor provided by the twelve (12) additional months of training (PARTEX).
- The track repair/upgrade was completed, but not without the assistance of the work crews of National Railways of Zimbabwe. Note, the major trackwork tools and equipment were delivered almost two years after the original shceduled date.
- The workshop conversion is completed, but is not being used due to lack of tools and equipment.

B. FACTORS AFFECTING PROJECT SUCCESS

Many diverse actions or lack there-of contributed to the problems causing project delinquencies resulting in penalty action against the prime contractor. Dilligent efforts in managing, directing and controlling project work could have reduced these delays.

Various project reviews conducted by USAID representatives focused attention on the deficiencies and as D. Gephart's Report of the September 1987 review points out, the Project Manager apparently was not working in the locations critical to the Project results. Gephart pointed out that the AID Project Manager spent 10 to 12 days a month on field trips to Beira and Bulawayo, but that it wasn't clear what the project manager was accomplishing during the other 10 to 12 days during the month. It appears that the project action was monitored and corrected on a part time basis. It should be noted that Dave Gephart was the acting USAID/Zimbabwe Regional Engineer during June-September, 1987.

C. CURRENT STATUS AND ACHIEVEMENT

Project Manager's contract agreement has expired and any remaining action will be coordinated with CFM(C), USAID and ZECO. The warranty has not expired on seven of the locomotives.

D. CONGLUSIONS

Strong, diligent, timely and effective project management action is required even on low dollar level projects.

E. RECOMMENDATIONS

Subsequent projects of this type require organized project management.

VIII. LOCOMOTIVE AVAILABILITY

Locomotive availability is the combined measurement of remanufacture quality, workshop/shed maintenance and driver performance. The measure is a straight-forward indication of whether or not a locomotive is in condition to be utilized as motive power for freight car haulage. The reading of availability is normally taken early in the day when "consists"* of wagons are ready to roll. However, as with any reporting statistic, adjustments are made in calculation of the number to suit the needs of the reporter.

The Project Manager's Final Report dated January, 1989 provides the following information:

PERFORMANCE LOCOMOTIVES

"The performance of the delivered locomotives in this project in terms of percentage of availability is as follows:

Oct. 87/Oct. 88

Loco No.	% average	Sep. 87	Oct. 88	Nov. 88
960	61	70	32	0
962	68	100	45	86
957	65	90	74	83
953	51	83	64	86
952	48	93	90	93
961	31	83	87	23
91	14	60	77	86
971	28	100	58	93
972	24	86	67	53
DE-33	51	90	77	83
DE-26	30	60	0	0 need rehab

*Note, "consists" is a group of wagons coupled together.

As can be observed there is a significant improvement in CFM-C availability of locomotives.

A review of the CFM(C) daily reports of February 3 thru 9, 1989 indicates availability of the remanufactured locomotives is currently 31 to 32 percent(see daily report data in Exhibit 7).

With DE-26 almost demolished in a head-on collision and 952 out because of driver negligence (boiler blown - no water) the availability suffers due to CFM(C) negligence. Condition of other locomotives is indicated in Exhibit 7.

Preventive maintenance, effective trouble-shooting on defective units, workshop turn-around time on defective units and driver diligence contribute to improving fleet total availability.

INDEX TO EXHIBITS - (ENGINEERING)

EXHIBIT NUMBER	SUBJECT
1	Remanufactured Locomotive Availability 1984 thru 1988
2	Locomotive Pre-Inspection Report Sample
3	CFM(C) Corrective Work After Remanufacture
4	Warranty Expiration Dates
5	Locomotive out of Service Reports
6	Mutare-Gondola-Accidents/Irregularities - NRZ Chart of Accidents by Month 1986-88 Derailments and Accidents by Month 1987-88 Derailment Locations 1986 Derailment/Accident Locations 1988
7	Locomotive Situations Feb. 3 thru Feb. 9, 1989
8	Final Report by CFM(C) Inspectors of Diesel Electric Locomotive Remanufacture
9	Persons Contacted During Evaluation
10	Bibliography

EXHIBIT 1

% AVAILABILITY

PROJECT LOCOMOTIVE AVAILABILITY 1984 THRU 1988

Month	LOCOMOTIVE 960 1988	1987	1986	1985	1984	LOCOMOTIVE 962 1988	1987	1986	1985	1984
D	N/O	29	-	12	-	64	22	-	-	29
N	N/O	33	-	-	-	80	10	-	-	-
O	N/O	6	-	9	-	45	32	-	6	35
S	32	55	-	13	-	96	47	-	10	33
A	33	10	-	-	-	25	3	-	25	-
J	38	6	-	-	-	35	-	-	22	-
J	80	-	-	-	-	76	-	-	-	-
M	67	-	25	-	-	74	-	32	-	-
A	73	-	40	26	30	80	-	-	10	-
M	71	-	32	38	6	84	-	-	32	-
F	No Oil	-	17	14	-	No Oil	-	17	10	-
J	6	-	29	16	-	16	-	-	35	67

	LOCOMOTIVE 957 1988	1987	1986	1985	1984	LOCOMOTIVE 953 1988	1987	1986	1985	1984
D	54	29	-	-	-	67	-	-	-	-
N	66	26	-	-	-	73	-	-	-	-
O	74	3	-	-	25	64	-	-	-	-
S	90	-	-	-	20	46	-	-	-	-
A	54	-	-	-	-	52	-	-	-	-
J	80	-	-	-	-	87	-	-	-	-
J	76	-	-	-	-	80	-	-	-	-
M	45	-	-	-	-	83	-	-	-	-
A	53	-	-	3	13	76	-	-	-	-
M	90	-	-	25	-	39	-	-	-	-
F	No Oil	-	-	25	-	-	-	-	-	-
J	32	-	-	3	-	-	-	-	-	-

N/O - Not Operational

	LOCOMOTIVE 952 1988	1987	1986	1985	1984	LOCOMOTIVE 961 1988	1987	1986	1985	1984
D	74	-	-	-	29	61	-	-	-	-
N	63	-	-	-	-	16	-	-	-	-
O	90	-	-	-	-	87	-	-	-	-
S	93	-	-	-	-	83	-	-	-	-
A	83	-	-	12	-	51	-	-	-	-
J	80	-	-	12	-	50	-	-	-	-
J	70	-	-	33	-	20	-	-	-	-
M	67	-	-	25	-	-	-	-	-	-
A	70	-	-	-	-	-	-	-	-	-
M	10	-	-	-	-	-	-	-	-	-
F	No Oil	-	-	3	-	-	-	-	-	-
J	3	-	-	32	-	-	-	-	-	-

EXHIBIT 1

% AVAILABILITY

PROJECT LOCOMOTIVE AVAILABILITY 1984 THRU 1988

Month	LOCOMOTIVE 960 1988	1987	1986	1985	1984
D	N/O	29	-	12	-
N	N/O	33	-	-	-
O	N/O	6	-	9	-
S	32	55	-	13	-
A	33	10	-	-	-
J	38	6	-	-	-
J	80	-	-	-	-
M	67	-	25	-	.
A	73	-	40	26	30
M	71	-	32	38	6
F	No Oil	-	17	14	-
J	6	-	29	16	-

LOCOMOTIVE 962 1988	1987	1986	1985	1984
64	22	-	-	29
80	10	-	-	-
45	32	-	6	35
96	47	-	10	33
25	3	-	25	-
35	-	-	22	-
76	-	-	-	-
74	-	32	-	-
80	-	-	10	-
84	-	-	32	-
No Oil	-	17	10	-
16	-	-	35	67

	LOCOMOTIVE 957 1988	1987	1986	1985	1984
D	54	29	-	-	-
N	66	26	-	-	-
O	74	3	-	-	25
S	90	-	-	-	20
A	54	-	-	-	-
J	80	-	-	-	-
J	76	-	-	-	-
M	45	-	-	-	-
A	53	-	-	3	13
M	90	-	-	25	-
F	No Oil	-	-	25	-
J	32	-	-	3	-

LOCOMOTIVE 953 1988	1987	1986	1985	1984
67	-	-	-	-
73	-	-	-	-
64	-	-	-	-
46	-	-	-	-
52	-	-	-	-
87	-	-	-	-
80	-	-	-	-
83	-	-	-	-
76	-	-	-	-
39	-	-	-	-
-	-	-	-	-
-	-	-	-	-

N/O - Not Operational

	LOCOMOTIVE 952 1988	1987	1986	1985	1984
D	74	-	-	-	29
N	63	-	-	-	-
O	90	-	-	-	-
S	93	-	-	-	-
A	83	-	-	12	-
J	80	-	-	12	-
J	70	-	-	33	-
M	67	-	-	25	-
A	70	-	-	-	-
M	10	-	-	-	-
F	No Oil	-	-	3	-
J	3	-	-	32	-

LOCOMOTIVE 961 1988	1987	1986	1985	1984
61	-	-	-	-
16	-	-	-	-
87	-	-	-	-
83	-	-	-	-
51	-	-	-	-
50	-	-	-	-
20	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

ATTACHMENT J-1

STEAM LOCOMOTIVE

ITEM NO.	DESCRIPTION	DES. NO.	952 COND	952 OBS	953 COND	953 OBS	957 COND	957 OBS
1	Main Frame	252	Aver	Verify	Aver	Verify	--	Verify
2	Cross Stretcher Bars		Aver	Verify	Aver	Verify	Aver	Repair
3	Alignments		--	Verify	Aver	Verify	--	Verify Correct
4	Horn Guide	255	Aver	Repair	Good	Verify	--	Repair Adjust
5	Stay Bar	259	Bad	Repair	Bad	Repair	--	Repair Adjust
6	Wedges	259	Bad	Replace	Bad	Replace	Aver	Replace
7	Guides	255	Bad	Replace	Bad	Replace	Aver	Replace
8	Headstock		Bad	Replace	Good	Verify	Bad	Repair
9	Cylinder	330	Good	Rectify	--	--	Good	Rectify
10	Pistons	348	Bad	Replace	--	Rectify	--	Replace
11	Piston Rods	348	--	Rectify	Bad	Rectify	Good	Rectify
12	Piston Packings	354	Bad	Replace	Bad	Replace	Bad	Replace
13	Hangers	375	Good	Verify	Bad	Repair	Good	Repair
14	Slide Bars	377	Aver	Rectify	Aver	Rectify	Good	Rectify
15	Crosshead	376	Fill	Level	Fill	Level	--	--
16	Hanger Pins		Good	Verify	Bad	Rectify	Aver	Rectify
17	Piston Heads	337	Good	Verify	Good	--	Good	--
18	Cylinder Covers	336	Good	Verify	Bad	Repair	Good	--
19	Hanger Key		Good	Adjust	Bad	Adjust	Aver	Adjust
20	Return Valve	357	Good	Repair	Good	Repair	Good	Repair
21	Cyl. Relieve Valve		--	--	--	--	--	--
22	Snifer Valve	358	Aver	Repair	Good	Repair	Good	Repair
23	Valve Liner	333	--	--	--	Rectify	Good	Rectify
24	Piston Valve	398	--	--	Bad	Replace	Good	Replace
25	Rods		--	Rectify	Bad	Rectify	Good	Rectify
26	Steam Chest Packings		Good	Verify	Bad	Repair	Good	--
27	Piston Valve Guide	401	Good	Verify	Bad	Repair	Good	Rectify
28	Combination Lever	403	Good	Repair	Aver	Repair	Good	Verify
29	Connecting Rods	403	Good	Repair	Good	Repair	Good	Verify
30	Radius Rod		Good	Repair	Good	Repair	Good	Verify
31	Eccentric Rods	408	Aver	Repair	Aver	Repair	Aver	Repair
32	Quadrant or Expansion Link	406	Aver	Rectify	Bad	Repair	--	--
33	Die Block		Bad	Replace	Bad	Replace	--	Replace
34	Return Crank		Aver	Rectify	Bad	Rectify	--	--
35	Bottoms Divider	339	Good	Verify	Good	--	Good	Adjust
36	Dividing Cover	338	Aver	Verify	Bad	Repair	Aver	Repair
37	Piston Rod Cotter		--	--	--	--	--	--
38	Coupling Rods	385	Good	Repair	Good	Repair	Good	Repair
39	Motor Connec. Rods	379	Good	Repair	Good	Repair	Good	Repair
40	Bearing	394	Bad	Replace	Bad	Replace	--	Replace
41	Bissel	476	Good	Repair	Aver	Repair	Good	Repair
42	Bogies	450	Good	Repair	Aver	Repair	Aver	Repair
43	Bogie Guides	457	Good	Repair	Aver	Repair	Aver	Repair

ATTACHMEN. J-1

STEAM LOCOMOTIVE

ITEM NO.	DESCRIPTION	DES. NO.	952 COND	952 OBS	953 COND	953 OBS	957 COND	957 OBS
44	Bogie Cross Beam		Bad	Repair	Bad	Repair	Aver	Repair Adjust
45	Crankpin Washer		Bad	Repair	Bad	Repair	Aver	Repair
46	Whistle		Bad	Repair	Aver	Repair	Aver	Repair
47	Serve Motor		Good	Repair	Aver	Repair	Aver	Repair
48	Reversing Indicator Scale		Aver	Repair	Aver	Repair	Good	Verify
49	Lifting Link	405	Aver	Repair	Good	Repair	Good	Verify
50	Wheel tyres		Good	Rectify	Good	Rectify	Good	Rectify
51	Hangers		Good	--	Good	--	Good	Rectify
52	Axles	205	Aver	Repair	Aver	Repair	Aver	Repair
53	Lubrication Boxes	488	Aver	Repair	Aver	Repair	Aver	Repair
54	Springs		Aver	Repair	Aver	Repair	Aver	Repair
55	Compensating Beam	235	Aver	Repair	Aver	Repair	Aver	Repair
56	Lubrication Box Ring	468	Aver	Repair	Bad	Repair	Aver	Repair
57	Suspension	520	Bad	Repair	Bad	Repair	Bad	Repair
58	Hand Brake		Good	Repair	Good	Repair	Good	Repair
59	Vacuum Aparatus		Good	Verify	Good	Verify	Good	Repair
60	Vacuum Gauge	531	Aver	Repair	Aver	Repair	Aver	Repair
61	Pull Rods Brake	527	Aver	Repair	Aver	Repair	Aver	Repair
62	Brake Beams	522	Aver	Repair	Aver	Repair	Aver	Repair
63	Brake Beam Hanger	535	Bad	Replace	Aver	Repair	Bad	Replace
64	Brake Blocks	542/537	Good	Repair	Aver	Adjust	Good	Adjust
65	Reversing crank Shaft		Aver	Repair	Aver	Repair	Good	Repair
66	Vacuum Cylinder	540	Aver	Repair	Aver	Repair	Aver	Repair
67	Steam Cylinder		Aver	Repair	Aver	Repair	Aver	Repair
68	Stoker Motor		Bad	Replace	Bad	Replace	--	Replace
69	Top Worm		Bad	Replace	Bad	Replace	--	Replace
70	Centre Worm		Bad	Replace	Bad	Replace	--	Replace
71	Lower Worm		Aver	Repair	Aver	Repair	--	Repair
72	Injectors	698	Aver	Repair	Aver	Repair	--	Repair
73	Feeding Valve Retent.	661	Aver	Repair	Aver	Repair	Aver	Repair
74	Steam Manifold		Good	Verify	Good	Verify	Good	Verify
75	Stoker Pressure Gauge	715	Bad	Repair	Good	Repair	Good	Repair
76	Spherical Joint	718	Good	Repair	Good	Repair	Good	Repair
77	Expansion Joint	709	Aver	Repair	Bad	Repair	Aver	Repair
78	Steam Conn. Tube	710	Merge	Repair	Bad	Repair	Good	Repair
79	Exhaust Conn. Tube	750	Good	Repair	Good	Repair	Good	Repair
80	Water Conn. Tube		Aver	Verify	Aver	Verify	Good	--
81	Boiler Casing		Aver	Verify	Aver	Verify	Aver	--
82	Lateral Plates Fire Bx		Good	--	Good	--	Aver	--
83	Throat Plate Fire Box		Good	--	Bad	Repair	Good	--
84	Ceiling Fire Box		Good	--	Aver	--	Good	--
85	Tubular Plate Fire Box		Good	--	Aver	--	Aver	--
86	Fire Door Plate	45	Good	--	Good	--	Good	--

ATTACHMENT J-1

STEAM LOCOMOTIVE

ITEM NO.	DESCRIPTION	DES. NO.	952 COND	952 OBS	953 COND	953 OBS	957 COND	957 OBS
87	Smoke Tubes		Good	--	Good	--	Good	--
88	Element Tubes	22	Aver	Verify	Aver	--	Aver	--
89	Lateral Support	23	Aver	Verify	Aver	--	Aver	--
90	Radial Supports	24	Good	--	Bad	Replace	Good	--
91	Ceiling Supports	28	Good	--	Good	--	Good	--
92	Palm Stay	40	Good	--	Good	--	Good	--
93	Wash out Plug		Good	--	Bad	Clean	Bad	Clean
94	Laminated Cylinder Body Water.	179	Bad	Replace	Good	--	Bad	Replace
95	Dome		Good	--	Good	--	Good	--
96	Smoke Box	38/39	Aver	Verify	Aver	Repair	Aver	--
97	Visiting Door		Good	--	Aver	Repair	Good	--
98	Internal Steam Pipe		Aver	Repair	Aver	Repair	Aver	Repair
99	Safety Valves		Good	Verify	Good	Verify	Good	Verify
100	Pressure Gauge	681	Bad	Repair	Bad	Repair	Bad	Repair
101	Glass Level		Bad	Repair	Bad	Repair	Bad	Repair
102	Bleeding Valve	90	Aver	Repair	Aver	Repair	Aver	Repair
103	Rocking Grated Steam Cylinder		Bad	Repair	Aver	Repair	Bad	Repair
104	Regular Valve	102	Good	--	Aver	Repair	Good	--
105	Header	104	Aver	Repair	Aver	Repair	Good	Repair
106	Header & Vacuum Valve		Good	--	Aver	Repair	Aver	Repair
107	Conductor Pipes	142	Bad	Repair	Bad	Repair	Good	--
108	Exhaust	143	Good	Verify	Good	Repair	Good	--
109	Exhaust Column		Good	Verify	Bad	Repair	Good	--
110	Exhaust Bend	728	Good	Verify	Good	Repair	Good	--
111	Junction Lower Steam Blower	106	Aver	Repair	Bad	Repair	Aver	Repair
112	Super heater Steam Tube	117	Good	Verify	Good	Repair	Bad	Repair
113	Ash Injectors		Bad	Replace	Bad	Replace	Bad	Replace
114	Spark Arrestor	141	Aver	Repair	Good	--	Aver	Replace
115	Kilala	124	Aver	--	Good	--	Aver	Replace
116	Chimney Stack	560	Bad	Repair	Bad	Repair	Aver	Repair
117	Water Tender	570	Aver	Repair	Aver	Repair	Aver	Repair
118	Coal Tender		Bad	Repair	Good	Repair	Aver	Repair
119	Worm Cutter		Good	Repair	Bad	Repair	Aver	Repair
120	Telescope Hose	756	Bad	Replace	Bad	Replace	Bad	Replace
121	Intercomun Hose	274	Bad	Repair	Aver	Repair	Aver	Repair
122	Pivots	277	Bad	Repair	Aver	Repair	Aver	Repair
123	Pivot Pins	800	Bad	Repair	Bad	Repair	Bad	Repair
124	Drain Plugs	849	Aver	Repair	Aver	Repair	Aver	Repair
125	Stoker		Good	Repair	Good	Repair	Aver	Repair
126	Lubricat. Pump	262	Bad	Repair	Good	Repair	Bad	Repair
127	Couplers	315	Bad	Repair	Bad	Repair	Bad	Repair
128	Cowcatcher		Bad	Repair	Bad	Repair	Bad	Repair
129	Lamps		Bad	Repair	Bad	Repair	Bad	Repair

ATTACHMENT J-1

STEAM LOCOMOTIVE

ITEM NO.	DESCRIPTION	DES. NO.	952 COND	952 OBS	953 COND	953 OBS	957 COND	957 OBS
130	Generator	753	Aver	Repair	Aver	Repair	Aver	Repair
131	Tender Water Valve	175	Aver	Repair	Bad	Repair	Aver	Repair
132	Ashpan		--	--	--	--	--	--
133	Speedometer	811	Bad	Repair	Bad	Repair	Bad	Repair
134	Sanders	690	Aver	Repair	Bad	Repair	Aver	Repair
135	Quick Action Val. Inj.	726	Aver	Repair	Aver	Repair	Aver	Repair
136	Round Exhaust Gasket	764	Bad	Repair	Good	--	Good	Verify
137	Central Chassis	781	Aver	Repair	Bad	Repair	Bad	Repair
138	Lubrication Cups		Aver	Repair	Aver	Verify	Aver	Verify
139	Roller Bearing Boxes Coupled Wheel		Aver	Repair	Aver	Verify	Aver	Verify
140	Roller Bearing Boxes Bissels		Aver	Repair	Aver	Verify	Aver	Verify
141	Roller Bearing Boxes Bogies		Bad	Replace	Bad	Replace	Bad	Replace
142	Piston Rings		Bad	Replace	Bad	Replace	Bad	Replace
143	Piston Valve Rings		Bad	Repair	Aver	Repair	Aver	Replace
144	Axle BoxLiner Bronze Coupled Wheels		Bad	Repair	—	--	Aver	Replace
145	Axle Box Liner Bronze Bissels		Aver	Repair	Aver	Repair	Aver	Repair
146	Axle Box Liner Bronze Bogies		Good	—	Good	—	Good	--
147	Bogie Chassis	699	—	—	--	--	--	--
148	Flexible Stays	722	Bad	Replace	Bad	Repair	Bad	Replace
149	Joint Rings	727	Good	Repair	Bad	Repair	Bad	Repair
150	Exhaust Elbow	774	Bad	Repair	Aver	Repair	--	--
151	Boiler Balancing Mounting		Good	Rectify	Good	Rectify	Good	Rectify
152	Tyres for Bissels		Good	Rectify	Good	Rectify	Good	Rectify
153	Tyres for Bogies Wheels	462	Aver	Repair	Aver	Repair	Aver	Repair
154	Bogies Pivot Upper		Bad	Repair	Bad	Repair	Bad	Replace
155	Blower		—	—	--	—	--	--
156	Spring Holder		Bad	Replace	Bad	Replace	Bad	Replace
157	Motion Pins		Bad	Replace	Aver	Replace	Bad	Replace
158	Brake Gear Pins		Bad	Replace	Aver	Replace	Bad	Replace
159	Suspension Pins		Bad	Replace	Bad	Replace	Bad	Replace
160	Motion Pin Bushes		Bad	Replace	Aver	Replace	Bad	Replace
161	Brake Pin Bushes		Bad	Replace	Aver	Replace	Bad	Replace
162	Suspension Pin Bushes		Aver	Adjust	Aver	Adjust	Aver	Adjust
163	Reversing Shaft Bearings		Good	Adjust	Aver	Adjust	Aver	Adjust
164	Brake Shaft Bearings		Good	Repair	Good	Repair	Aver	Repair
165	Mechanical Lub. Ratchet		Aver	Repair	Aver	Repair	Aver	Repair
166	Oil Lubrication		Bad	Repair	Bad	Repair	Bad	Repair
167	Electric Instal.		Bad	Repair	Bad	Repair	Aver	Repair
168	Tap & Various Valves		Good	Rectify	Good	Rectify	Good	Rectify
169	Coupling Rod Pins		Good	Rectify	Good	Rectify	Good	Rectify

Note: Locos 950/962 were manufactured in Belgium in 1952; locos 970/975 were manufactured in Germany in 1955; loco 91 was manufactured in the U.S.A. in 1941.

