PN-ABA-003
56528

TRANSPORT CORRIDORS IN SOUTHERN AFRICA

Considerations Relative to Regional Rail Linkage, Containerization, Logistics/Handling and Unitary Commodity Analysis

Philip W. Moeller, Ph.D.
Senior Transport Economist

Louis Berger International, Inc.

February 18, 1982

Office of Southern African Affairs
United States Agency for International Development
Work Order # 7
Contract No. OTR-C-1788

TABLE OF CONTENTS

PREFACE

TABLE OF CONTENTS

I. INTRODUCTION

II. REGIONAL OVERVIEW

III. ECONOMIC IMPLICATION OF THE LINKAGE ROLE OF THE NRZ

IV. UNITARY COMMODITY ANALYSIS: THE CONCEPT OF STRATEGIC COMMODITIES AND THE TRANSPORT SYSTEM

V. CONTAINERIZATION

VI. LOGISTICS/HANDLING

VII. RECOMMENDATIONS

APPENDIS

ANNEX I Zimbabwe: Elements in the Fuel Shortage, January 1982

ANNEX II National Railways of Zimbabwe (NRZ):

Clarifications Relative to PID Preparations for the Technical Training Wing, NRZ Training Center at Bulawayo

ANNEX III: Study on Training Requirements for Zimbabwe Railways Volume II C-340-5

ANNEX IV: National Railways of Zimbabwe (NRZ) Audio-Visual Production at the Training Center

PREFACE

The following report has been prepared in conjunction with the performance of Work Order No. 7 of Contract No. OTR-C-1788 for the Office of Southern African Affairs of the United States Agency for International Development (USAID). As such, the report represents the second and final of two reports relative to transport sector requirements in the Southern African region. The report was prepared in support of the development and design of regional program activities under the direction of the AID Regional Project officer at the AID mission in Salisbury, Zimbabwe. During the performance of the work order, particular consideration was given to the provision of support for the PID team for the proposed National Railways of Zimbabwe Technical Training Wing Project. This is reflected not only in the structure of the report, itself, but also in the annexes relative to the NRZ project which have been attached to the main report itself. In addition to the report and annexes, numbered memorandums, some of which appear as annexes, have also been prepared. Complete sets of these memorandums have been filed with both AFR/SA and AID/Salisbury.

I. INTRODUCTION

The political settlement and receipt of independence by Zimbabwe in early 1980, re-established the potential promised by a relatively well developed transport infrastructure to the commercial interest of Southern Africa. Although the less sophisticated populace expected to see the shelves of the stores in Lusaka restocked with goods overnight and trading and manufacturing firms considered potential markets and the possibility of re-establishing linked subsidiaries to be headquartered in Salisbury, transport analysts reminded both the consumer and the commercial sector that missive flows of cargo were not on the immediate horizon. Setting aside the issue of the commercial agreements required for the resumption of regional traffic, it was important to note that the very economics upon which such trade had been based had been altered in the years since the border closure. Most basic, however, was the fact that in the intervening years the very transport system itself had been allowed to seriously deteriorate. Major investment would be required for the replacement and upgrading of equipment as well as for manpower development.

The Front-line states joined with the newly independent Zimbabwe to form the Lusaka Nine, established the Southern Africa Transport and Telecommunications Commission (SATCC)--in association with the Southern African Development Coordination Conference (SADCC)-- and placed rehibilitation of the Transport sector as the primary goal in their efforts to reduce regional dependence upon the Republic of South Africa (RSA). As the majority-ruled states sought international donor assistance for the rail and port systems of Mozambique--the generally most agreed upon target for initial rehabilitation efforts -- the transport realities of the 1980's become depressingly clear:

- first of all, the time table for even reduced dependence on the transport facilities of the RSA for bulk commodity transport had to be set in the long-term rather than in the short-term;

- secondly, the access to and, hence, reliability of transport facilities of the RSA was being threatened by congestion in the RSA transport system, possibly complicated by political motives;

- and, thirdly, linkage to either the transport system of the RSA or to the rehabilitated system of Mozambique depended upon linkage via the National Railways of Zimbabwe (NRZ) which was increasingly showing signs of stress.

Thus, the complexities of transport system management, operations, and maintenance have been thrust into the forefront of considerations by development planners in both the public and private sectors.

II. REGIONAL OVERVIEW

A. General Congestion and Traffic Movements

Transport within the region during 1981 was characterized by congestion and recurrent shortages of such various commodities as fuel and fertilizer. The major elements contributing to this situation included:

- the deteriorated condition of rail and port systems in Mozambique, including the need for rehabilitation of equipment and manpower training, which reinforced dependence on the southern route through the RSA;

- the serious congestion of the rail and port systems of the RSA, resulting mainly from a surge in economic activity following soaring gold prices but also related to disruptions related to upgrading the Natal main line (acts of sabotage were isolated and created only short-term dislocations; some congestion was also the result of seasonal demands.)

- the reduced capacity (17%) of the NRZ compared to increased demand (25%) resulting from a shortage of locomotive power and, in turn, to manpower considerations;

- the need faced by Zimbabwe to move both internally and externally its largest maize crop in history.

Congestion during 1981 resulted in two major embargoes placed on commodity movements by the South African Railways (SAR); although the political issues related to their embargoes including the very timing of the embargoes, were obvious and may have been motives influencing the imposition of the embargoes, the existence of congestion on SAR was a real and truly unprecedented situation.

1. The Durban Embargo

In March, 1981 the NRZ, in consultation with the SAR, announced an embargo on import/export traffic for Zimbabwe via the port of Durban. The maximum capacity of the Durban/Johannesburg line is about 220,000 tons a day, but the demand in early 1981 exceeded 300,000 tons; an estimated 300,000 tons of cargo was backlogged in the port. This was no minor problem for Zimbabwe since the port was then handling about half of all the export/import traffic generated by Zimbabwe (the RSA as a whole was handling a total of about 75 to 80 percent of all of the external Zimbabwean traffic). Container traffic was allowed to continue over the route, but this represented only 4 percent by

volume of the total traffic. Other exceptions were also made for fuel and certain foods. The diversion of traffic projected for Port Elizabeth and East London as well as the ports of Mozambique was not equivalent to the traffic cut. The embargo was somewhat relaxed later in the year but was expected to remain in effect into 1982.