EXHIBIT 3

PENALIZAÇÕES POR AVARIAS DAS LOCOS A VAPOR

(PENALTIES FOR LOCOMOTIVE BREAK DOWNS)

RECD FROM MONTEIRO
FEB. 13, 1989
THIS INFORMATION WAS SENT TO USAID IN 1988.

Já tinha sido enviado avarias até 10.2.88

LOCO	960	725.265,00
LOCO	962	184.569,00
LOCO	953	37.678,90
LOCO	957	27.662,00

De 11.2.88 a 30.5.88

LOCO	957	1.030.242,70	34 dias paral.
LOCO	960		
LOCO	953		
LOCO	961		
LOCO	952		

LOCO 91 — 527.070,00 MT — 17 DAYS

LOCO	971	446.053,00	7 dias
LOCO	972	446.053,00	7 dias

TOTAL — 3.424.592,70

O Chefe de Serviço

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EXHIBIT 4

LOCOMOTIVE	PROVISIONAL ACCEPTANCE	WARRANTY EXPIRATION
960	15/OCT/87	15/OCT/88
962	20/NOV/87	20/OCT/88
957	14/JAN/88	14/JAN/89
953	16/APR/88	16/APR/89
952	21/APR/88	21/APR/89
961	29/JUN/88	21/JUN/89
91	09/JUL/88	09/JUL/89
971	31/JUL/88	31/JUL/89
972	05/AUG/88	05/AUG/89
DE-33	15/FEB/88	15/FEB/89
DE-26	06/JUN/88	06/JUN/89

EXHIBIT 5

EXTENDED PERIOD OF LOCOMOTIVE REPAIR

1988

LOCOMOTIVE	SITUACAO	LOCATION	ZECO DELIVERY
91	REPAIR APR/MAY/JUN/JUL/AUG	BEIRA	APR 1988
952	REPAIR MAR/APR/MAY/DEC	GONDOLA	JAN 1988
953	REPAIR OCT/NOV/DEC	GONDOLA	JAN 1988
957	REPAIR MAR/APR/MAY/DEC	GONDOLA	OCT 1987
960	REPAIR MAR/APR/MAY/SEP/OCT/NOV/DEC	GONDOLA	JUL 1987
961	REPAIR MAR/APR/MAY/JUN/OCT/NOV/DEC	GONDOLA	MAR 1988
962	REPAIR FEB	GONDOLA	AUG 1987
971	REPAIR MAR/APR/JUN/DEC	GONDOLA	APR 1988
972	REPAIR MAR/APR/JUN/AUG/OCT/NOV/DEC	GONDOLA	MAY 1988
DE-33	- - -	BEIRA	JAN 1988
DE-26	ACCIDENT SEPT 20, 1988	BEIRA	MAY 1988

EXHIBIT 6 (1)

MUTARE GONDOLA SECTION

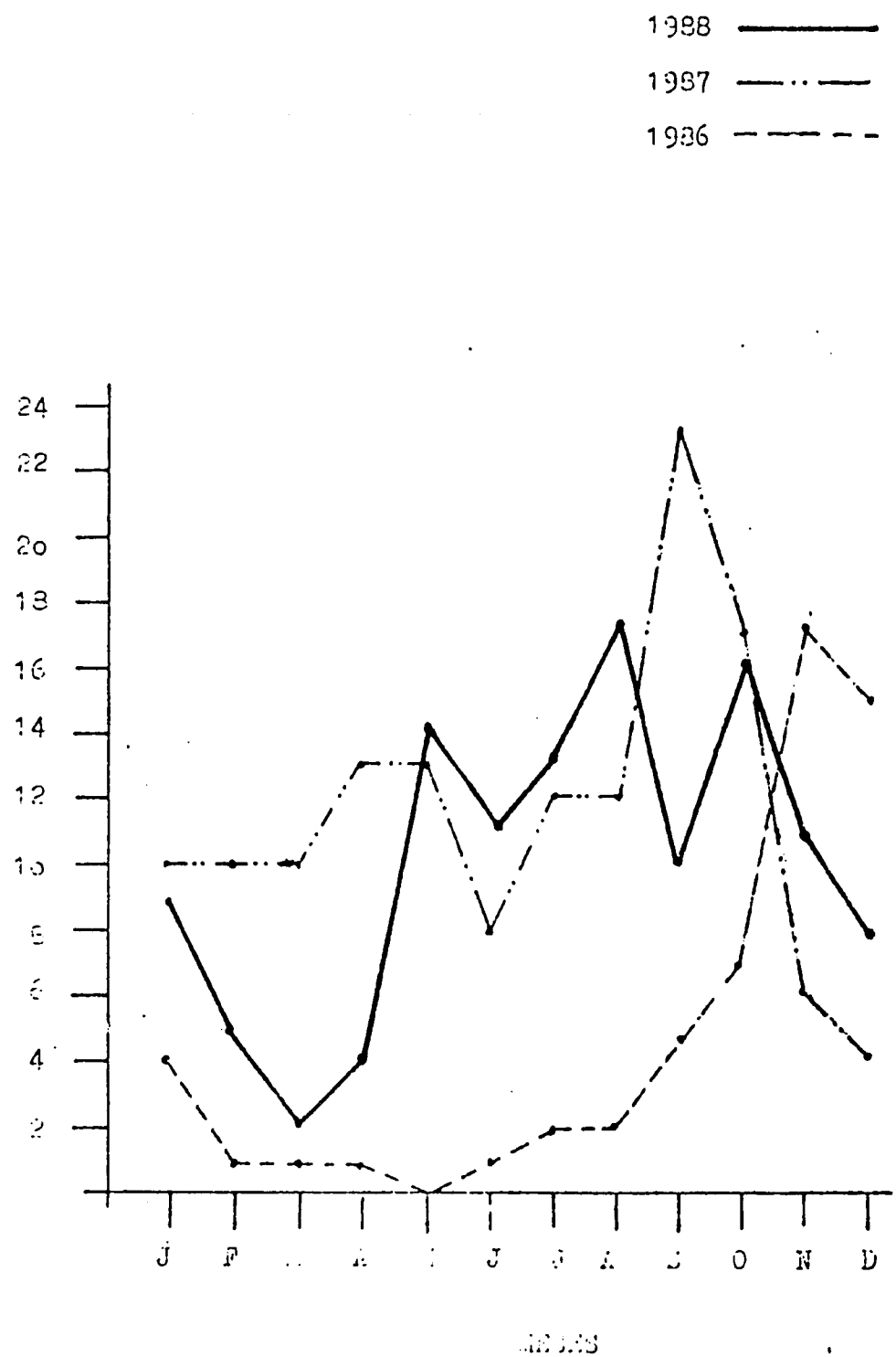
ACCIDENTS AND IRREGULARITIES

DATE	COLLISIONS	DERAILMENTS	SABOTAGE
3.3.83		TN 282 Gondola	
7.6.83		6 Wagons Machipanda	
30.5.83		501 Machipanda	
23.8.83			Track Blown 282 Km. Pe
1984 -85	No immeciate recorus		
27.9.86		5 Wagons Manica	
5.11.86		Train 2260 Gondola	
25.11.86	TN 2261 / Trolley		
4.12.86		Train 501 Machipanda	
26.12.86			Track Brown 246 km Peg
27.12.86			Track Brown 226 Km Peg
13.02.87		11 Wagons-Gondola	
8.03.87		TN 504 - Belas	
9.4.87		Ballast-241 km Peg.	
25.4.87			line blown - Bandula S
18.5.87		Garuso S.G.	
20.7.87			Line brown Bandula
25.10.87		TN 281 - Vumba	
2.1.88		TN 501 - Vumba.	
8.1.88			Line Brown Bandula
20.1.88		TN 502 - Chimoi	
25.3.88			Line Blown 376 km Peg.
8.4.88		TN 502 - Vumba	
16.5.88			TN 501 Ambushed
5.6.88			TN 260 Ambushed 110 km
21.7.88	TN 58 / Tamping Machine		
20.9.88	Trains 260/273		
18.1.89		Train 501 Vumba	

GRAF. - 0 ANO

ACCIONS INIMIGAS NA LINHA MACHIPANDA

(ENEMY ACTIVITIES ON MACHIPANDA LINE)



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CFM-CENTRO

DERAILMENTS

ACCIDENTS

LISTA DE INTERRUPÇÕES

ANO .....

	BA – DN 0,00 – 28,2						DN – NTA 28,2 – 97,6						NTA – GN 97,6 – 178,8						GN – MP 178,8 – 315,3						TOTAL					
	DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS	
	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas	Nº	Horas
JAN	1	0,9	–	–	–	–	–	–	–	–	–	–	–	–	7	31,1	–	–	5	22,2	2	8,7	–	–	6	23,1	9	39,2	–	–
FEV	–	–	–	–	–	–	1	4,6	–	–	–	–	–	–	4	23,1	–	–	–	–	1	–	–	–	1	4,6	5	23,1	–	–
MAR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	7,9	–	–	2	14,1	–	–	–	–	2	14,1	2	7,9	–	–
1º TRIM.	1	0,9	–	–	–	–	1	4,6	–	–	–	–	–	–	13	62,1	–	–	7	36,3	3	8,7	–	–	9	41,8	16	70,8	–	–
ABR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	10,1	–	–	1	24,7	2	16,7	–	–	1	24,7	4	26,8	–	–
MAI	1	9,2	3	14,4	–	–	1	4,7	1	–	–	–	1	1,2	7	47,0	–	–	2	6,6	3	7,5	–	–	5	21,7	14	68,9	–	–
JUN	1	8,3	1	4,2	–	–	1	3,2	–	–	–	–	–	–	9	47,7	–	–	–	–	1	6,7	–	–	2	11,8	11	58,6	–	–
1º SEM.	3	18,1	4	18,6	–	–	3	13,1	1	–	–	–	1	1,2	31	166,9	–	–	10	67,6	9	39,6	–	–	17	100,0	45	225,1	–	–
JUL	1	6,7	1	2,7	–	–	–	–	–	–	–	–	–	–	9	47,9	–	–	–	–	3	18,3	–	–	1	6,7	13	68,9	–	–
AGO	–	–	2	3,0	–	–	–	–	–	–	–	–	1	4,3	4	21,0	–	–	1	8,3	11	54,7	–	–	2	12,6	17	78,7	–	
SET		–	–	–	–	–	–	–	–	–	–	–	–	–	4	16,7	–	–	–	–	6	35,2	–	–	–	–	10	41,9	CHO 2	CUE 55,4
3º TRIM.	4	24,8	7	24,3	–	–	3	13,1	1	–	–	–	2	5,5	48	252,5	–	–	11	75,9	29	137,2	–	–	20	119,3	85	414,6	4	55,4
OUT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8	29,6	–	–	–	–	8	35,5	–	–	–	–	16	65,1	–	–
NOV	–	–	1	3,7	–	–	–	–	–	–	–	–	–	–	5	29,1	–	–	1	15,9	5	22,2	–	–	1	15,9	11	55,0	–	–
DEZ	–	–	–	–	–	–	–	–	1	5,0	–	–	–	–	1	4,2	–	–	–	–	6	35,3	–	–	–	–	8	44,5	–	–
2º SEM.	1	6,7	4	9,7	–	–	–	–	1	5,0	–	–	1	4,3	29	148,4	–	–	2	24,2	39	191,2	–	–	4	35,2	74	354,0	–	–
TOTAL	4	24,8	8	28	–	–	3	13,1	2	5,0	–	–	2	5,5	62	315,4	–	–	12	91,8	48	230,8	–	–	21	135,2	120	579,2	4	55,4

EXHIBIT 6(3)

CFM-CENTRO

LISTA DE INTERRUPÇÕES

ANO .....

	BA — DN 0,00 = 2,82						DN — NTA 2,82 - 97,6						NTA — GN 97,6 - 178,8						GN — MP 178,8 - 315,3						TOTAL					
	DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS		DESC		ACÇ		ORDENS	
	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas	Nºs	Horas
JAN	3	1,5	3	11,7	—	—	1	—	—	—	—	—	1	—	1	5,6	—	—	1	—	6	30,7	—	—	6	1,5	10	48	—	—
FEV	—	—	2	6,7	—	—	2	—	2	22,5	—	—	3	—	4	24,5	—	—	1	18,5	2	23,3	—	—	6	18,5	10	77	—	—
MAR	1	4,5	4	16,5	—	—	—	—	2	12,7	—	—	1	2,8	2	9,2	—	—	1	11,3	2	18	—	—	3	18,6	10	54,4	—	—
1ºTRIM.	4	6,0	9	34,9	—	—	3	—	4	35,2	—	—	5	2,8	7	39,3	—	—	3	29,8	10	67	—	—	15	38,6	30	176,4	—	—
ABR	—	—	2	4,9	—	—	2	10,1	—	—	—	—	—	—	8	20	—	—	2	16,6	3	15,3	—	—	4	26,7	13	40,2	—	—
MAI	—	—	2	11,8	—	—	—	—	3	20,4	—	—	1	5,2	8	40,9	—	—	—	—	—	—	—	—	1	5,2	13	73,1	—	—
JUN	1	0,5	—	—	—	—	1	5,3	4	17,7	—	—	1	6,5	4	18,3	—	—	2	22,4	—	—	—	—	5	34,7	9	56	—	—
1ºSEM.	5	6,5	13	51,6	—	—	6	15,4	11	72,7	—	—	7	14,5	27	118,5	—	—	7	68,3	13	82,3	—	—	18	106,2	54	325,7	—	—
JUL	—	—	2	8,2	—	—	—	—	2	10,3	—	—	1	1,5	6	34	—	—	1	—	2	20,7	—	—	2	1,5	12	73,2	—	—
AGO	1	11,5	1	4,5	—	—	2	20,9	1	82,3	—	—	1	—	6	47,8	—	—	—	—	4	24,7	—	—	4	32,4	12	159,3	—	—
SET	1	11,2	4	17,8	—	—	2	—	1	46,5	—	—	1	9,0	13	49,2	—	—	4	18,7	5	17,2	—	—	8	38,9	23	130,7	—	—
3ºTRIM.	7	29,2	20	82,1		—	10	36,3	15	211,8		—	10	25,0	52	249,5	—	—	12	87,5	24	144,9		—	35	178,0	111	688,9	—	—
OUT	1	4,0	—	—	—	—	2	4,3	3	21,2	—	—	—	—	12	50,1	—	—	1	23,5	2	11,9	—	—	4	31,8	17	83,2	—	—
NOV	1	49,3	1	4,0	—	—	—	—	—	—	—	—	—	—	2	9,5	—	—	5	71,3	3	14,0	—	—	6	120,6	6	27,5	—	—
DEZ	—	—	—	—	—	—	2	7,3	3	16,5	—	—	1	9,8	1	7,8	—	—	2	16,2	—	—	—	—	5	33,3	4	24,3	—	—
2ºSEM.	2	53,3	1	4,0	—	—	4	11,6	6	37,7	—	—	1	9,8	15	67,4	—	—	8	111	5	25,9	—	—	15	185,7	27	135	—	—
TOTAL	9	82,5	21	86,1	—	—	14	47,9	21	249,5	—	—	11	34,8	67	316,9	—	—	20	197,5	29	170,2	—	—	54	[illegible]	139	1035	—	—

+ ACHC

+ ACHC

Guinda 28,8

EXHIBIT 6 (5)

CFM. - CENTRO

DESCARRILAMENTO DE 1986

2. SEMESTRE

DIA DE DESC

LOCAL DE DESC

DERAILMENTS

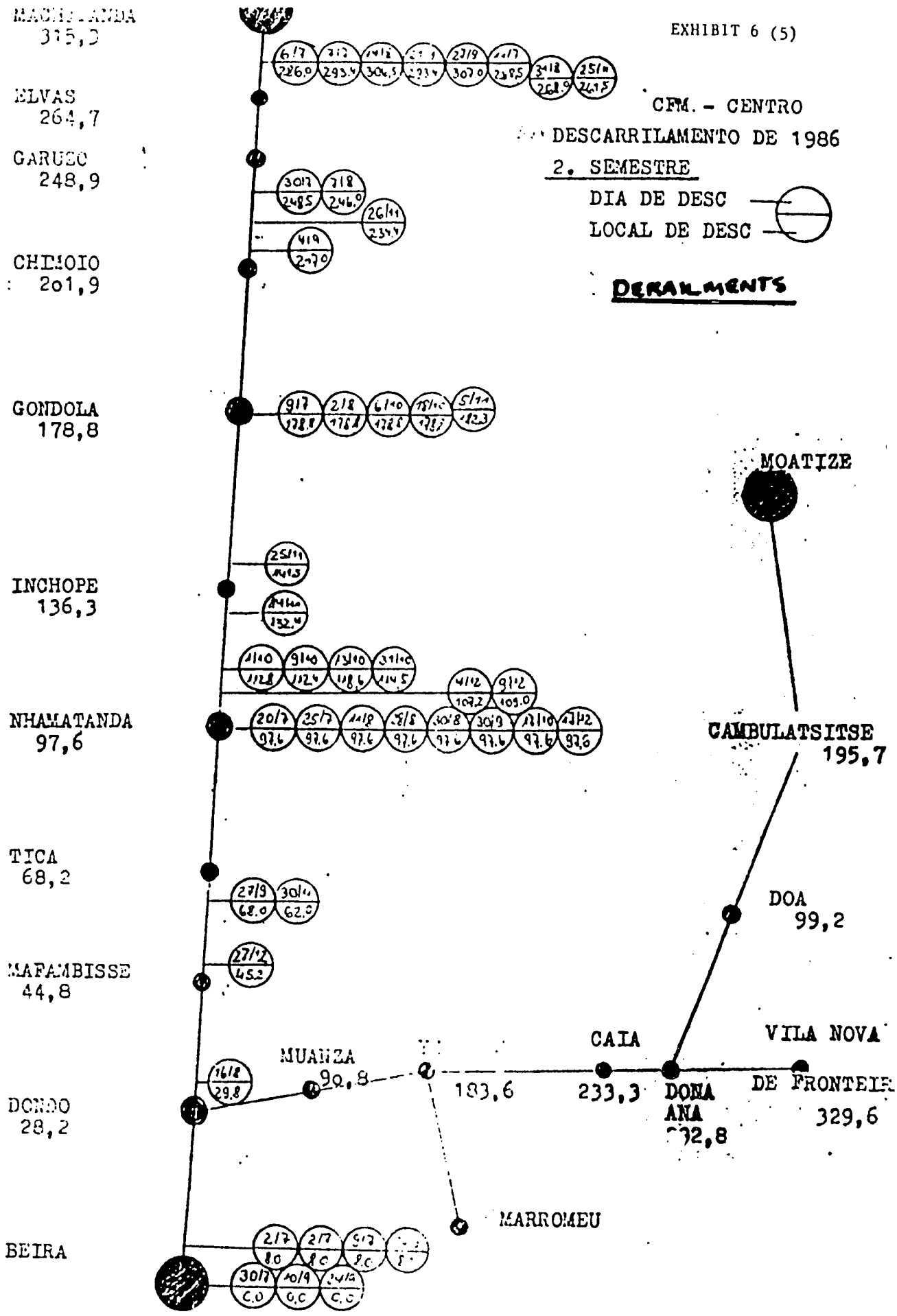
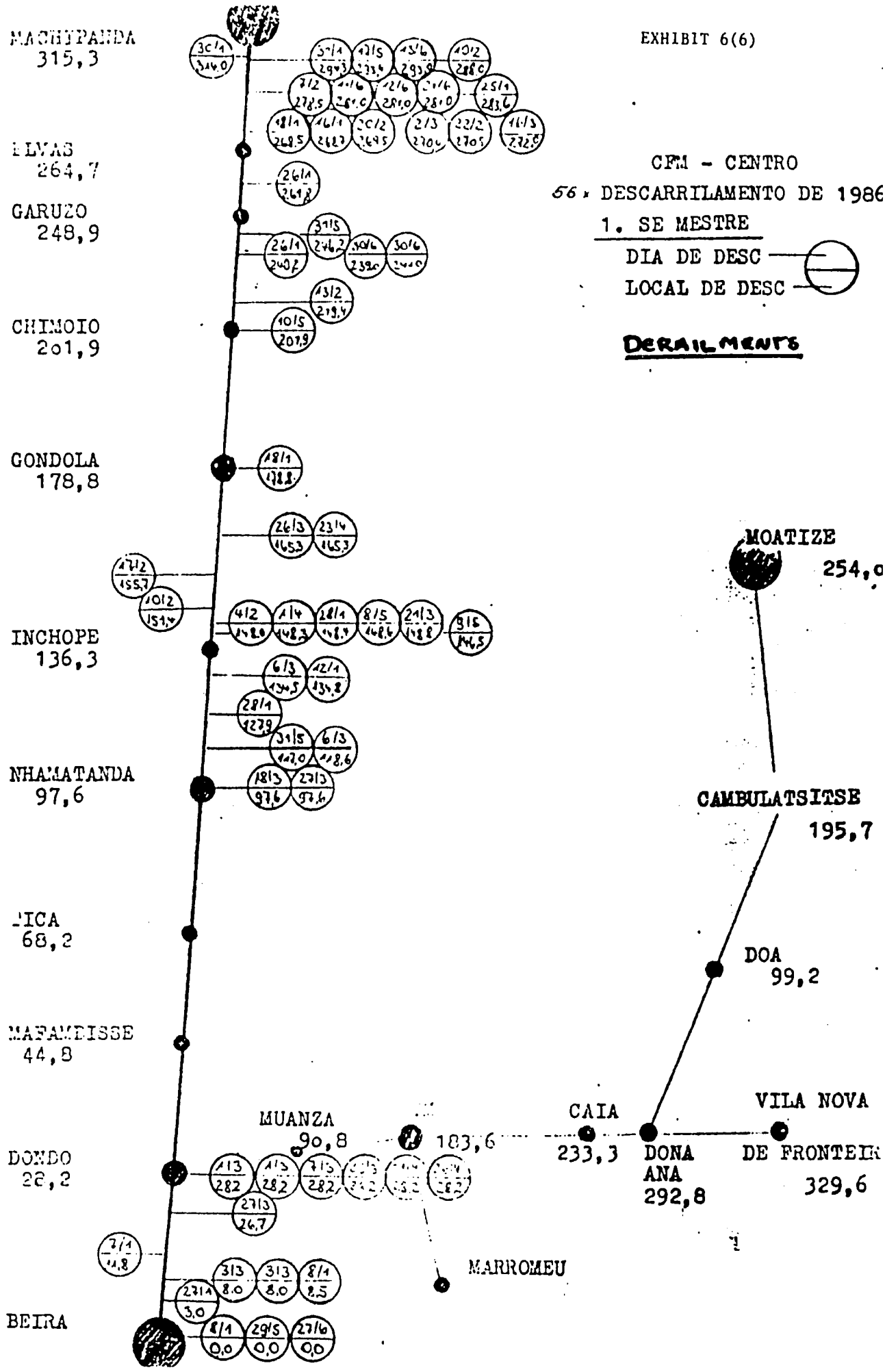


EXHIBIT 6(6)


CFM - CENTRO
56 x DESCARRILAMENTO DE 1986
1. SE MESTRE
DIA DE DESC
LOCAL DE DESC
DERAILMENTS
MACHIPANDA 315,3
ELVAS 264,7
GARUZO 248,9
CHIMOIO 201,9
GONDOLA 178,8
INCHOPE 136,3
NHAMATANDA 97,6
DONDO 28,2
BEIRA
MOATIZE 254,0
CAMBULATSITSE 195,7
DOA 99,2
CAIA 233,3
DONA ANA 292,8
VILA NOVA DE FRONTEIR 329,6
MUANZA 90,8
183,6
MARROMEU

CFM - CENTRO

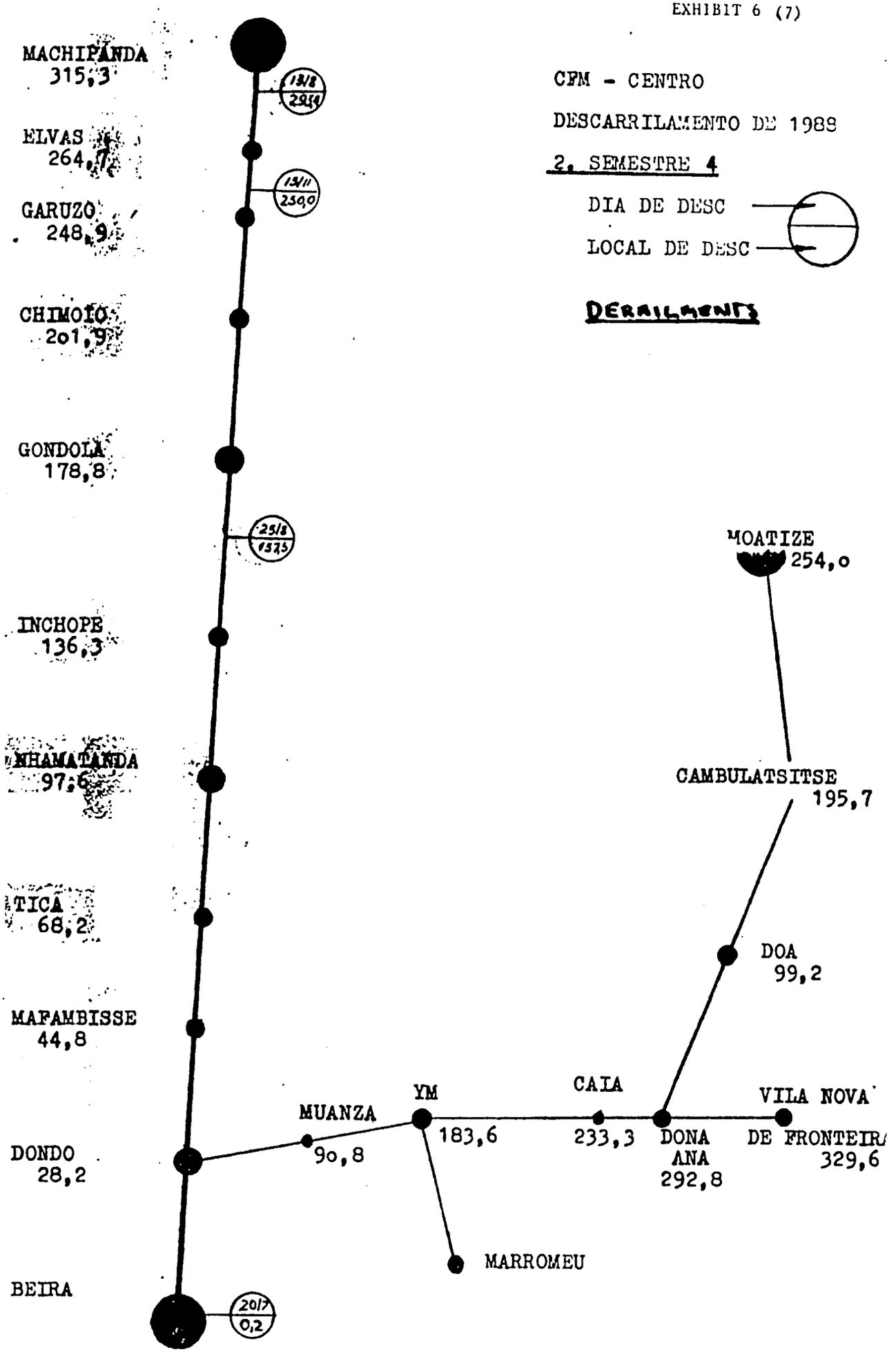
DESCARRILAMENTO DE 1988

2. SEMESTRE 4

DIA DE DESC

LOCAL DE DESC

DERAILMENTS



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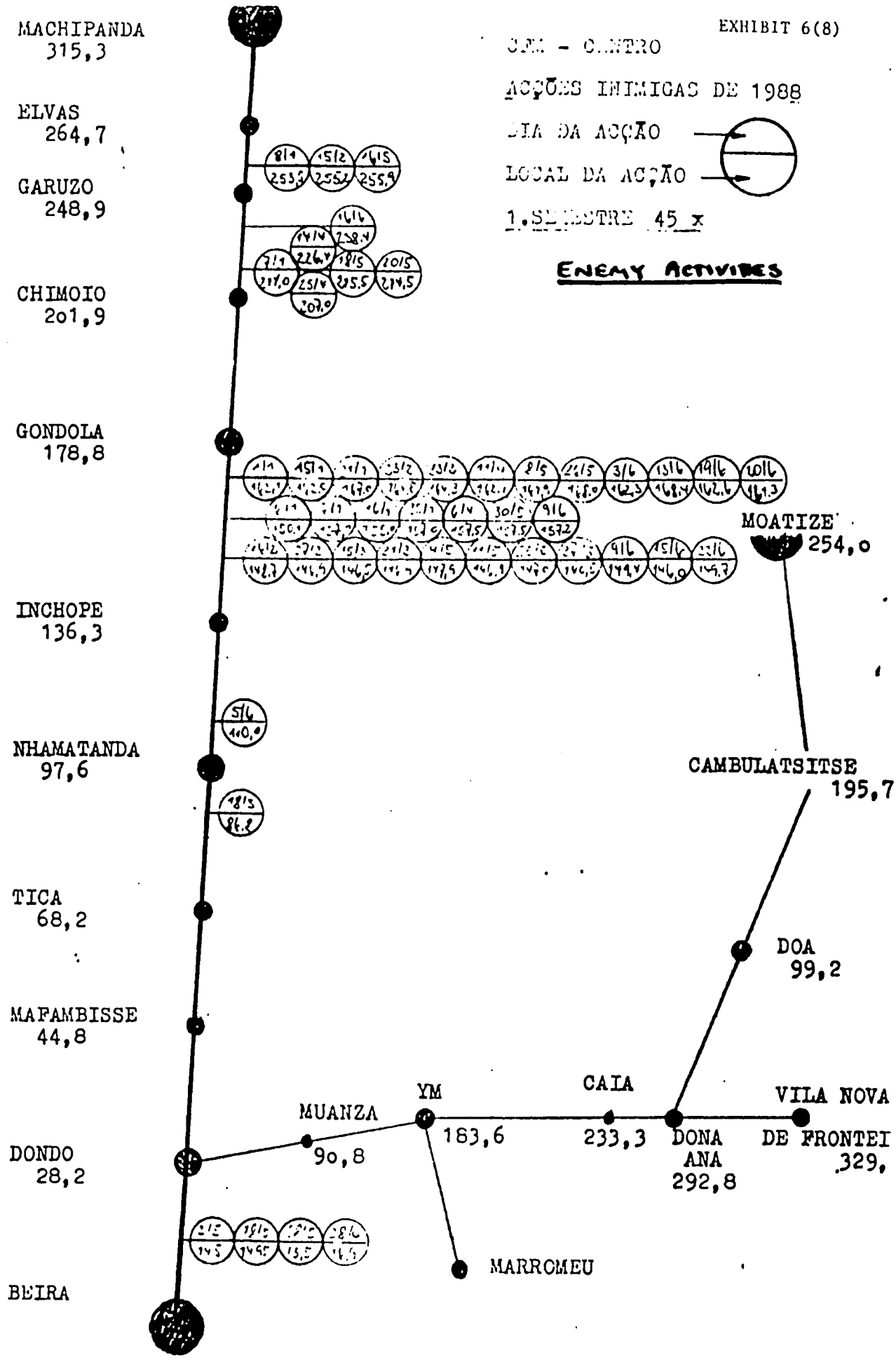
CNM - CENTRO
ACÇÕES INIMIGAS DE 1988
DIA DA ACÇÃO
LOCAL DA ACÇÃO
1.SEMESTRE 45 x
ENEMY ACTIVITIES
MACHIPANDA 315,3
ELVAS 264,7
GARUZO 248,9
CHIMOIO 2o1,9
GONDOLA 178,8
INCHOPE 136,3
NHAMATANDA 97,6
TICA 68,2
MAFAMBISSE 44,8
DONDO 28,2
BEIRA
MOATIZE 254,o
CAMBULATSITSE 195,7
DOA 99,2
MUANZA 9o,8
YM 183,6
CAIA 233,3
DONA ANA 292,8
VILA NOVA DE FRONTEI 329,
MARROMEU

EXHIBIT 7

EXHIBIT 7(1)

SERVIÇO DE TRANSPORTES FERROVIARIOS

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO ...9/2/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		MANOBRAS - REVISÃO
32		X	REPARAÇÃO POSTO VAPOR
34	X		MANOBRAS
91		X	REPARAÇÃO POSTO VAPOR
92	X		MANOBRAS
95	X		MANOBRAS
96		X	REPARAÇÃO O. GERAIS
10	X		APAGADA S/SERVIÇO
68		X	AG EXPERIENCIA
69	X		APAGADA S/SERVIÇO
415		X	

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D. 26		X	ACIDENTADA 20/9/88
D. 33	X		2121-163 E REVISÃO
D. 89		X	REPARAÇÃO 5/2/89
D. 106	X		261/170
D. 118		X	ACÇÃO INIMIGA 13/3/88
D. 119		X	ACIDENTADA 20/9/88
D. 120	X		120/151/125
D. 121		X	ACÇÃO INIMIGA 6/11/88
DH. 202		X	NÃO FOI ENTREGUE
DH. 212		X	REPARAÇÃO 8/2/89
DH. 213	X		MANOBRAS - REVISÃO
DH. 218		X	REVISÃO

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	G R - O GERAIS
953		X	LAVAGEM E REPARAÇÃO
955	X		MAN NTA
957		X	AP. REP. BA BALANCEIRO
958		X	AG REP - RODADO
959		X	REP. ESCORAS
960		X	A REP RODADO
961		X	ACÇÃO INIMIGA 22-1-89
962	X		270/271
971	X		2272
972	X		270/271
973		X	BIELA MOTORA PARTIDA

VARIAS DA TRACÇÃO ONTEM:

COMBUSTIBEL									
BEIRA	CARVAO	Exist. ontem	...	Consumo	...	Chegado	...	Exist hoje	...
"	GASOLEO	"	"	"	"	"	"	"	"
NYAMATANDA	CARVAO	"	"	"	"	"	"	"	"
GONDOLA	CARVAO	"	"	"	"	"	"	"	"
"	GASOLEO	"	"	"	"	"	"	"	"
MACHIPANDA	CARVAO	"	"	.....	"	.....	"	.....	"
"	GASOLEO	"	"	.....	"	.....	"	.....	"

CFM

EXHIBIT 7(2)

SERVIÇO DE TRANSPORTES FERROVIARIOS

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO 8/II/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		MANOBRAS
82		X	LAVAGEM
84	X		MANOBRAS
91		X	R.G. POSTO VAPOR
92	X		MANOBRAS
95	X		MANOBRAS
96		X	G.R. O.G.
.10	X		AP. S/SERVIÇO
.68		X	AG. EXPERIÊNCIA
.69	X		AP. S. SERVIÇO
.15		X	AG. REP. O.G.

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D.26		X	ACIDENTADA - 20-9-88
D.33	X		261-170
D.89		X	REPARAÇÃO, 5-2-89
D.106	X		2121-151.
D.118		X	ACÇÃO INIMIGA - 13-8-88
D.119		X	ACIDENTADA - 20.9.88
D.120	X		120-REVISAO-125
D.121		X	ACÇÃO INIMIGA - 6-11-88
DH.202		X	NÃO FOI ENTREGUE S.T.F
DH.212		X	REVISÃO
DH.213	X		MANOBRAS
DH.218	X		S. SERVIÇO

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	G.R. - O.G.
953		X	LAVAGEM
955	X		270-271
957	X		272-273
958		X	AG. REP
959		X	REP.
960		X	REP.
961		X	AP. REP
962	X		NTA. C/SERVIÇO
971	X		270-271
972	X		251-253
973			AP. REP.

VARIAS DA TRACÇÃO ONTEM:

COMBUSTIBEL			Exist. ontem	Consumo	Chegado	Exist hoje
	BEIRA	CARVAO	145	11		134
	"	GASOLEO	39870			39870
	NYAMATANDA	CARVAO	72	16	174	230
	GONDOLA	CARVAO	363	41		322
	"	GASOLEO	43870	40		43830
	MACHIPANDA	CARVAO				
	"	GASOLEO				

GFM

EXHIBIT 7(3)

SERVIÇO DE TRANSPORTES FERROVIARIOS

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO 7/2/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		MANOBRAS-REVISÃO
32		X	REP. DA LAVAGEM
34	X		MANOBRAS
91		X	REP. K/C
92	X		MANOBRAS
95	X		MANOBRAS
96		X	G/K. C. GERAIS
10	X		APAGADA
68		X	AG. EXPERIENCIA
69	X		APAGADA
15		X	AG. REP. C. GERAIS

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D.26		X	ACIDENTADA 20/9/88
D.33		X	COLOCAR VIDROS
D.89		X	AV. ELÉT. ELÉC.
D.106	X		C. 270/170
D.118		X	ACÇÃO INIMIGA 13/8/88
D.119		X	ACIDENTADA 20-9-88
D.120	X		C. 261
D.121		X	ACÇÃO INIMIGA 6-11-88
DH.202		X	APROVEIT. DAS PEÇAS
DH.212	X		C. 2121 E MAN. REVIS.
DH.213		X	REVISÃO GERAL
DH.218	X		C. 120/151

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	G. REP. C. GERAIS
953	X		C. 272 A LOCO ENTRA 900H
955		X	AG. LAVAGEM
957		X	AG. EM REP. BALANCEIRO
958		X	AG. DE BIELAS INT. ANT.
959		X	ESCOVAS A PTRONIK
960		X	AG. REP. RODANDO C. M.
961		X	ACÇÃO INIMIGA 22/11/87
962	X		NTA MANOBRAS
971	X		C. 272 A LOCO ENTRA 900H
972	X		C. 251
973		X	BIELA MOTRIZ ANTIGA

VARIAS DA TRACÇÃO ONTEM: A Loco 100 C. 271 Rec. [illegible]
A Loco 157 C. 2271 Espera [illegible]
A Loco 971 C. 271 [illegible]

COMBUSTIBEL											
BEIRA	CARVAO	Exist. ontem	118	Consumo	12	Chegado	39	Exist hoje	157
"	GASOLEO	"	"	42284	"	2414	"	—	"	"	39870
NYAMATANDA	CARVAO	"	"	95600	"	23	"	—	"	"	72600
GONDOLA	CARVAO	"	"	275	"	39	"	177	"	"	363000
"	GASOLEO	"	"	43890	"	20	"	—	"	"	43870
MACHIPANDA	CARVAO	"	"	.....	"	.....	"	.....	"	"	.....
"	GASOLEO	"	"	.....	"	.....	"	.....	"	"	.....