2. Maputo Embargo

About the same time (March 5, 1981) as the Durban Embargo the SAR announced an embargo on rail wagons going to Maputo except for perishables. Officially, the SAR said it had been requested by CFM-S on March 2nd to place an embargo on all export goods except coal and perishables but had imposed the embargo itself when it investigated and found that the backlog in rail wagons was reaching about twice the usually accepted level. The embargo was lifted after Mozambique returned more than 1,000 wagons to the RSA in only three days. Most of these wagons were carrying chrome and coal and were backlogged becaused of port inefficiency. About 1,000 coal wagons, however, were being held in port as a result of the delayed arrival of two coal ships, one of which was under charter to the SAR. Some sources felt the coincidence of the two embargoes was not without political motives.

3. Shifts in Traffic Flow

In an open market the selection of route options for the transport of cargo is ultimately dependent upon the realibility/timeliness of a route compared to the unit/cost of using the route. The reduction of dependence upon routing through the RSA may be a stated goal of the SADCC/SATCC countries, but such cannot become a reality until the "composite costs" of such routing become competitive. It was the assumption of many commentators that with the reopening of the border between Mozambique and Zimbabwe, the traffic diverted from Beira and Maputo to the RSA as a result of UDI would revert to former routes to the ports in Mozambique. That such has, in fact, not happened is reflective of the fact that in terms of composite costs that these routes are not competitive.

The comparative advantage of shipping via Beira or Maputo as opposed to using ports in the RSA on the basis of unit cost is primarily a function of distance; although the rate varies accordingly to the type of commodity used it is at least 30 percent cheaper. A consignment of 18 tons, of machinery for, example would cost Z$1,111 to rail from Beira Z$1,190 to rail from Maputo, and Z$2,016 to rail from Durban; in this case, the savings is equal to about 70 percent of the cost of routing through the RSA.

In view of the substantially savings offered by routing through Mozambique it would be expected that traffic through its ports would have increased dramatically during 1980/1981. The fact that such has not happened--actually traffic has declined--is the result of several factors, certain of which directly related to the aforementioned composite cost calculations:

- The realibility of the routes has yet to be established. Although the cost may be less not only are there substantial delays in delivery because of inefficiencies and backlogs but there is also the chance that the cargo might not make it at all or that if it does make it, it will be damaged in the process. This obviously affects the composite cost calculations of the route. Thus, although the routes through Mozambique could handle more cargo than at present, lack of confidence in the ability of the network to handle such traffic on a sustained basis is a major limit on cargo diversion from the RSA.

- The lack of confidence is reinforced by the difficulties related to logistics handling encountered in moving cargo over the route. In particular, one refers to communications problems, inadequate storage facilities, and lack of access to freight agents discussed later in this report.

As a result of these factors, traffic has not shifted from routing through the RSA to the ports of Mozambique, and, in fact, 75 to 80 percent of all external traffic for Zimbabwe remains dependent upon the southern route. The government of Mozambique has placed rehabilitation of the transport sector as a central goal for economic development and understandably is concerned that Zimbabwe has not made greater moves toward the use of its port facilities. The two countries have engaged in consultations as high as the ministerial level relative to this issue, and public pronouncements support the reliance on the eastern ports and suggest that such is "about to happen" at any moment. Confidence in the routes through Mozambique, however, will be slow to come, and the traffic from Zimbabwe will continue to rely on the southern route unless political or strategic factors intervene.

The decline in traffic handled by the ports of Mozambique is in part reflective of the fact, then, that there has not been the shift of traffic from Zimbabwe that had been expected. More specifically, however, it is the absense of this shift coupled with a shift away from the port of Maputo of other cargo which has resulted in the overall decline. Documentation of the process is somewhat complicated by the fact that the GOM considers

details of traffic patterns a state secret. For a general comparison see Table 1 - Mozambique: Cargo Handled at the Port of Maputo 1975-1980. Nonetheless, there are two obvious long-term shifts away from routing via Maputo. The first of these shifts represents the shift of South African cargo to Durban and Richards Bay. This shift represents an interest by the RSA in reducing its dependence upon Maputo which although recent in impact, in fact, goes back almost ten years. The allocation of traffic is primarily handled in the RSA by SAR. Certain shippers had been required by the railway, on the basis of an informal understanding, to make use of Maputo. During 1980, however, a number of South African chrome shipments were diverted away from Maputo, and in January 1981 SAR ended its informal policy of requiring shippers to use the port. The RSA will remain dependent upon Maputo, albeit to a lesser degree, until additional facilities have been constructed in the RSA and the SAR is able to clear congestion on the lines leading to such ports as Durban. The initial shift away from Maputo, however, has already had a visible affect. (See Table 2 - Mozambique Cargo Handled by the Port of Mozambique by Source).

The second shift of traffic more accurately represents a decline in demand rather than a shift, but it has had the same result. Expansion of the regional rail network into Swaziland was keyed to the development of iron mining in the country. Although the feasibility of investment for such was justified on the basis of the return on investment, it was known from the start that the supply of ore was limited. At its peak in the late 1970s, the export of ore equalled 3 million metric tons a year. In 1980, the ore was exhausted and the mine was closed down, representing a major loss in demand for Maputo. The RSA has been discussing the possibility of extending the railway into the RSA to link with SAR. The economics of such seems threathened by the shift in demand, and the strategic considerations of such investment might also be questioned.

4. <u>The National Railways of Zimbabwe (NRZ): Cargo Movement</u>

The National Railways of Zimbabwe plays a major role in regional linkage not only in terms of import/export traffice for itself and, to a lesser extent, Zambia and Zaire but also in terms of transport traffic serviced by the ports of Maputo and Beira. Specifics concerning this traffic have not been readily available because such information has been considered confidential by the NRZ and government offices both before and after independence. The NRZ has provided some projected figures which they have been using in their development planning. The original estimates projected for traffic in 1981 were not reached. With the resolution of the traction problem for the NRZ seeming close

Table 1

Mozambique: Cargo Handled at the Port of Maputo 1975-1980

(1000 tons)

	Maputo		Matola		
	loaded	unloaded	loaded	unloaded	Total
1975	3768	1395	3822	1932	10918
1976	3535	1040	3356	1257	9185
1977	3235	993	2549	1242	8019
1978	2308	1349	2167	1800	7624
1979	2657	1373	2550	1557	8137
1980	2545	1519	1834	1707	7603

Source: SATCC. Transport and Communications for SADCC, Blantyre, 1981.

Table 2

Mozambique: Cargo Handled by the Port of Maputo by Source, 1979-1980

	1979		1980	
	000 tons	%	000 tons	%
Mozambique	3118	38.3	3096	40.7
South Africa	3249	39.9	2992	39.4
Swaziland	1760	21.6	1276	16.8
Zimbabwe	-	-	194	2.6
Others	9	0.1	46	0.6
TOTAL	8137	100	7603	100

Source: SATCC. Transport and Communications for SADCC Blantyre, 1981.

at hand, the revised estimates for the fiscal year 1981/82, albeit optimistic, might be approximated.

Accordingly, to the figures for 1981/82 total traffic would reach almost 15 million metric tons. Of this about 64 percent represents internal traffic and 27 percent represents import/export traffic. The remainder is transit traffic. (See Table 3. National Railways of Zimbabwe: Traffic Estimates, 1981-1982). The importance of the transit traffic, primarily cargo for Zambia, relates to the various essential commodities so carried. The single major commodity carried per type of traffic by tonnage includes: local traffic, coal at 23 percent; export traffic, steel at 16 percent; import traffic, petrol at 10 percent; transit traffic, copper at 32 percent.

According to railway sources, it is estimated that the growth in external traffic to be handled by the NRZ between 1981/82 and 1985/86 will increase by about 23 percent from about 5.2 million metric tons to about 6.5 million metric tons (including import/export traffic and transit traffic. The forecasts of Zimbabwe external trade projected by the SATCC for the same period indicate an increase from only about 4.1 million metric tons to about 4.8 million metric tons or an increase of about 15 percent. See Table 4. Zimbabwe: Forecasts of External Trade 1981/82 - 1985/86). Uncertainties concerning the data base for these two sets of projections make it impossible to reconcile their absolute projections, but they do offer basic correspondence in the relative increase in traffic they project.

B. Traffic Considerations Via the Port of Maputo

Linkage via the port of Maputo has been affected by rehabilitation needs of both the port and rail connections. Following the receipt of independence by Zimbabwe in early 1980 the NRZ had to re-rail a section of the track connecting with Chicualacuala which had been removed for use elsewhere by the NRZ. In Mozambique the CFM-S (South) was also required to provide some upgrading before service could resume. Traffic over the route began in late 1980 but was highly restricted by the state of the road bed in Mozambique. In February of 1981, moreover, service on the line was disrupted by a major wash-out of a main line bridge. Engineering assessments had indicated that such was likely to happen as a result of the usual level of rains in the area. Although the bridge was repaired, concern remained that the problem had not really been solved and that future wash-outs could be expected.

The rail line in Mozambique itself needs both rebalasting and re-sleepering, as well as upgrading the weight of the rails in use on the portion of the line closest to the border. Communications and signalling is most inadequate and is a major

TABLE 3

NATIONAL RAILWAYS OF ZIMBABWE: TRAFFIC ESTIMATES, 1981-1982
Tonnage and Major Commodities

Total Traffic to be carried - 14.96 million metric tons

of which 64 percent = Local traffic (about 9.6 million metric tons)
of which 17 percent = Export traffic (about 2.6 million metric tons)
of which 10 percent = Import traffic (about 1.5 million metric tons)
of which 8 percent = Transit traffic (about 1.2 million metric tons)

Major Commodities

Local

beer	fertilizer	sugar cane
cement	iron ore	timber
chrome	maize	wheat
coal	phosphate rock	
coke	diesel fuel	
cotton seed	stockfeed	

Export

asbestos cement	ferro alloys	sugar cane
coal	maize	tobacco
coke	steel	

Import

amonia	petrol	salt
fertilizer	diesel fuel	steel
ime	avtur	urea

Transit

copper	maize	wheat
fertilizer	steel	zinc

Source: National Railways of Zimbabwe, unpublished data, 1981/82

Table 4

Zimbabwe: Forecasts of External Trade 1981/82-1985/86
('000 tons)

	1981/2	1982/3	1983/4	1984/5	1985/6
Southern Afr.	2,547	2,276	2,284	2,324	2,378
Maputo	1,038	1,505	1,507	1,535	1,558
Beira	119	284	334	331	329
Malawi	53	57	58	60	60
Zambia	105	133	139	145	149
Zaire	281	301	297	291	289
Total	4,143	4,556	4,619	4,686	4,762

Source: SATCC. Transport and Communications for SADCC Blantyre, 1981.

threat to safety. Major activities to date involve rehabilitation of the border station, including a marshalling/exchange yard, and contracting for management assistance by CFM-S from RITES. Consideration is being given to a feasibility study for electrification of the route and it is possible that ODA will assist with a survey of rehabilitation needs for the line rather than for the rail link with Beira.

Operations in the port itself were far from satisfactory upon the resumption of linkage with Zimbabwe, and President Machel himself visited the ports and called for a clean-up and organization of activities. Operations during 1981 were facilitated by the arrival of new fork-lift trucks, and the GOM claimed that it could handle more cargo than was being sent through the port. Uncertainties concerning the port seemed reconfirmed, however, in January 1982 when a backlog of cargo began to build in the port as a result of falling availability rates for the fork-lift trucks.

Improvement of the port capacity involved the need for dredging, augmentation of the coal terminal at Matola, and a container terminal. Activities were underway in each area for at least preliminary feasibility or design studies. Even with the receipt of financing, the operational impact of such improvements would not be felt under the best of schedules until the mid 1980s. Tonnage handled at Maputo remained well below tonnage in the mid 1970s. (See table 5, Mozambique: Cargo handled at the Port of Maputo 1975-1980)

Table 5

Mozambique: Cargo Handled at the Port of Maputo 1975-1980

(1000 tons)

	Maputo		Matola		
	loaded	unloaded	loaded	unloaded	Total
1975	3768	1395	3822	1932	10918
1976	3535	1040	3356	1257	9185
1977	3235	933	2549	1242	8019
1978	2308	1349	2167	1800	7624
1979	2657	1373	2550	1557	8137
1980	2545	1519	1834	1707	7603

Source: SATCC. Transport and Communications for SADCC Blantyre, 1981.

C. Traffic Considerations Via Beria

The geographic position of Beira in conjunction with existing rail linkage makes this port a logical service center for traffic not only for the interior of Mozambique but also for Malawi, Zimbabwe, Zambia, and other land locked countries. With the reopening of the border with Zimbabwe in 1980, expectations were high for the resumption of traffic over the route. Although the flow from Malawi reached 560,000 tons in 1980, or almost 37 percent of total port traffic for the year, the flow from Zimbabwe has been slow (See Table 6). An issue, again is a lack of confidence in the route as well as in the ability of the port itself to handle increase traffic.