CFM

EXHIBIT 7(4)

SERVIÇO DE TRANSPORTES FERROVIARIOS

ARQUIVAR

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO 6/2/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		Manobras
82		X	Rep da lavagem
84	X		Manobras
91		X	Rep. R.C. Posto vapor
92		X	AC. Rep. A Pneu Alimentação
95	X		Manobras
96		X	Rep. C.G.G.R.
210	X		APagada
268		X	AG. Experiencia
269	X		APagada
415		X	AG. Rep. C. Gerais

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D.26		X	Acidentada 20-9-88
D.33	X		Cº 120
D.89		X	AV. AC. 3V. Pelé Terra
D.106	X		Cº 261/260
D.118		X	Acção Inimiga 13/8/88
D.119		X	Acidentada 20/9/988
D.120	X		Cº 2121/151/150
D.121		X	Acção Inimiga 6/11/88
DH.202		X	Rep. Retirada as peças para outras
DH.212	X		Manobra
DH.213	X		Manobra
DH.218	X		Cº 163

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	G. Rep. C. Gerais
953	X		C: 270/271
955	X		C: 2271
957	X		C: 2271
958		X	AG. Rep: Bielas Int.
959			Acende
960		X	AG. Rep. Bodados
961		X	Acção Inimiga 22/1/8
962	X		NTA = Manobras
971	X		Cº 270/271
972	X		C: 251/252/272/273
973		X	Biela motora Partida

VARIAS DA TRACÇÃO ONTEM:

COMBUSTIBEL			Exist. ontem	Consumo	Chegado	Exist hoje
	BEIRA	CARVAO	1128	10	.....	118
	"	GASOLEO	11541	9444	38.187	42.284
	NYAMATANDA	CARVAO	.....	11	39.050	95.600
	GONDOLA	CARVAO	262	37	~~225.000~~	225.000
	"	GASOLEO	43[illegible]	.....	.....	43.840
	MACHIPANDA	CARVAO	.....	.....	.....	.....
	"	GASOLEO	.....	.....	.....	.....

CFM

EXHIBIT 7(S)

SERVIÇO DE TRANSPORTES FERROVIARIOS

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO 5/2/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇÕES
54	X		S/SERVIÇO
82	X		MANOBRAS
84	X		MANOBRAS
91		X	REP R/C
92		X	AC REP APARELHOS ALIMENT.
95	X		MANOBRAS
96		X	G R
210	X		AP F/DAGUA
268		X	AG EXP.
269	X		AP F/DAGUA
415		X	AG REP. O G.

LOCO	OPE	NÃO OPE	OBSERVAÇÕES
D.26		X	ACIDENTADA 20-9-88
D.33	X		Cº 151/150
D.89		X	REP DESDE 4/2/84
D.106	X		Cº 270/2160
D.118		X	ACÇÃO INIMIGA 13-8-88
D.119		X	ACIDENTADA 20-9-88
D.120	X		Cº 261/170
D.121		X	ACÇÃO INIMIGA 6-11-88
DH.202		X	REP.
DH.212	X		S/SERVIÇO
DH.213	X		S/SERVIÇO
DH.218	X		S/SERVIÇO

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇÕES
952		X	GRANDE REP
953		X	AC REP SEM FIM
955	X		Cº 272/273
957	X		
958		X	AG REPARAÇÃO RODAGE
959		X	REGULADOR PRESO
960		X	AG REP RODAGE
961		X	ACÇÃO INIMIGA 22/1/89
962	X		FALTA MANOBRAS
971		X	AC REP ANICHA DE CARROTA
972	X		Cº 251/253
973		X	SEM MOTOR PARADA

AVARIAS DA TRACÇÃO ONTEM:

COMBUSTIBEL	BEIRA	CARVAO	Exist. ontem	104.000	Consumo	11000	Chegado	35000	Exist hoje	128000
	"	GASOLEO	"	15541	"	4000	"	—	"	11541
	NYAMATANDA	CARVAO	"	87550	"	5000	"	—	"	82550
	GONDOLA	CARVAO	"	281100	"	19000	"	—	"	262100
	"	GASOLEO	"	43890	"	—	"	—	"	43890
	MACHIPANDA	CARVAO	"		"		"		"	
	"	GASOLEO	"		"		"		"	

CFM

EXHIBIT 7(6)

SERVIÇO DE TRANSPORTES FERROVIARIOS

SITUAÇÃO DAS LOCOMOTIVAS ÀS 5 HORAS DO 1 / 12 / 8

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		MANOBRAS
82	X		MANOBRAS
84	X		s/s a falta de água
91		X	R. C.
92		X	LAVAGEM
95	X		MANOBRAS
96		X	GRANDE-REPARAÇÃO
210	X		AP. FALTA DE ÁGUA
268		X	AG.-EXPERIENCIA
269	X		AP. FALTA DE ÁGUA
415		X	AG. REPARAÇÃO

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D. 26		X	ACIDENTADO-20-9-86
D. 33	X		C. 121-120-161-170
D. 89		X	EM REPARAÇÃO
D. 106	X		C. 261-260
D. 118		X	ACIDENTADO-13-8-88
D. 119		X	ACIDENTADO 20-9-86
D. 120	X		C. 120-163
D. 121		X	ACIDENTADO-6-XI-85
DH. 202		X	REPARAÇÃO
DH. 212	X		MANOBRAS
DH. 213	X		MANOBRAS
DH. 218	X		S/SERVIÇO

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	GRADE-REPARAÇÃO
953	X		C. 273
955	X		C/S
957		X	ACENDEU
958		X	AG. REPARAÇÃO
959		X	271-Ap. Motagem
960		X	AG. REPARAÇÃO
961		X	ACIDENTADA 22-1-8
962	X		NTA
971		X	ACENDEU
972		X	271-Ap. Motagem
973		X	BIELA MOTORA PT

AVARIAS DA TRACÇÃO ONTEM:

COMBUSTIBEL											
	BEIRA	CARVAO	Exist. ontem	104	Consumo	12	Chegado		Exist hoje	104
	"	GASOLEO	" "	15.541	"		"		" "	15.541 l
	NYAMATANDA	CARVAO	" "	87.000	"	5000 Kg	"		" "	87.000 Kg
	GONDOLA	CARVAO	" "	281 100 Kg	"	15.000	"		" "	281 100 Kg
	"	GASOLEO	" "	43 930 l	"	—	"		" "	43 930 l
	MACHIPANDA	CARVAO	" "	—	"	—	"		" "	—
	"	GASOLEO	" "	—	"	—	"		" "	—

GFM

EXHIBIT 7(7)

SERVIÇO DE TRANSPORTES FERROVIARIOS.

SITUAÇÃO DAS LOCOMOTIVAS AS 9 HORAS DO 3/2/89

BEIRA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
54	X		S/SERVIÇO
82	X		MANOBRAS
84	X		MANOBRAS
91		X	R. C.
92		X	LAVAGEM
95	X		MANOBRAS
96		X	GRANDE REPARAÇÃO
210	X		AP. FALTA DE ÁGUA
268		X	AG. EXPERIÊNCIA
269	X	X	AP. FALTA DE ÁGUA
415		X	AG. P. REPARAÇÃO

LOCO	OPE	NÃO OPE	OBSERVAÇOES
D. 26		X	ACIDENTADA - 20-9-88
D. 33	X		161-2162
D. 89	X		2160 - REPARAÇÃO
D. 106	X		261-260
D. 118		X	ACÇÃO INIMIGA - 13-8-88
D. 119		X	ACIDENTADA 20-9-88
D. 120	X		2122 - 151-150-125 120-4/11/89
D. 121		X	ACÇÃO INIMIGA - 6-XI-88
DH. 202		X	REPARAÇÃO - A)
DH. 212	X		MANOBRAS
DH. 213	X		FALTA DE ÓLIO
DH. 218	X		S/SERVIÇO

GONDOLA

LOCO	OPE	NÃO OPE	OBSERVAÇOES
952		X	GRANDE - REPARAÇÃO
953	X		3270 - 253
955	X		272 - 273
957		X	TAMPA DE CILINDRO PARTIDO
958		X	AG. REPARAÇÃO
959	X		270 - 271
960		X	AG. REPARAÇÃO
961		X	ACÇÃO INIMIGA - 22-1-89
962	X		NTA
971		X	LAVAGEM
972	X		270 - 271
973		X	BIELA MOTORA PARTIDA

AVARIAS DA TRACÇÃO ONTEM:

A/= NESTA LOCO ESTÁ SENDO RETIRADA AS PEÇAS OP. PARA AS OUTRAS -

COMBUSTIVEL			Exist. ontem	Consumo	Chegado	Exist hoje
	BEIRA	CARVAO	139	13	—	126
	"	GASOLEO	20060	4.519	—	15541
	NYAMATANDA	CARVAO	74	23	38	89
	-GONDOLA	CARVAO	327	31		296
	"	GASOLEO	.....	.....	43930	.....
	MACHIPANDA	CARVAO	—	—	—	.....
	"	GASOLEO	—	—	—	.....

The following report was translated from Portuguese to English by Mr. Correia who does translations for the Embassy of Portugal, Harare, Zimbabwe.

POPULAR REPUBLIC OF MOZAMBIQUE
MOZAMBIQUE RAILWAYS ADMINISTRATION - CENTRE
LOCOMOTIVES AND ROLLING STOCK-WORK SHOP HEADQUARTERS

FINAL REPORT ON INSPECTION AND REHABILITATION WORKS OF DIESEL-ELECTRIC LOCOMOTIVES D-26 AND D-33 AT ZECO LTD (ZIMBABWE ENGINEERING COMPANY LIMITED) IN BULAWAYO FROM APRIL 1987 TO JUNE 1988

The main objectives of rehabilitating the Railways of Mozambique CFM(C) locomotives; was to enlarge its operational fleet, to meet the demands of both national and foreign goods transportation, to and from neighbouring countries and those from SADCC, in accordance with Beira Corridor objectives. Eleven locomotives were rehabilitated, nine of which were steam powered.

To ensure good quality of work, CFM(C) , had decided to appoint two inspectors to supervise the electrical and mechanical works carried out.

In short, the inspection was carried out at the following stages:
1 - Throughout assembly
2 - Before the diesel engine was operated
3 - With the diesel engines in operation
4 - Before and after load tests (power tests)
5 - During line tests.

The rehabilitation works stared on loco D-33 and later, towards its conclusion, simultaneously with loco D-26.

The inspection works were very thorough and after the first couple of days, two negative points were found:
1 - ZECO technicians were not familiar with the G.E. type locos.
2 - ZECO technicians did not cooperate with the inspectors.

The second point was evident by the reaction against the inspection remarks. This attitude was aggravated when one of the mechanics from ZECO, dropped his tools and physically attacked the inspector. Similarly, the electric department foreman tried to obstruct the inspector's work in his department.

These incidents caused a serious debate calling for the cooperation of National Administration of Harbours and Railways (DNPCF) through its commercial office in Bulawayo and also from ZECO through its Head of Traction Department.

Facing this conflict, ZECO workshops headquarters authorized the inspection, but maybe to protect its technician, decided that they should be made in writing through the Head of Traction Department. However, the inspectors were determined to obtain the highest quality of work inspite of ZECO's apathy. After the inspection, the anomalies were pointed out, which once approved by ZECO had to be corrected.

The ZECO technicians reaction was, erroneously caused by the fact that they thought that the locos were sent to ZECO because CFM(C) had no qualified personnel (staff), capable of rehabilitating work and the inspectors were there for training purposes.

Being aware that the locos belonged to CFM(C) and not ZECO and that the poor quality of work was their own responsibility, the inspectors decided to participate in the actual works of rehabilitation. From then on the situation improved considerably, and it was clear that the inspectors were also good workers.

After various tests the locomotive was sent to NRZ for power tests, to evaluate the diesel engines power and the curve related to the traction generator. The first test of 1170 kw was not accepted by the inspectors, because, although the NRZ and ZECO staff considered it satisfactory, considering the power correction factors, it was found low. NRZ argued that the 1170 kw was the power used by its own locos of same type. This disagreement caused a hiatus period during this test. The inspectors informed ZECO headquarters why the power was not acceptable and made them responsible for its correction. After consulting the local representative of G.E., he agreed with the inspectors and the power was increased to 1400 kw.

After this, the loco was tested for 95km, most of the time uphill, having rolled 1250 tons on 140 axles. Several break-downs occurred during the test which had to be attended by all concerned. It was due to this cooperation and various repairs carried out that ZECO staff realized that the inspections were there to ascertain the good quality of work performed. It also put to an end the relationship between ZECO and the inspectors in writing.

Locomotive D-26

The final assembly works on this loco, occurred when the inspectors were in Mozambique delivering the loco D-33.

When the inspectors came back and the final works were taking place, the heads of ZECO workshops tried to avoid any inspection arguing that all works were carried out exactly like those on loco D-33 and possible inspections could be made during power tests. ZECO tried to justify this attitude saying that DNPCF would penalize them for not delivering the locos in time.

Perhaps as a reprisal, ZECO instructed that the food given to the inspectors should be rationed.

As a result the inspectors refused to participate in any tests, and to accept the loco whatever the results might be, arguing that ZECO wanted to get rid of it, that it was faulty, and the penalty for delivering time had nothing to do with their inspection. In the end ZECO agreed with the inspection. During the inspection various faults were detected, which ZECO tried to ignore, but due to the inspector's perseverance all were sorted out. After all corrections were carried out the loco was tested for power.

Various adjustments took place during this test until the right power was obtained of 1470 Kw. Then the loco was tested for traction having towed 1400 tons on 112 axles.

On the 17th of May 1988 the loco was delivered to the CFM(C) the electro-technician inspector's wife fell ill and one of the mechanical inspector's son went to hospital in October and December respectively. As a result of this, the inspectors went to Beira to assist their relatives. However they faced difficulties to meet travelling costs. Perhaps for contract reasons, ZECO wouldn't help with these costs. As far as CFM(C) was concerned, not much thought was given, and it was the commercial representative of CFM(C) who kindly gave instructions to allow them to travel by train. Facing this sad situation, the inspectors decided to get a car ride, and borrowed some money from ZECO. Since ZECO only felt responsible for travelling expenses from and to Mutare.

After delivering the loco D-33 to the executive administration of CFM(C), the inspectors had to go back to ZECO to proceed with the inspection of loco D-26. Again this journey was made by car. They had to stop at Machipanda in order to get another car ride to Mutare. This type of travelling , to a certain extent, gave the impression of personal convenience. However there is no question that the mission and stay of inspectors outside the country, was the sole responsibility of the DNPCF and CFM(C).

We suggest that future contracts of this nature be well known by both parties concerned to avoid possible inconvenience and humiliations. We believe that ZECO is a reliable company with a sound financial situation and good knowledge of mechanical works. However, as regards to locos diesel-electric G.E. they were not technically organized.

The following are the conclusions of works carried out on locos diesel-electric:
1 - ZECO had no staff with knowledge of diesel-electric locos (except for the Foreman of Electricity Department originally from NRZ.
2 - ZECO used the CFM(C) inspectors to perform works of rehabilitation on locos.
3 - ZECO had never executed a similar job.
4 - ZECO staff learned a lot from the inspectors.
5 - The relationship between ZECO Administration and the inspectors was generally good.

The inspectors praised the thought of DNPCF and the Executive Administration of CFM(C), to organize the supervision and inspection of rehabilitation works performed on those locos. The idea was twice advantageous for the CFM(C) Not only the good quality of works but also the performance of those locos, are to be credited to the inspectors who have worked as if they were ZECO staff and therefore accomplishing their mission with great success.

Signed

Electrotecnic Inspector	Mechanical Inspector
Elijah Donaldo Ndalama	Jose Verniz Jimo

EXHIBIT 9

PERSONS CONTACTED

ZIMBABWE ENGINEERING COMPANY (ZECO)

Gary Wynn	Company Secretary/Accountant
Allan Brown	Divisional Manager Steam Locomotive
Roy Woolf	Workshops Manager
Benjamin Costa	Shop Foreman
Archie Meth	Structural/Traction Manager

EX-ZIMBABWE ENGINEERING COMPANY REPRESENTATIVES

Barrie Mitchell	ZECO Director/Division Manager-Traction
Paul Roper	Estimator/Project Manager

Note: Mitchell left ZECO before locomotives left CFM(C)
Roper resigned from ZECO after eighteen months as Project Manager

NATIONAL RAILWAYS OF ZIMBABWE (NRZ)

Don Chapman	Chief Mechanical Officer
David Lynch	Chief Traffic Officer
Bob Shepard	Manager Maintenance Of Way (Trackwork)
Grace Lupepe	Public Relations Officer
M.R. Madhlela	Chief Planning Officer

MOZAMBIQUE PORTS AND RAILWAYS CFM

Fernando Mendes	National Director
Rudi Fonseca	Deputy Director Ports
Gabriel Mabunda	Director General CFM(C)
Oscar Dinis	Deputy Director CFM(C)
Jeanne Stephens	Commercial/Marketing Manager
N.C. Maquina	Harare Representative
Manual Monteigo	Steam Engineer
Artur Posse	Diesel Electric Engineer
Diogo Matsidhe	Technician Trackwork
Afonso Ramos	Permanent Way Inspector
Robert Dalamma	Supervisor Diesel Electric Shed

U.S.A.I.D. - MAPUTO, MOZAMBIQUE

Julius Schlotthauer	Director/USAID Mozambique
Arthur Thivierge	Project Development Officer
Luis Santos	Consultant/Project Manager
Judi Shane	Commodity Manager/Executive Officer

U.S.A.I.D. - HARARE, ZIMBABWE

Allison Herrick	Director
Fred Zobrist	Deputy Director
Denis Light	Regional Engineer
Ernest Rojas	Assistant Regional Engineer
Benjamin Mutiti	Transport Economist

EXHIBIT 10

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CFM(C) Files - Commodities receipt and open items 1986-1989
USAID/Harare Files - Mozambique Railways 1985-1989

TOTAL RAIL TONNAGES ON BEIRA LINE: 1984-1988
AND PROJECT PAPER DESIRED OUTPUT

REPORTED ACTUAL RAIL FREIGHT(TONS 000) 1/	1988	1987	1986	1985	1984
ZIM/MAL/ZAMBIA	393.5	377.0	286.1	240.9	171.8
MOZAMBIQUE	92.8	83.5	84.9	63.8	110.7
TOTAL	486.3	480.5	371.0	304.7	282.5

PROJECTED ABSOLUTE INCREASES (TONS 000): FROM 280,000 TONS/YEAR 2/

ZIMBABWE	100	50	0	0
MOZAMBIQUE	50	25	0	0
TOTAL INCREASE/YEAR	150	75	0	0
FORECASTED TOTAL	430	355	280	280

1) Beira Corridor Authority
2) Project Paper, page H-5 Economic Analysis

NUMBER OF TRAINS AND GROSS RAIL TONS HAULED ON INLAND SECTIONS
FREIGHT TRAINS ONLY: 1984-1988

YEAR/QTR	(1) NHAMATANDA-GONDOLA			(2) GONDOLA-MACHIPANDA		
	GR TONS	TRAINS	GRT PER TRAIN	GR TONS	TRAINS	GRT PER TRAIN
1988-4	236681	338	700	244294	237	1031
-3	281514	409	688	278937	269	1037
-2	234984	308	763	221764	225	847
-1	213176	255	836	205481	217	947
1987-4	265852	332	801	262307	288	911
-3	230311	330	698	277335	340	816
-2	307566	337	913	327369	620*	528(1056)
-1	202095	295	694	273085	563*	485(830)
1986-4	216759	283	740	311025	593*	524(1059)
-3	210974	322	655	287439	599*	480(860)
-2	178155	300	584	206267	595*	408(817)
-1	81088	163	497	98631	244	404
1985-4	135432	234	579	163192	374	436
-3	135522	245	553	157261	356	442
-2	198452	274	542	160169	357	449
-1	56082	141	398	113550	328	346
1984-4	108699	233	466	131956	372	355
-3	156616	287	546	163030	427	382
-2	91395	182	502	104617	283	370
-1	82074	190	485	102223	283	349

(1) Operated by CFM(C)
(2) Operated by NRZ

* Evident reporting of tandem locos as two trains; read as 50% shown. Figures in parens are adjusted to reflect G.R.T./Train at one-half the number of trains in this period.

SOURCE: CFM-(C) log book of rail activity.

CHANGE IN ANNUAL NUMBER OF TRAINS AND GROSS RAIL TONS
TWO INLAND SECTIONS (1984-1988)

	(1) NHAMATANDA-GONDOLA		(2) GONDOLA-MACHIPANDA	
ANNUAL	GR. TONS	TRAINS	GR. TONS	TRAINS
1988	966355	1310	950576	948
1987	1005823	1290	1140096	1811* (1219)
1986	686776	1078	903362	1941* (1092)
1985	475488	894	594172	1415
1984	448784	892	501826	1375

AVG. GR. TONS PER TRAIN AND INDEX OF CHANGE:

	GR. TONS	INDEX	GR. TONS	INDEX
1988	738	147	1003	274
1987	780	155	629(935)	172 *(256)
1986	637	127	465(827)	127 *(226)
1985	532	106	420	115
1984	503	100	365	100

AVG. GR. TONS PER DAY AND NUMBER TRAINS PER DAY:

	AVG.TONS	TRAINS	AVG.TONS	TRAINS
1988	2647	3.6	2604	2.6
1987	2755	3.5	3124	5.0 *(3.3)
1986	1882	3.0	2475	5.3 *(3.0)
1985	1303	2.4	1628	3.9
1984	1230	2.4	1375	3.8

* Adjustments for reporting error are shown in parens

NOTE: For (1) the increase in trains per day in 1988 over 1987 shows loss of efficient use of motive power (GRT/Day has declined). For (2) the reduction of trains per day in 1988 over 1986, 1985, and 1984, shows increased efficient use of motive power (GRT/Day has increased). However, this level of train movement per day does not reconcile with the 3.6 trains of the joining section.