From the very reopening of the route there have been recurrent security problems on the rail line. The majority of the time this has been confined to the gunfire from guerrilla groups in the area. In September 1980, however, the line was out of operation for 12 days because of damage to the track. Then again on October 29, guerrilla groups destroyed a span of the Pungwe rail bridge, disrupting traffic until early 1982. Cooperation between the security forces of the RSA and anti-Frelimo guerrillas has been a subject of considerable speculation. Although, the GOM has sought to remove the threat to rail traffic, considerable uncertainty remains over the security of the route.

Additional problems arise from the structure and condition of the rail line itself. The line from Beria on CFM-C (Central) is basically a short footed Y with one arm going to Umtali and the other to Vila Fronteira and on to Malawi. The gradiants of the line going to Umtali are excessive. Thus, although the route is shorter than via Maupto, estimates prepared by the NRZ indicate a kilometer/ton rate for the line to Beria which is 60 to 70 percent higher that via the Limpopo route to Maputo. Equally restrictive is the fact while about 20 trains a day could be run each way on the track between Salisbury and Umtali, only half that number can be handled on the section running on to Machipanda. Operational problems on the arm of track running to Malawi are reportedly greater than for the line to Umtali; derailments and collisions both appear to be problems. Signalling and communication are also major problems on both arms of the Beria line. Progress has been made with traction, but the supply of rolling stock and manpower remain major issues.

Cost considerations relative to rail rehabilitation play a major role in both present and projected utilization of this route.

Table 6

Mozambique: Traffic Handle at Beria 1979-1981

('000 metric tons)

	1979	1980	1981[1]
Zimbabwe	-	20	23
Malawi	659	513	154
Others	30	28	11
Total Transit	689	560	188
Mozambique	1034	958	457
Total	1722	1520	645

[1]January-May only.

Source: SATCC. Transport and Communications for SADCC Balantyre, 1981.

Even rehabilitation would not eliminate the gradiant problem; realignment represents an extremely expensive investment. As a result, the NRZ sees little value in the route to Beria and places its major hopes on Maputo. The basic position of NRZ is "we will look at Beria once we see a maximimzation of the route to Maputo." Rehabilitation has begun on the Dondo/Malawi line. Rehabilitation of the Almada/Machipanda line and the Beria/Dondo line are being considered by the UK and Belgium respectively. Pressure has been exerted on the UK to consider shifting its interest to the Beria line. Communications should be improved as a result of the new ground station to be financed by the Kuwait Fund.

The port itself is restricted by the constant need to dedgre the access to the harbor and by delays related to tidal conditions. A feasibility study is underway by NEDECO of the Netherlands concerning not only the dedgring situation, but also long-term development. A particular interest is the impact of exploitation of coal deposits at Moatize and in the Cabora Bassa region. The impact of any follow-up to this study would not be felt until 1985/86 at the earliest. Meanwhile, the port itself has also been exposed to attacks by guerrilla groups. A tug-boat supplied by the Dutch was reportedly lost at sea in 1980; certain sources believe it was sabotage, although it may have been the result of bad seas and improper use. Quite clearly, the work of saboteurs, however, was the destruction of eight marker bouys in the access channel to the port about mid-November 1981.

D. Traffic Considerations Via Nacala

The port of Nacala is one of the best natural ports on the entire east coast of Africa, offering both natural depth and shelter, and has long been proposed as a major port for import/export traffic for Malawi with a specialization in container traffic. Such development is severly restricted, however, by the state of rail connections between Malawi and the port. Major portions of the rail lines were originally built of light-weight rail much as a logging line would be constructed with the idea that additional investment would be matched to increased use. The section of the line from Cuamba to Nacala, representing about 87 percent of the line, is in very deteriorated condition. The rails are worn, buckled and, in some cases, fastened with loose or broken fishplates. The sleepers are wood and badly worn; the balast is erroded and in serious need of compacting. It is expected that a French/Portuguese consortium will assist rehabilitation of the line.

Table 7

Mozambique: Traffic Handled at the Port of Nacala 1975-1980

(000 tons)

	Loaded	Unloaded	Total
1975	361	386	747
1976	256	335	592
1977	284	349	633
1978	264	344	608
1979	322	462	784
1980	330	422	752

Source: SATCC. Transport and Communications for SADCC Blantyre, 1981.

Tonnage handled by the port declined during the late 1970s but in 1980 regained the level serviced in 1975 (See Table 7 Mozambique;Traffic Handled at the Port of Nacala 1975-1980.) Specific information was especially scarce for Nacala, but at least half of the total traffic in 1980 represented transit traffic for Malawi. Traffic for Malawi has been increasing, whereas traffic for Mozambique via Nacala has been declining. Nacala handled about 9,730 containers in 1980 of which 96 percent were for Malawi. The major need for the port is construction of a container terminal to supplement the facilities in place. The Kuwait fund has reportedly agreed to finance both a study of needs and actual construction. Interest has also been expressed by Finland and France.

III. ECONOMIC IMPLICATIONS OF THE LINKAGE ROLE OF THE NRZ

The fact that the inadequacies of the transport sector in Southern Africa represent a major constraint on economic development in the region is an increasingly common statement in economic analysis of the region. This constraint on economic activity, however, is as much one on current as on potential economic activity. The basis for economic dependency on the transport sector is the reliance of the land locked states and their neighbors on sales of such bulk commodities as mineral and agricultural products, or on the provision of transport services for such commodities, as the source of the foreign currency required to "feed" their economies, that is to say foreign currency which is essential to the very productivity and survival of those economics. The important linkage role of the NRZ relates not only to the potential transport routes and facilities of Mozambique but also to the major routings currently in use through the RSA. The NRZ is thus of key importance to the economics of Zimbabwe, Zambia, and Zaire and, to a lesser degree, even to Boswana.[1] It is on the basis of linkage via the NRZ, moreover, that the very rationale for the currently proposed investment in the transport system of Mozambique rests; traffic generated by Malawi and Swaziland and the RSA would not be sufficient to justify either the level or structure of the proposed investment. Finally, it should be added that the economic stimulus provided by economic activity in Zimbabwe, in turn dependent on the NRZ, is sufficient enough of a cause to warrant regional interest in the NRZ entirely separate from the linkage role of the NRZ for transit traffic. For illustrative purposes the linkage between the NRZ and the economy of Zimbabwe will be detailed more fully.

In January 1982, the Reserve Bank of Zambia released its report for the fourth quarter of 1981, during which economic growth slowed, giving an eight percent rate for 1981 compared to 14 percent in 1980. The decline was linked in the report to limited foreign exchange, scarce trained manpower, and persistent transport difficulties, all three of which are interrelated and are being given priority in Zimbabwe's strategy for national development. The significance of the NRZ to the findings of the report is a function of its major role in both import/export traffic and internal distribution, complications in providing both of which relate to scarcities of manpower and supplies of foreign exchange.

---

[1] The fact that the NRZ continues to operate all rail service through Botswana only emphasizes its importance even if the country does have direct routing through the RSA.

During the first few months after independence the NRZ was faced by rapidly deteriorating locomotives, a declining supply of skilled manpower (mainly white), and the need for widespread investment in rail infrastructure. In November, 1980, back orders for cargo for Zimbabwe in the RSA reached 55,000 tons, almost three times the usual level. The reason related primarily to the inability of the NRZ to meet demand. By early 1981, the combination of the decline in capacity of about 17 percent and an increase in demand of 25 percent resulted in an ability to service only about 50 percent of demand. In March 1981, for example, application was made for permits to export 18 million kilograms of tobacco but only seven million were moved. Mid-year projections for the remainder of the year indicated that no more than two thirds of all available exports and scheduled imports would be handled; some sources said that when one took into account the potential orders not being placed because agents thought it was hopeless, the NRZ might be only servicing 25 percent of potential demand.

The immediate implications of the transport backlog was a loss in the potential earning of foreign exchange which in turn would have direct and indirect effects on economic production. The reliability of the Zimbabwean economy as a source of commodities was put to question by the uncertain transport situation and actual or potential orders were lost. Foreign currency shortages were not new to the country but severely restricted the requirements of reconstruction. Structural modifications in the economy, morever, exposed the textile, fertilizer, furniture, food processing, and paper industries in terms of restrictions on vital supplies of machinery, spare parts or supplies of raw materials required for production. The supply of coal which could be delivered to local industries was also cut as a result of distributions problems and concern began to be expressed in mid 1981 about imports of bagged fertilizer or liquid urea needed for domestic fertilizer production needed for the October plantings (70,000 tons required).

The government has sought to allocate export quotas on a priority system based on earning potential. Thus, gold has been exported over chrome and iron. This was complicated in the case of agricultural products where value by ton could not be used as the only criteria. The massive surplus of maize from the June/July 1981 harvest left almost one million tons for export. Although the value by ton of maize was 19 on the list of agricultural exports in 1980, it was necessary to move as much maize as possible to international markets even if at the expense of such crops as green coffee beans, the prime earner by ton, and flue cured tobacco. Provisional estimates for 1981 indicated that only half of the surplus for export would be moved. (See Annex II, CM/T-125, page 13 for additional discusstion.)

The implications of transport constraints for the economy in 1982 were not reassuring. The overall supply of foreign currency available for the industrial sector was expected to be cut by as much as 40 percent. Drastic cuts had been announced in the allocation for the import of farm tractors. Zimbabwean maize was an uncertain source, especially when compared to more reliable sources in the RSA, and tobacco producers who had discussed increasing production by 28 percent were uncertain of the efficacy of such action if their product could not reach the international market. Declining mineral prices, including gold, requirering increased export to reach last years earnings, also were a source of concern. The declining availability of foreign exchange was a special concern of two groups in industry:

- those industries whose productivity/profitability had already been threatened by the loss of the preferential trade agreement with the RSA (especially textiles and clothing) and which might require additional foreign currency for investment;

- the new black entrepreneur who wanted to start a business but need foreign currency to establish a plant or operation)

The marginality of return on investment and economics of scale clearly were issues here relevant to the allocation of foreign currency and the promise of equity made by the government.

IV. UNITARY COMMODITY ANALYSIS: THE CONCEPT OF STRATEGIC COMMODITIES AND THE TRANSPORT SYSTEM

Whether is a question of managing, operating, or maintaining transport, the process is best seen within a systems context in which transport can be seen as a macro system in itself or as an interactive or micro element in a larger economic system which contains other sectors as well. The merits of such a perspective relative the resolution of transport problems in Southern Africa have already been presented to AFR/SA in previous reports and AID has accepted the perspective as a major element in its strategy for rehabilitation of transport in the region. An appreciation of the systems approach was reflected in the preconference document prepared for SADCC3 in November, 1981. Unfortunately, application of the approach remains to be made.

Subsidiary to the overall systems approach is what might be called Unitary Commodity Analysis. Basically, this involves reducing the focus of analysis to a single commodity or group of commodities which, taken from the perspective of the analyst, are considered of primary importance. Because of the usual connotations of the word "strategic" we would prefer to use the term Unitary Commodity Analysis, but clearly the selection of a particular commodity for such analysis indicates a prioritization of commodities relative to a particular need or interest. The commodity selected for analysis could be such a general category as machinery, food, or petroleum or it could be more specific a category such as drill presses, maize, or high test fuel. A particular industry or firm might wish to narrow the focus to the movement of its product into the economy after it has been produced; the obvious reversal in perspective to include the transport of all items and services needed to create the product rather than just to distribute the finished product clearly requires a broader analytical framework.

It should be pointed out that Unitary Commodity Analysis (UCA) is not simply the collapsing of systems analysis to a subsystem level as in the case of modal analysis (i.e. the NRZ as a focus of analysis) or site analysis (i.e. the port complex of Beira as a focus of analysis). Rather, it follows the transport of a particular commodity over whatever modes are used and to whatever sites are involved in the transit of the commodity through the complete transport system. Again, just as in the case of the systems approach for analysis of the transport sector as a whole, its advantage lies in its wholistic perspective.

The major problem inherent in the approach is the responsibility the analyst must take in subjectively identifying the elements in the overall transport system which direclty or indirectly

affect the movement of the commodity in which he is interested. The analysis could involve a very complicated model, well suited to data processing by a computer or could be reduced to the simplicity of black boxes and arrows on a wall chart. Similarly, the analyst has the responsibility for keeping in mind that his analysis of a single commodity or group of commodities is at the expense of all other commodities in the economic system. Such an approach would not be expected by the Ministry of Transport except in the case of a commodity-specific emergency--when it would indeed be applicable--and in fact the analyst may find the very transport of his commodity threatened by the transport of the other commodities which he has excluded from his model.