BEIRA RAIL FREIGHT BY TYPE INTERNATIONAL TRANSIT (IMPORTS)
(BEIRA-MACHIPANDA LINE HAUL)

	1988	1987	1986	1985	1984
	(1) FROM PORT TO MACHIPANDA: NET TONS				
TOTAL	110000	95000	54600	61400	76100
CONTAINERS:					
GENL CARGO	13500	21600	7100	14300	9800
FERTILIZER	36700	19800	9700	6100	4300
TALLOW	5700	5000	8000	7500	5700
STEEL	12300	1100	1900	5600	1200
SODIUM	13500	8500	5500	0	0
POL	8500	9400	0	5200	0
PAPER	16900	0	0	7200	4300
PULP	2900	0	3700	6000	0
WHEAT	0	0	0	500	200
MAIZE	0	0	0	0	29200
RICE	0	13600	4600	0	0
OTHER	0	12100	11800	15000	21400

SOURCE: Beira Corridor Authority

BEIRA RAIL FREIGHT BY TYPE INTERNATIONAL TRANSIT (EXPORTS)
(MACHIPANDA-BEIRA LINE HAUL)

	1988	1987	1986	1985	1984
	(1) FROM MACHIPANDA TO PORT: NET TONS				
TOTAL	283500	302000	231500	179500	95700
CONTAINERS*	34700	32500	13900	16200	25400
COAL (CFM USE)	0	1300	2000	22900	22700
SUGAR	29500	66200	58700	63900	26400
MAIZE	28600	37900	69300	30200	0
COTTON	13700	14500	14400	8500	9900
WATTLE	5000	3500	4900	4200	4400
COPPER	78200	84200	20600	0	0
ASBESTOS	28600	27100	15500	0	0
STEEL	200	8800	6100	7300	0
WOOD	13700	0	0	0	0
GRAVEL	20800	0	0	0	0
TOBACCO	0	0	0	700	1200
OTHER	30500	26000	25100	25600	5700

*TEA, TOBACCO AND OTHER PRODUCTS, SOMETIMES IN UNIT TRAINS.

- DIFFERENCES IN REPORTING -
TWO ACCOUNTS OF BEIRA RAIL FREIGHT:
INTERNATIONAL TRANSIT VOLUMES FOR EXPORT AND IMPORT
(NET TONS)

		BEIRA CORRIDOR AUTHORITY		CFM(C) 1988 ANNUAL REPORT	
		1988	1987	1988	1987
(1)	TO PORT	346000	313000	286200	303000
	ZIMBABWE	200500	161200	178600	152700
	TOBACCO	19400	19100	1400	1200
	TEA	7600	9800		
	COFFEE	10400	18100		
	COTTON	33900	30100	13600	14500
	MAIZE	5500	11000	28600	37800
	ASBESTOS	50400	42900	28500	27100
	WATTLE	4800	0	5000	3500
	STEEL	5000	3500		
	OTHER	63500	26700	87800	68500
	ZAMBIA				
	COPPER	106400	88700	78200	84200
	MALAWI	39100	63100	29500	66200
	SUGAR	37900	63100	29500	66200
	OTHER	1200	0		
(2)	FROM PORT	163100	117700	109900	95000
	ZIMBABWE	157900	115500	109900	95000
	ZAMBIA	200	0		
	MALAWI	100	1400		
	BOTSWANA	4900	800		
	TWO WAY TRAFFIC				
(3)	MOZAMBIQUE	92800	83500	92800	83500
(4)	NO. CONTAINERS	(15279)	(10072)	(15239)	(10072)

NOTE: Other accounts by Ministry of Transport and Communications, and AMI Freight Forwarders, also produce interpretive figures.

SOURCE: Beira Port Transport System, Quarterly Report No. 6, 31-12-1988, Beira Corridor Authority, (BCA)

CONTAINER MOVEMENTS ON BEIRA LINE BY TYPE FREIGHT
(NUMBERS OF CONTAINERS)

	1988	1987
TOTAL PORT	15279	10072
1) MOZAMBIQUE	5807	3083
Export	1119	322
Import	4688	2761
2) TRANSIT	8261	6989
ZIMBABWE EXPORT	5086	4796
COTTON	1365	1282
TEA	340	337
COFFEE	428	695
TOBACCO	598	543
ASBESTOS	1438	1405
WATTLE EXTRACT	107	183
PEANUTS	60	2
OTHER	748	311
EMPTY	2	38
ZIMBABWE IMPORT	2989	1486
ZAMBIA EXPORT	139	0
COPPER	139	0
ZAMBIA IMPORT*	8	0
MALAWI EXPORT*	34	0
MALAWI IMPORT*	0	2
BOTSWANA EXPORT*	2	0
BOTSWANA IMPORT*	3	4
3) TRANSIT EXPORT	5261	4997
4) TRANSIT IMPORT	3000	1992

* Other, unspecified products. Different CFM(C) data shows Malawi Export of 34 containers to be sugar only.

SOURCE: CFM(C) Annual Report, Dec. 1988

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COMBINED TOTAL NRZ RAIL VOLUMES (EXPORT, TRANSIT, IMPORT) TO/FROM PORTS (TONS 000)

	1983/84	1984/85	1985/86	1986/87	1987/88	(%COMPOSITION)	
						1983/84	1987/88
RSA	2388.9	2686.3	2799.0	2392.3	2039.3	59.6	60.3
BEIRA	165.4	219.7	199.5	239.9	335.4	4.1	9.9
MAPUTO	584.1	480.9	446.4	607.2	373.0	14.6	11.0
V/FALLS	723.5	621.0	541.1	380.0	374.3	18.0	11.1
PLUMTREE	146.5	173.1	148.2	136.9	260.2	3.7	7.7
TOTAL	4008.4	4181.0	4134.2	3756.3	3382.2	100.0	100.0
% CHANGE	-	+4.3	-1.1	-9.1	-10.0		

Note: Data above excludes internal local traffic

Source: NRZ Statistical Data, Bulawayo main office, Feb. 3-1989

NATIONAL RAILWAYS ZIMBABWE
RAIL TRAFFIC EXPORT AND TRANSIT TONS BY PORT
(TONS 000)

Fiscal Year:
(1 April - 30 March)

	1983/84	1984/85	1985/86	1986/87	1987/88
EXPORTS					
VIA:- RSA	927.6	958.4	1217.6	1074.6	947.8
BEIRA	116.5	126.8	99.2	173.6	179.8
MAPUTO	438.3	347.5	366.2	589.2	359.7
V/FALLS	287.6	201.8	213.1	123.4	95.4
PLUMTREE	141.8	167.4	139.0	126.5	223.5
GRAND TOTAL	1911.8	1801.9	2035.1	2087.3	1806.2
TRANSIT NORTH					
VIA:- RSA	446.2	464.7	312.3	260.0	389.8
BEIRA	-	0.2	-	-	-
MAPUTO	0.3	-	-	-	-
TOTAL (1)	446.5	464.9	312.3	260.0	389.8
TRANSIT SOUTH					
VIA:- RSA	435.9	406.9	328.0	256.6	278.8
BEIRA	-	-	47.4	-	-
TOTAL (2)	435.9	406.9	375.4	256.6	278.8
TOTAL (1) & (2) ALL TRANSIT	882.4	871.8	687.7	516.6	668.6

Source: NRZ Statistical Data, Bulawayo main office, Traffic Management and Planning, Feb. 3, 1989.

NATIONAL RAILWAYS ZIMBABWE
RAIL TRAFFIC EXPORT AND TRANSIT TONS BY PORT

	AVERAGE VOLUMES		PERCENT CHANGE	
EXPORT TONS (000)	(1983-86)	(1986-88)	(1986-88) FROM 83-86 AVERAGE	(Final Year)
RSA	1034.5	1011.2	-2.3	-8.4
BEIRA	114.2	176.7	+54.7	+57.4
MAPUTO	384.0	474.4	+23.5	-6.3
V/FALLS	234.2	109.4	-53.3	-59.3
PLUMTREE	149.4	175.0	+17.1	+49.6
TOTAL	1916.3	1946.7	+1.6	-5.8
TRANSIT IN AND OUT TOTAL (000)				
RSA	407.7	324.9	-20.3	-4.4
BEIRA	15.9	0	-100.0	-100.0
MAPUTO	0.1	0	-100.0	-100.0
V/FALLS	390.3	267.7	-31.4	-28.6
TOTAL	814.0	592.6	-27.2	-17.9

Note: Data above excludes internal local traffic.

Source: NRZ Statistical Data Bulawayo main office, February 3, 1989.

NATIONAL RAILWAYS ZIMBABWE
RAIL TRAFFIC IMPORT TONS BY PORT
(TONS 000)

AVERAGE VOLUMES - IMPORT TONS

		1983-86 AVERAGE	1986-88 AVERAGE	% CHANGE (1986-88) FROM 83-86 AVERAGE	% CHANGE (Final Year) FROM 83-86 AVERAGE
VIA:	RSA	1182.5	888.7	-24.8	-40.7
	BEIRA	64.8	110.9	+71.1	+140.1
	MAPUTO	119.7	75.5	-36.9	-88.9
	V/FALLS	-	-	-	-
	PLUMTREE	6.5	23.5	+261.5	+464.6
	TOTAL	1377.6	1038.9	-24.6	-34.1

COMPARATIVE PORT OPERATING RATES
BEIRA AND MAPUTO

		MAPUTO	MATOLA	BEIRA
VESSEL CALLS:	1987	626	78	392
	1986	692	93	271
	1985	701	96	306
	1984	831	105	348

AVG WAITING TIME: 1987 (HOURS)			
GENERAL CARGO	13	-	39
BULK GRAIN	18	-	53
DRY BULK MINERAL	25	-	55
POL	14	7	68
RO-RO	4	-	26
REFRIG STORES	13	-	38

AVG WORKING TIME (HOURS) X (AVG LOAD/DISCHARGE PER VESSEL)			
GENERAL CARGO	135 (2224)		108 (1869)
BULK GRAIN	257 (6804)		249 (6909)
DRY BULK MINERAL	176 (6225)		188 (3728)
POL	44 (3654)		62 (9817)
POL	-	53(3773)	
RO-RO	40 (4427)		84 (6889)
REFRIG. STORES	115 (2799)		174 (852)

SOURCE: CFM STATISTICAL INFORMATION, DECEMBER 1987

COMPARATIVE PORT CARGO HANDLING FACILITIES: 1987
BEIRA AND MAPUTO

EQUIPMENT	MAPUTO	BEIRA
ELEC. CRANES 20T	5	1
ELEC. CRANES OTHER	78	50
FORKLIFTS 20T	-	-
FORKLIFTS OTHER	31	36
MOBILE CRANES	22	10
TRACTORS	26	9
FRONT END LOADERS	11	3
PAYLOADERS	13	3
RO-RO TRACTORS	5	10
TUGMASTERS	2	1
TRAILERS	16	30
TUG BOATS	5	3

NOTE: Relative type and capacity of equipment, along with apparent specialization in type cargo-handling gear, will influence user perception of port adequacy. Other influences: storage, berths, vessel calls/destinations.

SOURCE: CFM Statistical Information, December 1987

PERSONS CONTACTED

IN MOZAMBIQUE:

CFM (Centro), Beira
- Gabriel Mabunda, Director General
- Oscar Dinis, Deputy Director

CFM/DNPCF, Maputo
- F.F. Mendes, National Director
- Jeanne Stephens, Communal and Marketing

CFM (SUL), Maputo
- Joao Filipe, Traffic Manager
- - Sedh, Rites Traffic Consultant

Beira Corridor Authority (Beira)
- Mads Tiemroth, Economist

USAID/Mozambique (Maputo)
- Julius Schlotthauer, Director

AMI Freight Forwarder, Beira
- Werner Martens, Managing Director

IN ZIMBABWE

Kwekwe	J. Banda, Export Officer, Lancashire Iron and Steel
Redcliff	G.N.B. Thomas, Manager Production Planning, Zimbabwe Iron and Steel
Gweru	W.P. Lugube, Area Traffic Manager (Eastern), National Railways of Zimbabwe (NRZ)
	A.H.S. Madhlela, Chief Planning Officer, NRZ
Bulawayo	Mike Coley, Operator, Coley Hall Transport
	P.F. Chakauya, Assistant General Manager, Cold Storage Commission
Mutare	Chris Donald, Managing Director, Green Motor Services
	- Zambelis, Manager, Baringa Wood and Paper
	F.J. Heyne, Director and General Manager, Leyland Manufacturers (Zimbabwe)
Harare	N.C. Maquina, CFM Representative

PART II ECONOMIC SEGMENT

FINDINGS AND CONCLUSIONS

The USAID investments in track rehabilitation and renovated locomotives have enabled the CFM(C) to achieve some impressive operating results. Despite delays in scheduled deliveries of repaired locomotives, specific goals set by the project were met or exceeded.

1. Trains per day increased from a pre-project level of 2.4 to 3.6 in 1988.
2. The train movement of 280,000 net tons annually rose to a level of 486,300 tons in 1988, exceeding the 430,000 ton target.
3. Rail efficiency increased in the haulage of gross tons per train, by 47 percent over 1984 levels, even as total annual gross tons rose by 2.2 times, from 448,000 GRT to 966,400 GRT. This was a major gain in turnaround times.
4. Freight wagons awaiting transfer between Mozambique and Zimbabwe amounted to only a single day's two-way volume or 0.2 percent of annual traffic, an acceptable backlog in a switching yard.
5. The Beira rail line increased its market share of traffic from 4.1 to 9.9 percent as total regional traffic of Zimbabwe declined by 20 percent over two years and rival regional rail-lines of RSA, Maputo and Victoria Falls lost market share. An improved image of the Beira Line appears to account for this.
6. Ocean vessel calls increased to 272 in 1988 from 177 in 1986 as Beira emerges as a container port, and as major port improvements are undertaken by a consortium of donors.

A number of factors contributed to the success of this project: rail-line management, yardmasters and train crews; advisories circulated by freight forwarders reporting on regional rail and port facilities and improvements; military security for the right of way; containerization and its advantages; donor projects at the port; an increased volume of rail-line traffic; each of these aiding in securing more ocean vessel calls and relieving a major complaint of potential rail users.

USAID provided funding to assist in improving operational efficiency of the Beira-Machipanda rail-line. The project helped to sustain and improve locomotive availability amid pressure from increasing traffic volumes, while at the same time some locomotives were being brought out for repair. The project experienced implementation problems in the form of workshop irregularities and poorly coordinated supervision and training. The high productivity of the rehabilitated locomotives, complemented by improved operational management, helped to minimize the impact of these implementation problems.

EVALUATION INSIGHTS

Analysis of a rail-line is best viewed as inter-independent with the port it serves. Inadequacies of one affect the other. Moreover, it is total delivered cost, including ocean rates to foreign markets, and not inland costs of rail and port alone, which will determine distribution of traffic among competing rail-and-port accesses.

This larger area for analysis is revealed in this project, as the traffic volume is not local but through traffic, and the foreign buyer, of individual products, dictates place and time of delivery while seeking least total delivered cost. This affects choice of port and rail-line. Background material for similar rail-port analysis would usefully show vessel time delays at competing ports, shore equipment, and ocean rates to foreign markets of principal exports of the region, as may be obtained from freight forwarders.

Because of geographical location factors, Zimbabwe utilizes the corridor more than any of the user countries. The project rail-line continues to attract Zambian copper exports traffic as well as Malawian sugar exports using the Harare-Tete-Blantyre route. However, analysis of the broad benefits/cost relationship is weighed in the context of the totality of other corridor component investments. The economic analysis in the Project Paper came out with a rather high base case IRR of 72.9% made plausible by the fact that only US$6 million was meant to tripple the carrying capacity of the line. No attempt therefore has been made in this evaluation to refine the aspect of specific allocation of benefits, in terms of determining specific impact of the USAID investment.

EVALUATION RESULTS

I. PROJECT GOALS:

The Project Paper has described the main problems of the Beira Line as 1) long turnaround times, 2) insufficient locomotive capacity, and 3) too few vessel calls at port. The results of Project activities designed to increase the carrying capacity of the line, from 280,000 tons per year to 430,000 tons by end of project would depend upon expected volume of demand, comparative cost rivalries with alternative ports, and security of the Beira line against National Resistance Movement (MNR) disruptions. The projected increase in traffic, following track rehabilitations, repair and maintenance of locomotives and wagons, would increase daily train movements from about 2.4 trains to 3.4. Zimbabwean and Mozambiquean freight volumes in two-way traffic were expected to rise by the following annual amounts:

(tons 000)

	Base Year	(Total Increase) Project Period:			(Total Volume) Project Period:		
	0	1	2	3	1	2	3
Zim	0	0	50	100	-	-	-
Moz	0	0	25	50	-	-	-
Total	0	0	75	150	280	355	430

SOURCE: Regional Transport Development (Mozambique Railways) PP

The corresponding actual rise from base year 280,000 tons would be 280,000, 355,000, and 430,000 by year 4 (1988)

Actual rail tonnages on the Beira Line in the first two years exceeded their targets (304,700 and 371,000 net tons), as shown by Annex Table E-1. Third-year performance was 486,300 vs projected 430,000 tons.

Although net tonnages were off schedule, the number of trains per day increased from a 1984 average of 2.4 to 3.0 in 1986, and to 3.6 by 1988. The productivity of these train movements may be measured by the equivalent gross tons per day (rolling stock plus freight) on the section of rail-line most critical to international transit traffic: Nhamatanda-Gondola (Km 98 to km 179, or 81 km in length). Gross tons per day rose from 1230 in 1984 to 1882 in 1986, and to 2647 by 1988. Annex Tables E-2

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and E-3 describe this evolution through the five-year time period for the CFM(C)-operated Nhamatanda-Gondola section.

For comparative purposes, the equally strategic section Gondola-Machipanda which is operated by NRZ locomotives and train crews, is also shown. This section of the Beira line is within Mozambique, between Km 179 (Gondola) and Km 308, and during the period under review (1984-1988) has been almost continuously used by the NRZ on a locomotive/crew rental basis. Operating diesel-electric locomotives generally in tandem on this hilly stretch with restrictive curves, the NRZ had generally performed more effectively than could the existing CFM(C) motive power, hauling a greater volume of gross tons per day per train, and operating more trains per day. This section is 129 km in length, and, as with both inland sections, restricted to daylight operating hours, between 0400 and 2000. A late train departure or arrival, on either section, must limit the number of trains per day as crews are held over before resuming the schedule.

For the period 1984-1988 the two line sections may be compared as follows:

	Nhamatanda-Gondola CFM(C)		Gondola-Machipanda NRZ	
	GRT/train	No. Trains	GRT/train	No. Trains
1988	738	1310	1003	948
1987	780	1290	935	1219
1986	637	1078	827	1092
1985	532	894	420	1415
1984	503	892	365	1375

It may be observed that both sections improved upon gross ton haulage (GRT) per train, which is the main business of motive power. For the CFM(C), the relative increase in the number of trains in 1988, for lesser average loads per train, is a relative loss in efficient utilization. This may be traced to directional imbalance in net tonnage: in the review period export volumes may exceed import tonnages by three times, producing empty wagon backhauls and reduced gross tons per train although the number of wagons may have increased.

The NRZ operation shows an improved utilization in 1988, increasing the gross tons/train while reducing the number of trains substantially below preceding years. The comparison of diesel-electric efficiency on the NRZ stretch with CFM(C) steam-and-diesel single motive units on the joining section demonstrates two main points: continued inadequacy of the

CFM(C) motive power nevertheless has produced an improved performance in actual utilization over the project period, and the use of diesel-electric locos for the more difficult section operated by NRZ under rental agreements testifies to the contribution made by diesel-electrics in line-haul efficiency. A CFM(C) operation on that section, if made possible by properly restored diesel-electrics in sufficient number, could have performed as well, and saved considerable rental expense.

II. FINANCIAL EFFECTS OF DELAYED REHABILITATIONS

Delayed delivery to CFM(C) of rehabilitated locomotives has mainly resulted in continued and successively higher rental rates being paid to NRZ for the hire of NRZ locomotives on the Gondola-Machipanda section. Terms of these agreements in earlier years specified a payment of Z$220 per locomotive per day. This rate was increased to Z$380 as NRZ faced the added burden of renting locomotives from South African Railways (10 per day in 1988) for domestic Zimbabwe-South Africa line hauls. By the 1988-89 period, the NRZ charge for locomotives (and driver) had risen to Z$3,411 per 'train haul' -- which effectively increased rates for the directional movement as well as for the daily rental period. The cost in 1988, for the 948 trains which NRZ operated, amounts to Z$3,233,628, or Z$3.4 per average gross ton per train (1,003 GRT/train in 1988).