Although it is not appropriate to the terms of reference of this report to set up a fill model of UCA, its application to the current fuel crisis in Zimbabwe is highly appealing (For an overview of the situation the reader is referred to annex I. Zimbabwe: Elements in Fuel Crisis, January, 1982 attached to this report) Elements to be required in such an analysis would include:

- Spot Purchasing (supply)
- Costal Delivery
- Port Handling
- Transit by Rail or Pipeline
- In-Country Processing
- Internal distribution/storage
- Prioritization of Demand Against Supply

Clearly some of these elements extended beyond the traditional concept of transport and are elements of logistics handling discussed in Section VI of this report.

V. CONTAINERIZATION

Containerization is clearly the most encompassing advance in international commodity movement since World War II and brings the promise of not only faster rail wagon turn-around but also more efficient and secure handling of the cargo itself. Its introduction to Southern Africa came to the fore in 1977 when the fleet of special "Cellular Ships" capable of carrying varying cargoes of 20-foot container units (TEUs) and roll-on/roll off (Ro-Ro) vessels was inaugarated by the Southern African Europe Container Service (SAECS), itself established just three years before (vessel capacities range from about 1.300 to 2,450 TEUs). Initially, this fleet was intended to serve primarily Maputo, but until the port has been dredged and rehabilitated only the Ro-Ro vessels can use the port. In the interim, the fleet has been diverted mainly to the RSA which has made a major investment in the construction of container handling facilities. If the region wishes to expand its trade with countries in the northern hemisphere and reduce dependency on the RSA, major investment in containerization in Mozambique and Zimbabwe will be required. It should be noted also that the recent embargo on traffic for Zimbabwe via Durban excluded cargo shipped by containers. The current policy of both the NRZ and CFM is to regard Maputo and Nacala respectively as the container centers to be developed for traffic for Zimbabwe and Malawi.

The importance of containerization is reflected in the advance that has made in its role in Zimbabwean traffic. In 1979/80, about 2,000 containers were handled by the NRZ (the monthly container capacity of Maputo and Nacala at that time were about 280 and 500 TEUs respectively, but the containers reaching Zimbabwe at that time came exclusively from the RSA). During 1981/82, the number of TEUs to be handled by the NRZ increased to about 12,600, an increase of over six times, and represented about six percent of all import/export traffic. The NRZ projected an annual growth rate of container traffic between 1982 and 1986 of 10 percent per year. This figure seemed low and was probably limited by projected investment for the flat cars (PNNs) needed to carry the containers (two per flat car) rather than being a function of demand.

The NRZ currently has 206 wagons classed for use in container traffic. Projections have been made of the number of PNNs required for the 1982-1986 period depending on the routing to be used. The NRZ considers certain of the details confidential but estimates that twice as many wagons would be needed if the mix of routing were 50 percent via the RSA/50 percent via Maputo as opposed to 100 percent via RSA. An order for 250 additional PNNs has been placed which would cover the NRZ estimates until sometime in 1985 if the ratio does not exceed 50 percent via Maputo.

Currently, the procedures used for handling containers in Zimbabwe center on the facilities at the Dabuka marshalling yard. This facility has two gantry cranes and can store about 400 containers. The containers are sorted at Dabuka and prepared for customs clearance. Those coming from Durban--plus a few possibly from Port Elizabeth--arrive in trains of 50 wagons and represent the majority of container traffic. Containers do also come from Maputo and, to a much lesser extent, have also come from Beira[1] via CFM-C. Of the total TEUs received about 80 percent go to Salisbury, about 15 percent go to Bulawayo and about five percent are for Umtali, Gwelo and other destinations. During 1981, there was a backlog of TEUs at Dabuka reportedly waiting for PNNs. There were also problems in internal distribution resulting from differentials in import/export use by both Bulawayo and Salisbury; the NRZ was attempting to address this matter in an innovative way using temporary plastic liners to convert the TEUs to carry such liquids as cooking oils.

The facilities in use in Salisbury are in a highly congested area in the central city and are restricted to a traffic rate of about 30 containers a day by city regulations. The limitations of this facility are also a cause for backlogs at Dabuka. There is also a major container park in Salisbury which is privately operated by Independent Container Operators (ICO). ICO has the only facilities in Zimbabwe with full cleaning and repair facilities on site. Capacity in mid-1981 was for 360 containers but plans were underway to increase this to 600 TEUs.

The NRZ has drawn up plans for the construction of a new, fully equipped container terminal for Salisbury to be located at Lochinvar.[2] Both the location and cost of this facility are controversial. The lowest estimate is Z$3 million of which Z$2 million would represent foreign exchange; higher estimates go up to Z$6 million. The construction would be planned in two phases. During the second phase, the length of the yard serviced by the gantry crane to be provided in the first phase would be doubled. The NRZ has had problems in implementing this project because of the foreign currency required as well as because of the other controvercies mentioned above. The issue of the relationship between private firms using the facility and their access to the NRZ facility is another concern. Stimulation of the private haulage sector would be welcomed by the NRZ as it could reduce the foreign currency needs, but the problems faced by the NRZ sector in this matter seem obvious. There are also

---

[1] Unpacking of containers on private sidings without off-loading from the PNN is often an advantage. The NRZ reports that such may not be possible for TEUs from Maputo without reversal by the gantry. Similarly, TEUs with different destinations are often put on the same PNN at Maputo also requiring extra handling at Dabuka.

[2] The NRZ would also like a terminal for Bulawyo by 1990.

potential issues related to user charges, some of which are explained by the NRZ interest in directing future traffic to Maputo rather than to Beira (This in turn relates to higher cost resulting from the steeper grades on the Beira route and CFM policy on container traffic).

It is fairly obvious that various pressures will result in increased use of containerization by the NRZ. The spill-over effect for Zambia, however, will be limited by the reluctance of contain suppliers to send TEUs across the border; they, as well as the wagons that carry them, are slow to return. It is also clear that plans for the adoptation of containerization not only in Zimbabwe but is the region as a whole would benefit from a more rationalized, systemic, and coordinated approach.

VI. LOGISTICS/HANDLING

Logistics/handling is a rather broad, alternately--and sometimes conflictingly--defined term used by transport economists to refer to activities associated with the transit of cargo which is somehow disassociated with the actual process of transit itself. Cargo which is to be transported by rail, for example, must be loaded and off-loaded as well as placed in storage and various decisions must be made about and associated documentation rendered relative to what cargo is to be moved where and when; these activities can be seen as separate from the actual management, maintenance, and operation of the train that carries the cargo. Although, there are points where the distinction between transit and logistics/handling becomes difficult to make, it is important that development planners keep in mind the broad range of activities such a distinction implies.

Previous reports have warned of the danger resulting from neglecting the interface of man and equipment, that is, from viewing the supply of equipment as the solution to transport problems rather than appreciating the necessity of manpower training in order to ensure effective management, operation, and maintenance of that equipment. Although manpower training has been a stated objective within the SADCC/SATCC context, the extent to which this objective has been manifest on a project-specific basis in the transport sector is disappointing. It is from this same perspective, then, that the issue of logistics/handling needs to be given additional attention.

Failure to take such considerations into account results in added damage, costs, and delays. Various examples can be cited:

- Improper handling, including over-stacking, of bagged grains can result in split bags at various points in the transport process;
- Failure to fumigate bulk grains in storage can result in considerable loss;
- Mismanagement of work gangs or misallocations of cranes or trucks at loading sites can cause considerable delay and increase wagon turn around times and unloading charges;
- the use of low-sided wagons instead of flat cars to transport containers can result in damage to the wagons--and possibly the containers or cargo--as well as delay loading/off-loading.

Complications relative to documentation are frequent causes of transport delays throughout the region. Following the lead

of an UNCTAD project in Latin America, documentation for the port of Dar es Salaam has been considerably improved; application of this approach, especially for transit traffic, would be useful in Mozambique. A step which has been taken in this regard was the introduction of a unified system of payments in Maputo in June, 1980. Before then vessels had to pay various charges to different people for such services as lighterage, dredging, the provision of cranes, and labor. This was replaced by two set charges, one for the ship to use the port, and one to load or unload a specific amount of cargo. The system is not only simplier but also allows a shipper to know in advance what charges he will face. Greater pressure is also put on the port for efficient service; now if they do not finish on time, it is the responsibility of the port and not the shipper to pay overtime charges.

In summary, some of the logistics handling problems known to be affecting transport between Mozambique and Zimbabwe include:

- The government of Mozambique has apparently placed a limit on the number of freight and forwarding agents who can work in any one port and opportunities for preferential treatment and this is an area that needs serious consideration and revision.

- Similarly, institutional representation is in adequate. The problem is more serious between the government offices or agencies of one country and other but also exists between the railways themselves. As late as 1981, TAZARA and Zambia Railways had only one way telephone linkage at their common rail head. Mozambique has three major rail systems linkage between which is possible only via the rail system of another country. Although the southern system (CRM-S) has established a representative in Bulawayo, it was unable to provide information to the NRZ about rail conditions on the central system (CFM-C).

- On a more technical level, the issue of inadequate telecommunication service itself affects logistics handling. The problem is especially a problem on lines linking with Beira (CFM-C) with whom there is almost a complete direct telecommunication blackout. Not only do shippers not know where their cargo is or when it has been loaded but the NRZ does not know when to expect a train or the nature of a delay until after the fact.

In recent years, AID assistance programs have ignored the importance of telecommunications in regional transport. Although the Agency may prefer to target its assistance elsewhere and leave the area to other donors, inadequate telecommunications remains a constraint which must be considered in transport planning for the region.

VII. RECOMMENDATIONS

The primary task of this work order has been to assist USAID/Salisbury with program development relative to the transport sector in Southern Africa, including specific project focus on manpower training for the NRZ. In regard to this task several recommendations are made:

- Continued Focus on Key Goals of the Existing Strategy

  Although progress has been made in the realization of the goals set forth in AID's strategy relative to assistance for the transport sector in Southern Africa, the goals themselves remain valid objectives. Restated, the key objectives include:

  --rehabilitation or selective upgrading of existing facilities before new construction is undertaken;

  --re-establishment of meaningful linkage to the ports of Mozambique, including stabilization of the NRZ as well as rehabilitation of the transport network of Mozambique;

  --adoption of systems analysis as the approach to not only rehabilitation but also for day-to-day operation, management, and maintenance of transport;

  --stress on the importance of the interface between man and equipment and the importance, therefore, of manpower training in transport development and planning.

- A Revitalized Image

  Although AID might not really need a "new" image in the region, there would seem a need, especially after SADCC3, for at least a revitalized image. It is suggested that such an image be built on support for institutional growth and development with particular emphasis on manpower training, including management training. (note that institutional development was one of the criteria suggested in M/T-119 and is also a priority for SADCC.) Particular emphasis should be on both skill elevation and self-generation. Primary targets for such include:

  --personnel in government ministries, agencies and organizations associated with transport;

--personnel involved in management, operations, and maintenance within the transport organizations and activities themselves, including both public and private sector activities.

--emphasis on the institutional growth of SATCC itself in the form of:

++ A survey of regional rail training capabilities

++ An application of systems analysis to regional transport constraints and the development of priorities for project selection

++ Application of conceptual analysis based on the selected concepts cited below and expanded in the main body of the report.

Institutionally SATCC has experience almost no real growth. This relates to various factors including the funding and use of short-term teams of advisors rather than creating an in-house capability. The creation of an in-house capability to handle ad-hoc situations on a revolving basis is suggested as an intermediate goal for AID assistance; initial reliance upon the provision of technical assistance by consultants should be seen as an initial expedient.

- Maximization of Existing Resources

The scarcity of institutional resources in the region necessiates the maximization of all the resources which do exist. AID actions should seek to facilitate and promote this maximization process as part of the overall image it is creating relative to institutional growth and development. Areas for particular attention include:

--assisting in the identification of existing institutional resources including public, private, and international;[1]

--developing communications links between these resources;

[1]Note: UNCTAD is currently implementing a regional transport project about which little is generally known and the impact of which seems marginal. Liaison with the project office in Malawi should be implemented and the possibility of supportive or complementary actions be considered.

--encouraging flexible responses on the part of these institutions;

--developing a problem solving orientation.