A further reason for the increased NRZ rate arose from a poor maintenance and repair record for these units during their use by CFM(C) under agreements on the section which provided for CFM(C) care of the rented locomotives. The present agreement shifts to NRZ the maintenance responsibilities. NRZ is reportedly anxious for the return of the rented units, and may have precipitated the recent interest by CFM(C) in the purchase of about 10 retired steam locomotives being offered by the South African Railways. These would be operated on an interim (2-year) basis by CFM(C) until it receives the scheduled delivery of some 5 new GE diesel-electrics expected from another foreign donor.

A reported operating effect of the scarcity of CFM locomotives was the backlog of wagons awaiting transfer at Gondola from NRZ to CFM(C). A review of the clearance records of CFM(C) disclosed that this situation commonly existed both before and during the project activity. For a recent period, the following backlog existed:

Traffic Backlog at Gondola (Daily Avg)
August/December 1988

	National (Mozambique)		International		Total	
	Wagons	Gr Tons	Wagons	Gr Tons	Wagons	Gr Tons
Awaiting UP	9	427	52	1440	61	1867
Awaiting DOWN	33	553	41	2149	74	2693

It may be seen that the CFM(C) backlog of 74 wagons of 2693 gross tons exceeded that of the NRZ, and amounted to about 3.6 trains one-way (2693/738 GRT/train in 1988). The equivalent NRZ trains to clear the transfer point would be 1.9 trains one-way. Overall, an average 135 wagons and 45600 gross tons per day awaited clearing. But as shown by Annex Table E-3, CFM(C) GRT/train had shown consistent improvement in the period 1984-1988, attaining a 55 percent improvement in 1987. The gross tons hauled increased from 448,800 in 1984 to 1,005,823 in 1987, or by 2.24 times. It thereafter declined slightly to 966,355 in 1988. On this evidence, a backlog of 0.2 percent of the annual traffic, is roughly equal to one day's average two-way volume (966,355/365 = 2647 GRT).

III. USER BENEFITS AND RAIL/PORT SPECIALIZATION

Benefits to rail users may be counted in a number of ways beyond the statistical evidence of larger volumes of rail net tonnages and trains per day, or of increased haulage of gross tons per train and per year over the project life. In addition to improving train productivity, increasing rail specialization in use of containers will also modernize the technology utilized in goods freighting.

Containerization and
Beira Rail Line Freight
(net Tons)

	1988	1987	1986	1985	1984
From Port to Machipanda					
International	110000	95000	54600	61400	76100
of which:					
Container Tons	13500	21600	7100	14300	9800
From Machipanda to Port					
International	283500	302000	231500	179500	95700
of which:					
Container Tons	34700	32500	13900	16200	25400
National Mozambique Tonnage					
Two-way	92800	83500	84900	63800	110700
Total	486300	480500	371000	304700	282500

SOURCE: National Directorate of Ports and Railways, Mozambique, Feb. 1988

The doldrum years of 1985-86 may be traceable in part to lack of motive power on CFM(C), and other ailments of the port, which are duly reported by freight forwarders, such as Manica, and closely watched by users. The bright aspects are the recovery of volumes and the emergence of the port of Beira as a principal containerport. Some of this is owed to the necessity to improve upon damage and pilferage as much as to the nature of the cargo: tea, coffee, tobacco, asbestos, some copper, which increasingly make their way as exports in unit trains (all one commodity).

The period 1985-86 saw a decline in traffic volumes for international imports, reduced container freight of both import and export, and lower Mozambique volumes. In 1987 a 30 percent increase overall was registered, with recovery of import volumes and a continued rise in international exports, with container freight showing good improvement; Mozambique traffic remained flat. In 1988, only a 1.2 percent overall gain is to be seen, with international exports weaker but on higher container volume. Imports were up 15000 tons but markedly down in container freight, and Mozambique traffic up almost 10,000 tons from the previous year.

Containerization is to be appreciated as a new glimmer of competitiveness of the Beira port, vis a vis other regional ports, in specializing in Beira's packaging and handling of products from its inland hinterland. Cotton, now arriving in bales at the port, is re-packed in containers for ocean voyage, and likely soon also will be among

containerized freight volumes of CFM(C). Smaller copper shipments of Zambia find their way to Beira in containers, extending the geographic range of appeal of this type of handling.

The expectation by rail/port users that the major Beira port improvement plan will increase the effective scope for handling containers has been widely reported in the region. AMI Freight Forwarders of Beira foresee a prospective demand by Malawi for containers for export of 40,000 tons of sugar, 7500 tons of tea and 7500 tons of tobacco annually. Zambian and Zairean containers of imported jute and fertilizer may return as containerized copper exports.

It is only after completion of re-structuring of Beira port by end of 1991 that shippers will be expected to effectively take advantage of the cost savings availed by the corridor. Meanwhile, competition for traffic can be expected to come from the ports of Maputo, Nacala and the South African ports of Durban and Port Elizabeth. The normal dislocations of traffic which arise from port rivalries (specialization in facilities and port handling equipment, longer berths, deeper channel dredging, advanced innovations to attract 'third generation' ocean-going vessels, etc.) in the near-term will be further aggravated by the expected re-opening of the Nacala line, which will reduce Malawi traffic through Zimbabwe and alternate lines south.

The renewal of the Port of Nacala in the recent period was to usher in a new era for the Nacala line and Malawi rail freight, until closure of the rail line by enemy action; its re-opening may see the disappearance of the expected containerized freight via the Beira line. Possible re-opening of the Maputo (Chicualacuala) line, may be expected to reduce traffic via South Africa to Maputo or via Durban/Port Elizabeth. The present availability of South Africa Railways wagons for southerly freight via Maputo will vanish as traffic moves through Mozambique via Chicualacuala, sorely limiting the rolling stock available to the CFM. Rolling stock of South Africa Railways, extensively used throughout Zimbabwe, is not allowed to move within Mozambique.

These uncertainties reflect the high state of flux to be expected near-term for the rail volumes and type of freight on the Beira line as well as other lines. A combination of events provide indirect user benefits which are now apparent for the Beira line:
1) the evident security of transported goods, as concerted efforts by Zimbabwe and Mozambique military have reduced disruptions, and as containerized freight have reduced losses;

2) enjoyment of equalized ocean freight rates by liner services, which now handle cargo at rates similar to South Africa ports (S. Africa-Europe Container Services via Cape, and East Africa-Europe Conference Line via Suez), effectively removing the ocean freight rate advantages of Durban and Port Elizabeth; 3) the vexing problem of too infrequent vessel calls at Beira has shown improvement with ocean-going vessels numbering 272 in 1988 compared to 238 in 1987 and 177 in 1986 -- with further improvement in both number and size of vessel (with consequent rate savings) expected upon completion of Beira port renovations in 1991; 4) soon to-be-completed enlarged container port facilities; and 5) five new GE locomotives to be provided under Japanese Aid by 1991.

Annex Tables E-4 and E-5 show the type of rail freight which moves in international traffic on the Beira line. Tonnages contained in containers are specially shown because the products conveyed are sometimes omitted from the list of freight, and sometimes are listed with partial tons or as zero tons when in fact they are carried as ``container''. The list of products reflects the list of users and their relative level of benefit, in either import or export trade. Because of peculiarities in the recording of container freight, which may fail to show supplementary schedules of the contents, CFM(C) records and Beira Corridor Authority show accounts which differ between them, and differ also internally within the accounts. For this reason, Annex Tables E-6 and E-7 have been compiled from both sources, to aid in defining origins and destinations, i.e., the rail user.

The differences in the accounting of rail freight by the two sources are shown on Annex Table E-6. Each account offers a view of the countries originating the exports, and their export product. The amounts in net tons differ between these sources, although the Mozambique rail tonnages agree, and the total number of containers shipped by rail in the two-year period also agree. It is clear that Zimbabwe leads in export and import tonnages, with Zambian copper following, and Malawi sugar exports next, well ahead of the low tonnages which Botswana imports via Beira. Domestic (Mozambique) volumes of 83,000-93,000 tons would be placed between Zambian copper exports of 85,000-106,000 tons, and Malawi exports of 39,000-63,000 tons.

The reported container traffic adds further details of the specific country of origin and product content, while being less specific about imported products. A clarification is found here of Mozambique container volumes: fully 38 percent of container traffic in 1988 and 31 percent of 1987 volumes (5807/15279 and 3083/10072). Zimbabwe usage of containers was 6782 for both import and export trade in 1987, and 8075 in 1988, a 19 percent increase.

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IV. INFLUENCE UPON REGIONAL TRAFFIC PATTERNS

A partial view of the influence of project activity is given by the data above which reflects Beira rail line usage only. For that line, Annex Table E-1 has shown the combined total of rail traffic by Zimbabwe, Zambia, Malawi. The Zimbabwe volume dwarfs all other regional traffic. For the period 1986 through 1988, the composition of regional traffic was as follows:

Regional Traffic Flows 1986-1988

	(Net tons 000)			(As %)		
	1988	1987	1986	1988	1987	1986
Zimbabwe	358.4	276.7	164.5	70.4	64.22	79.0
Exports	200.5	161.2	91.9			
Imports	157.9	115.5	72.6			
Malawi	39.2	64.5	25.7	7.7	15.0	12.3
Exports	39.1	63.1	23.5			
Imports	0.1	1.4	2.2			
Zambia	106.6	88.7	17.6	20.9	20.6	8.4
Exports	106.4	88.7	17.6			
Imports	0.2	0	0			
Botswana						
Imports	4.9	0.8	0.4	0.9	0.2	0.2
Total	509.1	430.7	208.2	100.0	100.0	100.0

Totals here do not agree with other accounts by CFM(C).

Source: Beira Port Transport System, Qtrly Report No. 6, Dec. 31, 1988, Beira Corridor Authority

From this breakdown of rail activity, no dynamic change in regional traffic distribution can be seen. Except for increases in volume of traffic by Zimbabwe and Zambia, with minor improvement in the marginal levels of Botswana (Malawi traffic has been erratic), the regional distribution of activity appears to be relatively static.

A broader view of the rail freight which is distributed between all the major rival rail lines may be obtained by reference to the Zimbabwe Rail accounts of export, import, and transit for the period 1983/84 through 1987/88. These figures appear on Annex Tables E-8, E-9, and E-10, and show rail volumes on the following lines: Beira, Maputo, Victoria Falls, Plumtree, and South Africa Rail. This comprehensive picture includes transit traffic (through Zimbabwe) of regional rail volumes. The different accounting period for NRZ is based on a fiscal year beginning in April, and thereby makes comparisons with the calendar year data of the CFM(C) an unrewarding task.

Table E-8 shows that aggregate rail tonnages of the NRZ, into and out of all ports of entry, have declined by 19 percent from their high during the five-year period. In summary form, the Beira Rail line, in rivalry with four other lines, performed as follows:

Total NRZ Rail Tonnages (000)

	1983/84	1984/85	1985/86	1986/87	1987/88
NRZ Total	4008.4	4181.0	4134.2	3756.3	3382.2
Beira Line	165.4	219.7	199.5	239.9	335.4
Beira as %	4.1	5.2	4.8	6.4	9.9

It was seen in previous data that Zimbabwe traffic accounted for about 70 percent of Beira rail tonnage. Now comparing NRZ traffic via Beira with total NRZ traffic, it can be seen that the Beira line is increasing its share of total volumes, by more that 100 percent over prior recent years. Lines losing traffic were RSA, Maputo via Ressano Garcia, and Victoria Falls, with only Plumtree making gains or holding steady. While existing information cannot confirm the extent of diversion of traffic to Beira, a presumption exists that some re-routing may have occurred. Maputo has reported diversion of asbestos to Beira, and oppositely, freight forwarders at Mutare (Beira line trans-shipment point in Zimbabwe), have reported re-routing normal Beira line freight of tea in containers to South Africa because of previous sluggish vessel calls at Beira.

Table E-8 also shows that, on declining traffic volumes since 1984/85, the NRZ volumes retained by RSA (So. Africa) continue at levels of 60 percent, Maputo has dropped from 14.6 to 11 percent, Victoria Falls from 18 to 11.1 percent, with only Beira and Plumtree making gains: Plumtree rising from 3.7 to 7.7 percent.

The internal composition of this traffic is reported on Annex Tables E-9 and E-10. Export and Transit volumes shown on E-9, and import volumes shown on E-10, are useful in showing the comparative Beira line traffic against the other entry/exit lines operated by NRZ. On both tables, Beira traffic is evaluated against these rival lines, as average volumes in the period 1983-1986 vs 1986-1988, and as relative percentages of the gain or loss in traffic shown by each of the five lines. In summary form, Beira traffic in export tonnages amounted to 114,200 tons average (1983-86), only 6 percent of total, and rose in the period 1986-88 to 176,600 tons or to 9.1 percent on a gain of 55 percent in traffic. In the final year 1987/88, the increase for Beira over 1983-86 was 57.4 percent.

It fared less well in transit traffic: dropping from about 16,000 tons to zero in 1986-88 (the marginal amounts recorded by CFM(C) as transiting via NRZ were simply not reported here). Import volumes on overall NRZ account declined from an average 1.4 million tons in 1983-86 to 1.0 million in 1986-88, or by almost 25 percent. Three of the five lines experienced declines from 25 percent to almost 90 percent, while Beira and Plumtree recorded gains of 71 percent and 262 percent in 1986-88 over 1983-86, and in the final year 1987-88 still higher gains of 140 percent and 465 percent over the period 1983-86. It is notable that Maputo suffered the severest losses, of 37 percent and 88.9 percent in the same periods.

From the comparative figures, there is clear measure of improving competitive performance by the Beira line in attracting both export and import volumes. As these accounts also relate to inter-regional distribution of all rail volumes, they again show Zimbabwe to be the major user of all rail lines, with transit regional traffic of other African countries amounting to 814,000 tons on average in 1983-86 and 593,000 in the period 1986-88, or 20 percent and 16.6 percent of total NRZ traffic for the consecutive periods. For transit traffic, the RSA accounted for 50 percent and 55 percent; and the apparent level of Zambia/westerly traffic amounted to 48 percent and 45 percent via transfer at Victoria Falls. This suggests that transit volumes of adjoining African countries has shifted in favor of RSA on the decline in volumes overall (-27%) in the period 1986-88).

On the evidence of NRZ rail traffic being somewhat flat-to-declining in the latest reporting period, the rise in Beira volumes in the face of reduced overall demand by NRZ and transit (other African) traffic, supports the conclusion that the Beira line performance is upward, perhaps constrained by slack demand overall. Beira has seen a rise in Zimbabwe exports and imports of important proportions (29.5 percent in 1988 over 1987), a rise in Mozambique traffic of 11 percent in the 1987-88 period, a rise in Zambian copper movement of 20 percent in the same period, increases in Botswana volumes of 6 times (from marginal levels), but a substantial decline of 40 percent in Malawi sugar exports in the last two years. While Beira has not attained growth objectives set out for it in 1985, most other competing lines suffered loss of traffic while Beira gained in traffic. Inasmuch as the expected port improvements which might later yield rapid gains have not as yet taken place (construction and demolition has actually interrupted some port activity), the rail line itself, along with improving vessel calls, must take credit for the user attention it has attracted.

V. COST EFFECTS OF RAIL IMPROVEMENTS

The users of the Beira rail line have historically enjoyed lesser total delivered costs (CIF) than provided by alternative route structures. When all lines are fully operational, comparative costs of recent date show that Beira rail and port charges, plus customs, CFA and insurance, are less for four main kinds of cargo.

Comparative Total Delivered Costs/Ton
(Z$/ton)

	Beira	Maputo	Durban	Port Elizabeth	Dar es Salaam
Bagged Fertilizer	33	43	71	76	151
Steel billets	40	43	93	96	136
Tobacco (container)	113	133	217	254	333
Gen. Cargo (container)	205	205	378	407	361

Source: Beira Port Transport System, SATCC, Jan. 1986, reporting UNDP/UNCTAD figures for 1984

The quoted rates are based on a rail distance reflecting: fertilizer imported to Harare, steel export from Redcliff, the site of Zimbabwe Iron and Steel Co., tobacco exports from Harare, and general cargo from Bulawayo, the second principal town of Zimbabwe some 600 km south.

Such cost advantages as these, prevailing up to July 1987, were under increasing pressure from Mozambiquean inflation, which saw the exchange rate for the local Metacal deteriorate from MT 40: US$1 to about MT 450: 1. Both rail and port tariffs were thereupon increased; but by September 1988, with a further decline in the rate to MT 645: 1, rail passenger, freight, and port charges were increased by 35%, 74%, and 44% respectively.

The new rail rates increased from MT 7.20/ton-km to MT 12.56/ton-km. The cost effect to the distant user cannot be determined as the basic port rate is unspecified (varying by type of cargo) in the Announcement of Tariff Increase. The impact upon the Rail-and-Port ^Authority,^ CFM, however, has been to more than double port revenues in 1988 over 1987, and to increase rail revenues by about 46 percent on average.

Financial Accounts of CFM(C) and Port Operations
(Metacal: Million)

	1987	1988	% increase
Receipts(National)	1290.7	2413.1	87
Rail	248.9	393.7	58
Port	567.9	1267.9	123
All other	472.9	751.5	59
Receipts (Foreign)	2214.9	4804.9	117
Rail	139.3	186.9	34
Port	2075.6	4618.0	124
Total Receipts (Global)	3505.6	7218.0	106
Total Expenditures	3021.5	6070.0	173

Other accounts also show that salaries of rail and port staff were increased by about the same amount as the yield from the new tariffs. Beyond that, accounts were consolidated and distinction between port and rail costs not defined.

It is not known whether the user of the Beira line is now adversely affected by these rate hikes, nor is it known to what extent comparable costs on alternative rail-port outlets may have been changed since the earlier 1984 cost comparisons were made. In any event, user savings must be conveyed by reductions in tariff, and/or by the savings in insurance or ocean freight rates which are governed by security of freight, reduced ships, waiting time at port which relieve demurrage charges, or by equalization of liner rates to equivalent South African Port levels (which has taken place).

VI. VIEWS OF USERS OF EFFICIENCY AND RELIABILITY OF THE BEIRA CORRIDOR

(User Interviews)

In addition to reports by the NRZ and the CFM of rail tonnages, trains operated, and annual changes in the progress of the Beira rail line, the viewpoint of Zimbabwean and Mozambiquean users and freight forwarders was solicited, to obtain a representative sampling of the attitudes of the private sector toward the Beira corridor.

These users were selected as being representative of important interior (Zimbabwean) exporters asnd importers, both by volume of freight and by reason of diverse location. Their choice of rail line, reasons for that choice, attitudes toward rail and port options, costs, and delivery schedules, were viewed as significant determinants of present and future traffic levels among competing routes.

In summary form these views reflect the following main attitudes: 1) a somewhat unfavorable impression of the Beira line in the mid-1980s is giving way to a renewed interest; 2) the seaport itself more than the rail line received complaints related to inadequacy of space, equipment,and ocean freight handling; 3) the immediate Beira port hinterland of Mutare and Harare, while generally complaining of the same port problems, never considered an alternate routing (except for containerized freight meeting a delivery schedule to UK or EEC); 4) a widely acknowledged lack of locomotive and wagon stock was cited by all, but accepted with resignation, as it affected all lines (less so for South Africa routing); 5) users are well-informed by current advisories put out by freight forwarders as to the status of rail and port operations, equipment available, power outages, vessel calls, etc., and will act upon this advice for near-term decisions regarding routing; 6) certain lines are reputed to be specialized in handling different cargos, and commitments by an industrial or agricultural sector to a given port will reflect a historic experience with that line, not easily shaken by the jockeying for position among rival ports; 7) planned improvements at the Beira port through 1991 are watched with acute interest, along with the rail prospects for improved rolling stock and traction power (but so are all port-and-rail activities throughout the Southern Africa region); 8) users in the southern regions of Zimbabwe, at some remove from Beira, do not experience a competitive cost advantage given by proximity, and act more independently at 600 km from Harare, where cost differences are at the closely-examined margin; beyond 600 km the cost advantage goes to RSA via Maputo, or Durban, or Port Elizabeth.

As there are a considerable number of factors which govern the choice of routing by the user/freight forwarder/buyer, the principal leading issues which were found to guide these decisions will be recounted here.

VII. REPORTS BY USERS

International commodity price fluctuations, for grains, tea, coffee, copper, tobacco, sugar, etc., along with changes in domestic demand levels which may inhibit export volumes, continue to make highly variable the supply of export. Along with changes in annual climatic growing conditions, and the emergence or decline of rival production sources, few industrial or agricultural sectors are immune to fluctuations in quantity of shipments. With increased price competition, choice of routing is imperative, supply tends to diminish, and with a buoyant market price, more volume for more routes may be seen.

South African Railways previously competed favorably because of ocean rate advantages (before equalization by some lines). It continues to compete well for iron and steel, and many other cargos because of vessel calls, depth alongside, port handling equipment, wagon availability and locomotive assistance to NRZ for southerly routing, and a tariff structure which reduces rates on increased volume.

In order to address the pertinent questions regarding corridor usage, a representative sample of past, present or potential users was interviewed as outlined below:-

1. Zimbabwe Iron and Steel Co., at Redcliff, midway between Harare and Bulawayo, has a clear distance savings out of Beira, but chooses Maputo, Durban and Port Elizabeth for very specific reasons:-

   a) A cost payback by Maputo to ZISCO, honoring the construction by ZISCO of major port facilities in 1971 when sanctions existed, continues to take the form of reduced tariff. ZISCO in turn rewards the port with 50,000 tons per month of iron and steel exports, and enjoys concessional rates in the process.

   b) RSA provides as many as 5000 rail wagons to Zimbabwe for movement only within Zimbabwe or South Africa or for transit the 88-km distance between S.A. and Maputo. These wagons are suitable for a variety of freight including metal billets and blooms; their use on the Beira corridor or other Mozambique rail is expressly excluded. Availability of rolling stock, along with the provision of RSA locomotives for use on the Zimbabwe trunk line-and-south are material advantages in putting together consignments for clients by shipload size.

c) Larger ocean-going vessels are favored by bulk shippers such as ZISCO, and these are simply not available at Beira because of channel and alongside restriction. Annual shipments by ZISCO out of rival southerly ports amount to the following volumes:

		(Port)	(tons)
	1988	Maputo	96,391
		Durban	12,076
		Port Elizabeth	172,068
		Beira	0
			280,535
Planned:	1989	Maputo	242,620
		Durban	11,000
		Port Elizabeth	179,000
			432,620

In 1987, ZISCO volumes were 443, 736 tons, with a weak test of the Port of Beira in the amount of 9,624 tons to check on problems and progress (ZISCO would like to use Beira). The experience disappointed: port area for ZISCO stock was severely limited, not because of its volume but because of inadequate space provision, generally. The consignment of billets and blooms, following a rain, sank into the sand base which was provided. No hard standing existed at the port. No stores or fuels for the ships calling was said to exist at this time. While the Beira route may be cheaper, these problems and restricted vessels drafts, will eliminate ZISCO from Beira's potential customers, until the opening of the renovated port facilities in 1991, at least. And with the emphasis upon containers and general cargo at Beira, such producers as ZISCO may continue to find the specialized ports to the south better able to deal with metal bulk.

2. National Railways of Zimbabwe, the Area Traffic Manager (East) who is responsible for the NRZ lines which converge at the Dabuka marshalling yards near Gweru stated that the transit time and the damage to light cargo for shipments via RSA south to Maputo or Durban was minimum. Security was no problem, and the advanced specialized equipment at South African ports gave these ports historical advantages. At this major marshalling yard, the break-down time of train dis-assembly is 30 minutes, and assembly 60 minutes, for an average 2400 tons per train. These trains are assisted by 10 RSA locomotives per month, adding to a fleet of 30 NRZ diesel electric 25 KV mainline locos operated on the northern route, which gave few maintenance problems, being only 4-5 years old. Trains on this section, Harare-Dabuka, amounted to 10 per day, excluding passenger and coal trains. This permitted 20,000 tons per day to Harare from the south.

As many as three trains per day between Harare-Dabuka-Bulawayo-Durban would be unit trains consisting of coal, chrome, iron ore, plus a 3 times per week unit train of tobacco.

The ability to move large train volumes at the rail-head of Dabuka was accounted by capacity: the receiving yard accommodated 450 wagons on 12 tracks, which then entered the Classification yard equipped to handle 3000 wagons on 32 tracks. The Departure yard managed 670 wagons on 16 tracks. Through trains operated left and right of the combined yards and were unobstructed. At the present time, 29 yard and shunting engines were in use daily.

These figures give an idea of physical capacities and train volumes moving north or south, and some of the reasons for this directional movement. The reduction of tariff rates on increased volume, and the free provision of RSA wagons was again mentioned as attractive to shippers.

3. Green Motor Freight of Mutare, in the immediate inland area of Beira on the border of Zimbabwe, exports 1800 containers per year of tea, coffee and other near-region products. Seventy percent moves out via Beira, but critical foreign market arrival times at specified ports of arrival in the UK or EEC may force the other 30 percent to go by way of Durban to gain access to shipping with route schedules which meet buyer's special requirements. Weekly auctions held in European markets will demand delivery in a specified time period at a delivery point which makes routing and time of arrival at sending and receiving port important. This forwarder found only one ship in 19 days handling this schedule at Beira, while Durban offered one ship in 7 days.

4. Baringa Wood and Paper of Mutare, established its plant at Mutare specifically to take advantage of the Beira line. It imports plastic in 40-wagon shipments of 1500 tons at a time, and paper pulp for its manufacturing process at Harare (some pulp arrives from Swaziland by rail). Arrival of shipments from Beira Port within one week was considered a good schedule, but could vary with freight forwarder. In this case, he favored AMI (a Belgian-Mozambique company). Sales of company products were mainly domestic.

5. Leyland Motors of Mutare, also was established here in 1959 to take advantage of the Beira corridor. They receive container imports of knock-down engine kits manufactured in Japan for assembly at the plant for a variety of larger vehicles: tippers, buses, and for production of spare parts. Production was down, owing to foreign exchange problems as with most buyers of the region: 7500 units were built in 1982, but only 1400 units in 1988. The prospect of regional sales beyond Zimbabwe was further limited by the number of vehicle assembly plants located in all the nearby countries, but some sales to Tete Province in nearby Mozambique were being made. The manager felt well-served by the two container depots located at Mutare, and less well served by the shortage of locomotives for both the NRZ and CFM(C).

6. At the Port of Beira, the AMI freight forwarder expected future container services for Malawian sugar, tea, and tobacco (40,000 t, 7500 t and 7500 t respectively) provided that re-opening of the Nacala Line, a more direct route, did not take place. Prospects for Zambian and Zairean copper exports via Beira, using wagons carrying imported jute and fertilizer to both countries, seemed to be good. Increased exports of Zimbabwean asbestos at Beira seemed now secure, and diversion to Beira had begun. Cotton now received in bales and packed in containers at Beira would likely be containerized inland soon.

   The manager of AMI discussed the varying accounts of the railways regarding tonnage, and contended that conversion tables in use by CFM(C) purporting to standardize volume measurements with weight measurements were probably incorrect or off standard. He was referring to the practice of both shipping lines and railroads to quote a tariff which was based upon alternative cubic meters of space occupied or upon tonnage weight "whichever was of advantage to the carrier." Users commonly do not object, as it is understood that lightweight but large volume cargos occupy space which might carry heavier cargos of less volume. The difficulty lies with converting from volume to weight -- the unit in which rail freight is quoted. Is liquid measured by specific gravity (and is this agreed upon by different national codes) to obtain weight? What of RO-RO (roll on-roll-off vehicles)? These would be rhetorical questions were it not for the fact that AMI used other daily sources for its measurements of port and rail volumes, and could show port volumes over four years which were less than official accounts. For 1988, AMI records were less by 500,000 tons, or almost 23 percent.

7. Lancashire Iron and Steel of Kwekwe, about 210 km south of Harare, imported only machinery and parts from Beira and shipped its products of galvanized wire, nail wire, barbed wire, and wire mesh to Zambia and Tanzania by rail, to Kenya and Malawi by road. Domestic sales went by road. This shipper, like several others, commented on the high price in foreign exchange which must be paid to border agents of freight forwarders for payment of transport costs. The TAZARA line (Tanzania-Zambia Rail) imposed the highest charges, and was the rail line most frequently cited by other shippers in this connection.

8. Coley Hall Transport of Bulawayo, operate truck services for line-haul distances which may either serve or compete with rail. The manager placed labor training in railways and at ports as the greatest regional need, ahead of new investments in capital equipment. He advanced the only recommendation herd in favor of privatization of both rail and ports, suggesting a 20-year contract to accelerate the efficient handling of freight.

   Watchful of regional events affecting transportation, he would travel on February 13, 1989 to Walvis Bay (Namibia) to review with other transporters prospects for haulage of Zimbabwean and Zambian freight to the West Coast as an alternative to Easterly routes. His interest lay with a road haul overland of about 1700 km to Grootfontein, where transfer to an existing short-line rail may be m ade, for onward shipment to Walvis Bay. The cease-fire and independence of Namibia would open this possibility. Feasibility of such transport would be examined. Lower Ocean freight rates to Europe from the East Coast were a main advantage over total delivered costs from South Africa or Mozambique ports. Inland road costs, security of transport, etc., would be other factors affecting route costs.

9. The Cold Storage Commission at Bulawayo, consigned shipment of refrigerated beef only through South Africa. Operating under a quota arrangement with Botswana, cold storage beef sent to EEC was asssured of proper refrigeration facilities at Southerton ports, but not at Maputo or Beira, which operted stores suitable only to fruits and vegetables. The EEC would not accept beef products out of Mozambique from existing storage facilities, and the added problem of security risk for the containers on these lines was not experienced in north-south transport, which had refrigerated containers readily available for inland operations.

VIII. COMPARATIVE PORT OPERATING RATES AND SHORE EQUIPMENT

The contentions by many rail users that the inadequacies of the Port of Beira were as significant in governing choice of rail-line as the rail itself, is largely borne out by the comparisons which are made on Annex Tables E-11 and E-12. Maputo and its sister port of Matola are compared with Beira in 1) annual vessel calls, 2) average vessel waiting time (for six kinds of cargo), and 3) average hours of working time per vessel -- correlated with the average load/discharge per vessel. For the comparison of vessel calls, only aggregates of ocean and cabotage combined could be found for Maputo, which required this as the basis for comparison. (Beira's ocean sailings are shown elsewhere in this report). But cargo handling rates cited here relate exclusively to ocean-going vessels.

Vessel calls. Maputo over a four-year period expected an annual average of vessel calls of 712 per year, or almost two per day, between 1984 and 1987. Beira received an average of 329, or less than one per day. This amounted to about 46 percent of the traffic at Maputo. Matola is a dry and liquid bulk port and receives about 93 vessels yearly. Traffic at each port began to slump in 1985, continued this downward trend in 1986, and fell further in 1987 for Maputo and Matola, while Beira surged upward by 45 percent over its 1986 low. At present, Beira is about 13 percent higher than its 1984 level of 348 vessels.

Waiting Time. Time delays in servicing the fewer vessel calls at Beira are due mainly to tidal influences which control channel depths, and limitted dredging capacity. Channel pilotage, berth space, storage area, and type of shore equipment, are other factors which may restrict not only rapid servicing of vessels, but type and size of vessel, with consequent loss in economic handling. As channel and port time delays increase, vessels incur time costs which translate into demurrage charges. These time costs may often exceed port charges and fees, and contribute to the overall total costs of ocean shipping. If not corrected, ocean freight rates affecting that port rise to accommodate the extra costs.

Average waiting time per vessel in 1987 (Table E-11) shows Beira at considerable disadvantage against Maputo or Matola, in every category of cargo: 39 hours vs 13 for general cargo, 53 hours vs 18 for bulk grain, 68 hours vs 14 (and 7 for Matola) in handling POL, 26 hours vs 4 for roll-on roll-off, and 38 hours vs 13 for refrigerated stores.

Working Time. Vessels at each port are worked 24-hour shifts. Beira competes more favorably in average working time per vessel, but not enough to diminish its total channel-and-port time per vessel. Table E-11 shows time in hours and load in tons. The equivalent rates in tons per hour per average vessel, are calculated below:

Cargo Handling Rates Per Hour and Total Hours Per Vessel

1987	Maputo	Matola	Beira	Maputo	Matola	Beira
	Tons per Hour Working Time Hours			Total Hours per vessel		
General Cargo	16.5	--	17.3	148	--	147
Bulk Grain	26.5	--	27.7	275	--	302
Dry Bulk/mineral	35.4		19.8	201	--	243
POL	83.0	71.2	158.3	58	60	130
RO-RO	110.7	--	82.0	44	--	110
Refrig. Stores	24.3	--	4.9	128	--	212

Cargo handling rates (in tons/hour) at Beira for Petroleum, Oil and Lubricants (POL) are about double those of Maputo or Matola, and tonnage rates are about equal for general cargo and bulk grain. For other dry bulk, roll-on roll-off (RO-RO), and refrigerated stores, Maputo has the advantage.

Total vessel time, however, erodes some of Beiras best performance. This places the port of Beira at a competitive disadvantage in all categories of total vessel time except for general cargo. The extent to which delays are occasioned by the number of available gangs (or hatch crews) is not reported but may contribute to a poorer performance by Beira. This would appear to be unlikely, as the costs of added crews, and the surplus of casual labor, would argue against this.

Port handling equipment. Shore equipment, which is a further basis for port competition, is shown on Annex Table E-12. The Port of Beira may be seen to have had less cargo handling gear in general than the Port of Maputo. This comparison is for installed equipment and not for available operational equipment. In the advisories provided by Manica freight forwarders operational equipment is compared with total existing equipment, and provides another cmparison, which places Beira is even worse position.

In eight types of handling equipment out of eleven, Beira has fewer than Maputo, and is seen to have more (smaller) forklifts (palletized cargo), Ro-Ro tractors, and trailers. But continued changes in these figures were in 1988 further altered by the receipt at Beira of three new 20-ton forklifts, plus one of 42-ton capacity, and another of 28-ton capacity. The new strengths obtained for Beira by this infusion of capacity will not be lost upon other ports, which will find similar or alternative strategies to maintain port share of total traffic.

In this same way, in February 1987, the Port of Dar es Salaam announced the expected arrival in the Spring of the following new port equipment (despite major difficulties in available locomotive and rolling stock):

Dar es Salaam Port Equipment to be Installed (1987)

Number	Type
5	35 ton loaders for containers
35	2 to 16 ton forklifts
13	tractor units with 39 trailers
4	rubber tired gantry cranes
2	ship-to-shore rail-mounted gantry cranes
2	rubber-tired gantries
2	rail-gantries

Against this background of port rivalry, assisted by foreign donors, the further improvements expected by these same donors at the Port of Beira will see another shift by 1991 in the competitive posture of the ports and provide a new basis for evaluating the constraints of their inland rail services. Among these constraints may be the actual volume of demand which these investments are intended to serve.

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December 6, 1988

MEMORANDUM

To: Denis Light, USAID/Zimbabwe, REO
Ernest Rojas, USAID/Zimbabwe, A/REO

From: Peter W. Shirk, REDSO/ESA/RCO

Subject: Contract No. 613-0231-C-00-6022-00, ZECO

This is in response to your request for an assessment of certain provisions incorporated in the subject contract.

1. Host Country vs Direct AID Contracting: From the standpoint of project implementation I see no advantages in host country contracting over that of direct AID contracting. I believe that the direct AID contract offers more direct Mission/AID control over contractor performance. Such control represents an advantage in this case given (a). the complexity of the contract document as awarded and (b). the nature of the project which departs somewhat in scope and administration requirements from the traditional AID technical assistance activity.

A host country contract would have provided for Mission approvals of prescribed contract provisions. The Mission, however, would not have been a party to the contract and would have had to deal through a third party in order to resolve performance problems or rely exclusively on the the host government to administer the contract properly. The requirement, to date, for in depth AID involvement in project implementation is, in my view, inconsistent with the basic concept and management realities of host country contracting.

2.

(a). General Electric (G.E.): The contract specified that AID would pay suppliers directly via a direct letter of commitment (L/Comm) for replacement of General Electric (G.E.) locomotive parts. The contractor was to identify the parts required to rehabilitate the diesel locomotives and after proper approvals place the order. AID was to pay directly to the off-shore supplier in order to accomodate problems resulting from Zimbabwean currency controls which precluded payments in foreign exchange by the contractor.

One of the problems with this approach is that although the contract served the purpose of committing the funds for purchasing the spare parts it did not provide for appropriate commitment, i.e. contractual linkage, to the supplier in order to issue an L/Comm. The contractor would send a list of required parts to the supplier. The list, however, did not consititute a sub-contract with the provisions and clauses which establish an appropriate business relationship (protecting the interests of the government) and in so doing serve as the basis for issuing the L/Comm.

Recommendation(s):

(1). If the G.E. parts are required by the contractor who is going to use them to rehabilitate the locomotives, the contract should provide for sub-contracting by the prime contractor to acquire the parts. The contractor would be required by standard contractual provisions to obtain AID consent and/or approval of sub-contracts. The sub-contract would provide the appropriate contractual clauses, identify the parts required and the L/Comm payment procedure, and specify that the parts are to be consigned to the contractor who would receive, inventory, and account for them pursuant to AID regulations regarding commodity end-use. The sub-contract (or copy thereof) could be sent to the Mission for approval prior to placing the order. At that time the Mission could issue the L/Comm which could accompany the sub-contract to the supplier.

The contractor would be responsible for processing receiving reports identifying the parts recieved, those which were short landed, and those which were incorrectly sent or damaged. Insurance claims would be issued by the contractor accordingly.

(2). The contractor could be responsible for identifying the parts required for rehabilitation and submitting the list with the proper approvals or concurrences. A direct AID or host country contract could be issued to the vendor/supplier and paid for directly via the contract.

(b). COTR: The term "contracting officer's representative" conveys certain contracting officer authorities to other individuals. Such transfer should be done only in carefully prescribed circumstances where the authorities are specifically identified with clearly established parameters. The Technical Directions clause in the schedule of the subject contract limits the COTRs authorities, however, I do not believe that the term is appropriate (or useful) in this contract.

The COTR's role in this contract/project seems to be overly ambitious for one Mission employee. Mission oversight responsibilities should be carefully examined to determine more accurately the functional requirements of the position and whether additional personnel are required or whether certain functions could be shifted to the contractor.

(c). Extra Work - Locomotives: The provision for ordering/authorizing through work orders necessary rehabilitation work which could not be identified at the time of contract award is contractually sound. There is a standard provision in contracting, however, which provides for changes within the scope of work with an equitable adjustment in cost. The changes clause makes contractor performance mandatory and provides that the changes as ordered will be negotiated and incorporated into the contract by modification.

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The work orders in this contract are being used in lieu of modifications issued pursuant to the changes clause. The problem with the work orders issued under this contract is that the work orders may tend to be viewed as a means of ordering work or supplies which are not within the contractual scope of work. When that happens the work orders become invalid requiring extraordinary contractual action (pursuant to FAR Part 50).

(d). Penalties: In circumstances where the extent of damage or loss resulting from contractor non-performance or delays can be determined at the time of award a liquidated damages clause may be negotiated and incorporated into the contract. A liquidated damages clause will prescribe the amount of, or formula for damages to be paid or absorbed by the contractor if non-performance occurs. A liquidated damages clause may be not be enforceable unless it can be established that actual damages or loss will be or are likely to be incurred if contractor non-performance occurs.

(e). Claims: The provisions in Section H, paragraph III, entitled "Extras" and in Section C.5 entitled "Extra Work - Locomotives" adequately protects the government's interests regarding claims for extra work.

(f). Guarantee and Warrenty Retention: Provision IV. Locomotive Guarantee and Provision V. Retention for Locomotive Warrenty in Section H are, in my opinion, adequate to protect the government's interest. The default clause provides additional protection requiring the contractor to pay the costs of reprocurement in the event of default. A liquidated damages clause would provide additional protection.

3. Work Orders

(a). Prices - Work orders are contractual documents the prices for which must be fair and reasonable. A memo describing the negotiations which established fair and reasonable rates/prices, if not already negotiated at the time of award of the base contract, should be prepared for each work order.

(b). Payment - The work order should not provide for direct payment by AID to the supplier (or sub-contractor) for local purchases. The prime contractor should pay local vendors in local currency, using commercial lines of credit if necessary, and be reimbursed through the work order.

(c). Handling Fee - (1). the 5% fee to ZECO is a "percentage of cost" of technical assistance and specifically prohibited by Federal and Agency regulations. (2). There is no stated rationale for the fee.

(d). Use of Work Orders - Work Orders which specify that the contractor is to supply materials or services which are not authorized in the base contract are incontractable.

Individuals exercising contracting authority should be careful to ensure that the scope of work in each work order is consistent with the supplies/services authorized by the contract.

SCOPE OF WORK FOR RCO

1. Determine if contracting machanisms used were appropriate for this type of project. Would it have been more efficient to have gone with a host country contract versus an AID Direct contract?

2. Evaluate the ZECO contract by addressing the following:

   (a) General Electric (G.E.)

   Should the Section pertaining to AID's direct reimbursement to G.E. for provision of spare parts for the rehabilitation of two G.E. locomotives have remained as is, been modified or left out of the contract altogether?

   (b) Contractor's Officers'Technical Representative (COTR)

   Was the role of the COTR, as written in the contract, appropriate? Should the COTR have assumed a greater or less responsibility in contractual matters?

   (c) Extra Work - Locomotives

   Was the concept of extra work orders, as written in the contract, a sound approach. What alternatives are there that could have improved contract implementation?

   (d) Penalties for Delays in Delivery of Locomotives

   Should there have been a specific clause in the contract relating to penalties for late delivery of locomotives? What recommendation would you make to conver penalties in future, similar contracts.

   (e) Claims

   What problems were caused by the absence of a section on claims in the contract? Should there have been a specific clause in the contract relating to claims submitted by the contractor?

   (f) Final Acceptances and Special Contract Requirements

   Were the locomotive Guarantee and Retention for locomotive warrantly provisions adequate and appropriate for this type of contract?

3. Upon completion of items 1 and 2 prepare a 3-5 page report on findings, conclusions and recommendations to be used as an annex in the Mozambique RR final evaluation report.

Annex II (1)

UNITED STATES GOVERNMENT

memorandum

DATE: December 7, 1988

REPLY TO ATTN OF: Robert B. Stader, REDSO/ESA/RCMO

SUBJECT: Evaluation of the Procurement methods used in the Mozambique Regional Transport Development Project 690-0231

TO: Ernest R. Rojas, ARE, USAID/Zimbabwe

Because of the limited amount of time that the RCMO could devote to the task, my review of the procurement methods used in the Mozambique Regional Transport Development Project was limited to a some of the historical record of the procurements as reflected in the project files and to discussions with Mr. Light, the Engineer who acted as AID project manager for the activity. In spite of this limited basis for the comments below, I believe that my review was sufficient to draw some very definite conclusions and to point out some lessons that should be learned concerning the methods used to procure commodities and to implement the Project.

Having just arrived in REDSO at the time this project was designed, I know that the pressure to obligate funds quickly (before the end FY 1985) was the compelling force behind the project design. The funds were not even made available by AID/W until June 1986. The design team, because of the AID/W pressure to produce a project paper quickly and because of the unavailability of appropriate technical staff, was itself poorly constituted. Although the REDSO RCMO was nominally on the design team, he never actually participated in the design of the project either in Harare or in Mozambique. Moreover, neither the resident CMO in Harare nor the resident CMO in Mozambique were part of the design team. In addition, neither the Regional Contracting Officer from the REDSO nor the RCO from Swaziland participated in the design effort. Thus, in spite of the fact that the entire project consisted of AID financing of commodities and services, no CMO or CO actually participated in the design of the project. From my personal knowledge, I can also state that AID's normally thorough project paper review process was somewhat shortened in order to comply with the bureaucratic imperative to obligate the funds quickly. It is my opinion that many of the difficulties encountered in the implementation of this project, particularly those involving the commodity procurement component, are the result of poor implementation planning which was a direct result of the pressure to obligate the funds which emanated from AID/W.

OPTIONAL FORM NO. 10
(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114
* U.S.G.P.O. 1986-491-248/20641

Commodity procurements for the project can be broken down into four elements as follows:

Component	Approx. value	Procurement Entity
Locomotive Workshop Equipment (Biera & Gondola)	$315,000	ZECO
Vehicle and commodities to support TA	$50,000	Moz. Railways
Spare parts for locomotives	$1,120,000	ZECO
Track Rehabilitation and Communications equipment	$210,000	AMEG (SER/OP IQC)

The process for procurements conducted by ZECO was basically as follows: When ZECO needed parts or equipment to work on a locomotive, ZECO would order the item(s) from a local vendor (or from General Electric in the case of parts for the GE diesel electric locomotives) instructing the vendor to send his invoice to USAID/Harare for payment. If a vendor desired a letter of credit before he would deliver the ordered items to ZECO, the USAID/Harare Controller would issue to the vendor an AID direct letter of commitment in lieu of the requested L/C. In either case, when the invoice arrived at USAID, usually without a Form 1034, the USAID controller would complete any missing paperwork such as the 1034 and process the vendors invoice for payment. These transactions, which numbered about 100, varied in value from the Zimbabwe currency equivalent of about US$3.00 to over US$150,000. Most of this procurement/payment process was set forth in clause C.13.1 of the ZECO Contract.

It would be hard to visualize a more cumbersome and USAID staff intensive procurement/payment process that the one followed for the procurements conducted by ZECO. Far simpler procurement/payment processes, such as reimbursement to ZECO for small value purchases made upon presentation of a ZECO invoice supported by the invoices from the various vendors, were possible. Such reimbursements could have been limited to a certain minimum value (maybe $50,000) and/or to a certain time frame (maybe every two months). Then USAID staff would not have had to process numerous small value transactions for payment or to issue numerous direct letters of commitment to the individual suppliers. It must also be stated that the RCMO, in no transaction he reviewed, found evidence of adequate competition among potential vendors or of any effort to advertise large procurements either locally or in appropriate publications in the U.S. In other words the competitive processes that AID normally requires procurement agents to follow were not completely followed. It is also highly

unlikely that other normal AID requirements, for example source/origin and componentry rules or marking requirements, were met. The RCMO is therefore of the opinion that ZECO should have been charged only with small value procurements in Zimbabwe. An arrangement under which ZECO was to subcontract offshore purchases of the GE spare parts and other large value or offshore procurements to an identified U.S. based procurement services agent should have been written into the ZECO Contract.

Procurement of the vehicle by Mozambique Railways was also not ideal. Mozambique Railways purchased an 8.5 Ton Leyland truck from a dealership in Zimbabwe for $37,786. Along with the truck the Railway purchased $8,243.73 worth of spare parts. Undoubtably, the cheapest source for Leyland trucks is not a retail dealer in a country where Leyland trucks are not assembled. Moreover, Spare parts at the retail level normally have a mark-up of between 50% and 100%. There was also no evidence of competition in the file covering this procurement. There were several preferable alternatives to the way this procurement was handled. Mozambique Railways could have been allowed to procure the needed vehicle but should have been given the necessary assistance from USAID/Harare in order to assist the railway to meet AID regulations and to follow good commercial practice. Frankly, the RCMO can not understand why at USAID/Harare which had a resident CMO, the CMO was not involved in assisting a host country agency in a neighboring country to conduct an AID financed project procurement for which USAID/Harare had implementation responsibility. If it was decided that the vehicle would not be purchased under a host country contract, the USAID Executive Officer could have been required to purchase a like project vehicle from the Regional Services Office in Tokyo (this is the standard operating procedure for procurement of project vehicles in many of the USAIDs in East Africa). If either of these procurement methods, a HC contract with proper support from USAID or an AID direct contract executed by the executive officer, were followed, there is no doubt that the purchase would have been less costly. In any event, the procedure under which the vehicle was to be purchased and by whom should have been determined at PP stage.

The procurement of Track Rehabilitation and Communications equipment by American Manufacturers Export Group (AMEG) under the AID Washington SER/OP PSA IQC was also problematical. However, the mission vulnerability to a negative audit or other criticism is far reduced when an American PSA is utilized to conduct project procurements. There is not a clear enough record in the file for the RCMO to determine why this procurement took as long as it did, but it is obvious that the purchases were conducted in a commercially viable way and in compliance with AID regulations.

In summary, the RCMO believes that the following lessons should be learned from the record of the implementation of the procurement element of this project:

1. Poor procurement planning at project paper stage leads almost invariably to poor implementation. Implementation of this project was made much more difficult because of the lack of a decent procurement plan in the project paper. A good deal of the responsibility for the lack of appropriate procurement planning lies with AID/W because of the pressure exerted on USAID/harare and REDSO/ESA to quickly obligate funds.

2. Clearance by a Commodity Management Officer should be required on any services contract which contains a large commodity procurement element. Much of the cumbersome procurement/payment process used by ZECO resulted from one of the clauses of the contract. It is possible that a CMO review might have resulted in changes to that clause.

3. Procurement responsibility should not be assigned to contractors who are probably incapable of complying with AID regulatory requirements. Although it can be argued that a CMO review of the contract may not have altered the clause referred to above, there is little doubt that virtually any CMO would have suggested that large value and offshore procurements should not be conducted by ZECO which had no prior experience in AID financed procurement.

4. Assistance by a CMO for host country conducted commodity procurements should have been established at PP stage. A good procurement plan would have assigned responsibilities for the actions required to properly carry out the procurements needed to implement the project. The USAID/Harare CMO probably should have been designated to assist ZECO and Mozambique Railways with commodity contracting in the implementation plan in the PP.

SCOPE OF WORK FOR CMO

1. Determine if the procurement mechanisms used were appropriate for this type of project. Would it have been better to have had all the commodities procured through one source instead of using a combination of IQC, host country procurement, procurement through ZECO Ltd.and direct letter of commitment to various suppliers.

2. Was the procurement of spare parts from General Electric establishing ZECO Ltd. as the "buyer" and AID as the agency responsible for payment appropriate for the Mozambique Railway Project?.

3. Evaluate the procurement of track repair equipment. What could have been done to streamline the procurement process?

4. Was the procurement of tools, equipment and spare parts establishing ZECO Ltd as the "handler" and "clearing agent" and AID as the agency responsible for payment appropriate? Should this procurement have been handled differently?

5. Was the procurement of tools, equipment, vehicles and vehicle spare parts through the Host Country (Mozambique) handled effectively. Could it have been improved?.

6. Upon completion of items 1-5, prepare a 3-5 page report on findings, conclusions and recommendations to be used as an annex in the Mozambique R.R. Final Evaluation report.

SCOPE OF WORK
MOZAMBIQUE RAILWAYS FINAL EVALUATION

I. Description of Activity to be Evaluated

The project to be evaluated is the Regional Transport Development (Mozambique Railways) project which is being implemented by the Direccao Nacional dos Portes e Caminhos de Ferro (DNPCF) and Caminhos de Fe Ferro de Mocambique-Centro CFM(C) on behalf of the Government of the People's Republic of Mozambique (GPRM). The grant agreement was signed on September 4, 1985 and the fist Project Implementation letter was signed on February 19, 1986.

Project Number: 690-0231.56
Title: Regional Transport Development (Mozambique Railways)
Cost: $5.54 million - USAID
.94 million - GPRM
LOP: September, 1985 - June 1989
PACD: June 30, 1989 (Current) September 30, 1988 (Initial)

II. Purpose of Evaluation

The purpose of the evaluation is to assess the achievement of the project's purpose and outputs, as well as other pertinent issues. Among these are: effectiveness of AID's assistance; efficiency increases along the Beira Corridor, economic impact of the project, and sustainability. The evaluation will enable AID to apply lessons obtained from the implementation of this project to future, similar transport projects in the region.

III. Background

The Southern Africa Development Coordination Conference (SADCC) was established in 1980 by the nine majority-ruled countries in the region to facilitate and promote regional economic cooperation and the reduction of dependence upon exogenous economic influence. Given its historical role as a key transit center for the region, Mozambique was assigned responsibility for the transport and communications sector of SADCC. Hence, the Southern African Transport and Communication Commission (SATCC), based in Maputo, was established to plan and coordinate development efforts in the transport and communications sectors. The majority of the projects identified to date by SATCC focus on rehabilitating existing infrastructure, much of which has been damaged by various conflicts in the region or has deteriorated from lack of sufficient resources and management and maintenance expertise.

In FY 1985 the USAID Southern Regional Program (SARP) provided funds for the Regional Transport Development Project (690-0231), which provides assistance to the Mozambique and Zambia railway systems. Under the $5,540,000 Mozambique portion of the project, funds were to achieve the following outputs:

- Improved condition of the Beira-Machipanda railway track;
- More CFM(C) steam and diesel locomotives operational;
- Establishment of facilities for diesel locomotive maintenance in Beira;
- Increased availability of commodities for maintenance and repair of steam and diesel locomotives; and
- Enhanced capability of workshop and foundry personnel.

The outputs were to be achieved as follows:

- Emergency repairs for approximately 141 km of track were performed on the Beira-Machipanda railway track by CFM(C) railway crews under the general guidance of a project funded inspector;

- Rehabilitation of eight (8) mainline steam locomotives, one shunting steam locomotive, and two diesel electric locomotives was carried out by ZECO Ltd., a Zimbabwe firm. Two steam locomotives were rehabilitated at Beira by CFM(C) technicians with technical assistance;

- Conversion of a portion of the steam workshop located at Beira to a diesel workshop was done by CETA, a Mozambican firm;

- Supply and installation of railway equipment through an American indefinite Quantity for Beira workshop has been completed. Supply of other commodities using ZECO as the supply agent for the Beira workshops is 98% complete; and

- Training of 32 CFM personnel using on-the-job training and classroom instruction was accomplished at ZECO's workshop in Bulawayo. Provision of 18 months of technical assistance through ZECO was accomplished at the Beira steam locomotive workshop and Beira foundry operations. Currently, PARTEX, subcontractor to ZECO, is providing 2 technical trainers at the Beira workshop. This training will be completed at the end of December, 1988.

IV. Work of Statement

The evaluation team consisting of Locomotive Engineering Specialist and Transport Economist will address the following questions in a written report:

A. Engineering Specialist

1. How has the track repair between Beira - Machipanda (performed under the project) improved the operation of CFM(C)'s steam and diesel locomotive fleet? Did the delayed procurement of railway repair equipment hinder CFM(C)'s capability to perform these repairs? Did the project- procured steel rail ties assist NRZ in their track rehabilitation?

2. Evaluate the quality and schedule of rehabilitation of the 8 steam and 1 shunting steam locomotive and 2 GE diesel locomotives. How did the 7-15 month delay in delivery of rehabilitated locomotives by ZECO affect CFM(C)'s operational capacity? How have the rehabilitated locomotives performed? Have they suffered excessive breakdowns requiring major repairs? If so, how long did any breakdowns cause the rehabilitated locomotives to be out of service? Would it have been more cost effective based on the number of breakdowns and estimated life of the rehabilitated locomotives, to have purchased new locomotives. State reasons for the above conclusions.

3. Has the provision of technical assistance and training strengthened the capacity and capability of CFM(C) to maintain and repair locomotives in Beira? Is CFM(C) now capable of making their own spare parts as a result of project assistance? To what extent have the operations in Beira and Gondola workshop and Beira foundry improved? What has been the percentage increase in foundry production? Can the CFM(C) technicians in Beira now provide adequate and proper maintenance for the steam locomotives recently rehabilitated by ZECO? Is the workshop operated efficiently and is quality control adequate?

4. Has the conversion of a portion of the steam workshop for diesel locomotive maintenance increased the efficiency of the locomotive workshop and enabled CFM(C) to properly maintain the two recently rehabilitated diesel locomotives and the other diesel electrics in their current operating fleet? Is the unfinished workshop and lack of equipment and tools impairing normal mAintenance and repair of the diesel locomotives?

5. Has the procurement of commodities through ZECO and host country procurement agencies increased the availability of commodities for maintenance and repairs of locomotives located at Beira? Were sufficient commodities procured for the types of maintenance and repairs required for both steam and diesel locomotives? What additional commodities, if any, should have been added?

6. Was the additional training (Jan-Dec, 1988) provided by PARTEX through ZECO at the Beira workshop worthwhile? Did the CFM(C) technicians benefit from this additional training and are they now capable of performing the tasks for which they were trained?

7. Are the stores card system and workshop requisition operations adequate for workshop requirements? If not, what improvements are required?

B. Transport Economist

1. Has the daily average number of trains increased from 2.4 (before project) to 3.4 (after project) due to fewer derailments and fater turnaround times? Similarly, to what extent has the pre-project yearly cargo (280,000 tons per annum) increased?

2. Has the availability of locomotives increased since completion of the rehabilitation of the steam and diesel locomotives? If so, by how much?

3. What users have benefited from the increased haulage capacity of the Beira-Machipanda rail line? What countries have benefited from the increased capacity?

4. What types of cargo are being transported by the Beira locomotive fleet, including rehabilitated locomotives?

5. How has the impact of increased locomotive availability affected regional traffic patterns?

6. Have costs been reduced for users of the Beira-Machipanda line due to increased availability of locomotives? If so, to what extent?

7. What were the financial and operating impacts on CFM(C) of the delays in delivery of rehabilitated locomotives?

V. Methods and Procedures

The evaluation will take place from January 30 - February 25, 1989 in Zimbabwe and Mozambique.

The team will follow the format and guidelines established by USAID in the Supplement to Chapter AID Handbook 3 Project Assitance, entitled. "AID Program Design and Evaluation Methodology Report No. 7". The final report will include sections on "Findings and Conclusions", "Lessons Learned" and "Recommendations".

The team will use the following data collection and analysis methods:

A. Interviews and discussions with all appropriate NRZ DNPCF, CFM(C), USAID/Mozambique, USAID/Zimbabwe and ZECO officials involved in the project and review of their data and conclusions;

B. Visit to ZECO in Bulawayo, Zimbabwe for discussion with management;

C. Visits to Beira Corridor freight-forwarding agents and users in Bulawayo, Kwekwe, Harare and Mutare, Zimbabwe and Beira, Mozambique to obtain traffic data; and

D. Visits to NRZ in Bulawayo, Zimbabwe; CFM(C) in Harare, ZImbabwe; DNPCF, CFM(S), USAID/Mozambique in Maputo, Mozambique and CFM(C) in Beira for discussions with government officials.

VI. Team Composition

Ernie Rojas, AREO,	USAID/Zimbabwe
Ben Mutiti, Transport Economist,	USAID/Zimbabwe
Peter Shirk, RCO,	REDSO/Nairobi
Bruce Stader, RCMO,	REDSO/Nairobi
Jack Foreman, Locomotive Engineering Specialist,	IQC (PBI)
Warren Gilbert, Transport Economist,	IQC (PBI)

Resource Persons:

Denis Light, REO,	USAID/Zimbabwe
Luis Santos, Project Manager,	USAID/Mozambique

VII. Funding

All the IQC consultants will be funded by the Regional Transport Development (Mozambique Railways) project.

VIII. Reporting and Debriefing Requirement

The final draft of the evaluation will be completed prior to the IQC team member's departure from Zimbabwe. A final debriefing will be held by the IQC team on February 23, 1988, including USAID staff (Director (Acting), Program Officer, Controller and Chief Project Development Officer).

SCHEDULE FOR MOZAMBIQUE RAILWAYS EVALUATION

January 28 (Saturday)	-	Jack Forman - Locomotive Engineer arrives
January 30 (Monday)	-	Review scope of work, project paper and travel/work plans with Jack Forman
	-	Warren Gilbert - Transport Economist arrives-evening
January 31 (Tuesday)	-	Review scope of work, project paper and travel/work plans with Warren Gilbert.
	-	Review ZECO and CETA contract files
	-	Visit CFM(C) representative- afternoon
February 1 (Wednesday)	-	J. Forman - review Mozambique railway files
	-	Discuss Maputo-Beira travel schedule
	-	Ben Mutiti and Warren Gilbert travel to Kwekwe by rented car to meet major Beira corridor users: Zimbabwe Iron and Steel Company (ZISCO) and Lancashire Steel (sleep in Gweru)
February 2 (Thursday)	-	Jack Forman and Ernie Rojas leave for Bulawayo to visit ZECO Ltd.
	-	B. Mutiti and W. Gilbert leave Gweru for Bulawayo. Visit Dabuka National Railways of ZImbabwe interchange facilities and review train performance, facilities etc.
February 3 (Friday)	-	E. Rojas and J. Forman visit with NRZ officials and continue visits at ZECO Ltd.
	-	Mutiti and Gilbert to meet with: NRZ Planning Branch, Mike Coley of Coley Transport; Manica Freight; Cold Storage Commission.
	-	Forman, Gilbert and Rojas fly back to Harare (evening)
February 4 (Saturday)	-	Mutiti drives back to Harare
February 5 (Sunday)	-	Mutiti and Gilbert travel to Mutare

February 6 (Monday)	-	Gilbert and Mutiti meet with the following in Mutare: Mutare Board and Paper; Green Transport Company; Brown Motors; Leyland and Motors
	-	(travel back to Harare same day)
February 7 (Tuesday)	-	Forman, Gilbert and Rojas fly to Maputo, Mozambique
February 7-8 (Tuesday and Wednesday)	-	Meetings with:
	-	Mr. F. Mendes - Director, DNPCF
	-	Ms. J. Stephens - CFM(S)
	-	Mr. L. Santos - USAID/Mozambique
	-	Mr. J. Schlotthauer - USAID/Mozambique Mission Director
	-	Site visits to: CFM(S) Workshop and Port of Maputo
February 9 (Thursday)	-	Forman, Gilbert and Rojas fly to Beira, Mozambique
February 9-13 (Thursday-Monday)	-	Meetings with:
	-	Mr. G. Mabunda - Director, CFM(C)
	-	Mr. O. Dinis Deputy Director, CFM(C)
	-	Local Freight Forwarding Agents
	-	Workshop Personnel (Engineers, General Manager, Artisians)
	-	Site visits to: CFM(C) Workshop and Port of Beira
February 14 (Tuesday)	-	Fly to Harare (morning)
February 14-18 (Tuesday-Saturday)	-	Write up report for Final Evaluation
February 20 (Monday)	-	Draft report due
February 21-25 (Tuesday-Saturday)	-	Make modifications to draft report
February 23 (Thursday)	-	Review draft report with USAID staff
February 25 (Saturday)	-	Final report due

ANNEX V

BIBLIOGRAPHY

1. Bibliography used for the Engineering Segment of Project Evaluation Report, Parsons Brinckerhoff International, Inc. can be found in Exhibit 10.

PERSONS CONTACTED

1. Persons contacted for the Engineering segment of the Project Evaluation Report, Parsons Brinckerhoff International, Inc. can be found in Exhibit 9.

2. Persons contacted for the Economics segment of the Project Evaluation Report, Parsons Brinckerhoff International, Inc. can be found on table E 13.