- Advancement of Specific Concepts

In the main body of the report three conceptual areas have been discussed which are suggested for special consideration in project design and program development. Included are:

--Containerization
--Logistics/Handling
--Unitary Commodity Analysis/Systems Analysis

3/a

Annex I: Zimbabwe: Elements in the Current Fuel Shortage, January 1982

Zimbabwe: Elements in the Current Fuel Shortage, January 1982

With the receipt of independence, the reliability of both the supply and routing of fuel through the RSA came under question. With the serious shortage of fuel encountered in Malawi in 1980 well in mind, the GRZ announced in early 1981 efforts to reduce dependency on South African ports for its fuel imports, primarily through rerouting of shipments to Mozambican ports. A split of 50/50 was a goal for mid-year. Although petrol consumption had increased by 18 percent and diesel fuel by 19 percent since independence, the GRZ stated that it held sufficient reserves in country to handle any immediate difficulties and was taking advantage of spot market purchases to obtain the most favorable price. (See table 1 Zimbabwe: Fuel Consumption, 1980)

Table 1: Zimbabwe Fuel Consumption

1980

	Metric Tons
petrol	179,630
diesel	296,166
aviation	40,618
kerosene	23,691
liquid gas	4,420
TOTAL	544,525

(Source: Salisbury Business Herald, April 9, 1981, see also JPRS, April 24, 1981)

Note: Petroleum imports for 1980 were reported to have cost Z$174 million or US248.8 million, AED, June 19, 1981.

By the beginning of July, however, the existence of a fuel shortage in Zimbabwe was quite apparent and was causing serious disruption in the agricultural sector and was threatening to do the same in the transport sector. The shortage related primarily to diesel fuel; the GRZ announced that allocations of diesil fuel to retail outlets were being cut by 20 percent. By mid-month, many farmers were unable to get the diesel fuel they needed to prepare the ground for "spring" planting, trucks loaded with cotton had been stranded for lack of fuel, and at least two private transport operators in Salisbury had trucks loaded with agricultural produce unable to carry their cargo from rural areas to rail depots for lack of fuel. Even the movement of the maize harvest was threatened. The most affected area was along the Salisbury/Bulawayo road where gas stations were completely out of diesel fuel.

Although some efforts had been made to bring fuel via Mozambique, transit through the RSA remained the principle route of fuel for Zimbabwe. Congestion on both the railways of the RSA and Zimbabwe had almost resulted in a virtual stoppage of fuel shipments. The NRZ itself was down to only two days supply of fuel at some depots. Railway spokesmen were optimistic, however, that the supply could be maintained at that level or better, and no reduction in passenger or freight services was anticipated.

Although the shortage of diesel fuel eased by the beginning of the last quarter of the year, such was done apparently at the expense of standard petrol.[1] The GRZ announced in October that, in order to build up the in-country reserve of petrol, allocations to retail suppliers would be cut by 25 percent. Experiments were also initiated with the mix of ethenol and gasoline, a ratio of 15 percent having been used since early 1981. By November there were serious shortages of petrol, which the GRZ claimed were the result of panic buying. Stations were limiting purchases but still closing early and often for the entire weekend in order to stretch their stock. Lines of 40 cars were common and some having over 100 cars were noted in Salisbury; some retailers had no stock six to eight days before the end of the month. The adoption of an official ration system was urged by some when dealers began to adopt such discriminating policies as selling only to regular customers or to customers buying on account. The GRZ assured the

[1] Zimbabwe no longer uses preminum petrol; the demand for aviation fuel and liquid petroleum gas has increased substantially.

public that there was sufficient fuel in country to meet consumption but that efforts remained to rebuild petrol stocks. To ease concern, the allocation to retailers was to be increased immediately and into December, presumably to normal levels, but the GRZ requested that the public make every effort to conserve on fuel consumption. The GRZ shifted to a 20 percent blend of ethenol in December but by mid-January, cut allocations back to the 75 percent level. The impact of increase demand was also admitted as a cause for the shortage but fuel reserves were reported to be satisfactory.

With the persistence of the shortage it is understandable that the GRZ is anxious to see fuel shipments via Mozambique increased. Before the 1960's all petroleum products were imported in refined form by rail using routing through Mozambique or, to a lesser extent, through the RSA. In 1962, however, the consortium Central African Petroleum Refineries (CAPREF)[1] announced plans to build a refinery at Umtali which was to be linked by a 288 kilometer (about 180 miles) pipeline to be build by the Portuguese controlled Compahia do Pipeline (Mozambique-Zimbabwe) to the port of Beira. The Feruka Refinery was completed in late 1964 at a cost of about 10 million. It was designed to process 907,000 tons[2] of light Iranian crude a year into premium and regular petrol, diesel and air turbine fuel, paraffin, liquid petroleum gas, solvent, and bitumen. The facility operated for only about ten months, however, and was shut down with the introduction of economic sanctions against Southern Rhodesia and the associated oil embargo. The pipeline ceased operation in 1966.

With the settlement in 1980, the GRZ expressed considerable interest in the reopening of the refinery and the pipeline, the latter of which is managed by LONROH. A US$2 million study of the refinery was made by an American firm FLUOR to discover how fifteen years of disuse had affected the facility. The report was completed in December, 1980, but the results were not immediately released. The study found that dampness had accumulated in the asbestos fiber insulation and had caused the exhaust chimmeys to rust. As a result, it was necessary to strip and replace the insulation and treat the rusted metal surfaces. The GRZ accussed CAPREF of dragging its feet. It was then revealed that the cost of rehabilitation was estimated

---

[1] Shareholders in the consortium are; Shell, 20.75 percent; British Petroleum (BP), 20.75; Mobil, 17.75; Coltex, 15.75; American Independent 15; Total Zimbabwe, 5; Kuwait National, 5.

[2] (Maximal capacity probably one million tons)

at US$ 100 million or about ten times the original cost of construction. Eighteen months would be required to complete the rehabilitation, making the earliest possible date for the resumption of operations September, 1982. The viability of the refinery was questioned by most experts, moreover, without rehabilitation of the port facilities not to mention the pipeline.

In view of the projected delay, re-opening the pipeline became a top priority matter. Even before the refinery was in operation, it was suggested , the pipeline could carry refined products. The pipeline could handle up to one million tons of crude, so it ought to be able to handle the 700,000 tons of petroleum products Zimbabwe required for 1981[1]; the limit would be the capacity of the port of Beira.[2] Uncertainly, also existed over the possibility of passing modern aviation fuel through the pipeline without contamination.

A study of the pipeline was made by Pipeline Technologists of London. The first issue was pressure leakage in the pipeline affecting pumping. Secondly, the pipeline still contined approximately 14,000 tons of Iranian crude; part of this had to be pumped to Feruka and the remainder to Beira. Expectations that the pipeline would be operational by April were set back by the discovery that a 40 kilometer section through the Pungwe marshes near Beira were eroded and would have to be replaced. The pipe was ordered from Japan with a target of a June arrival in order to be laid before the onset of rains in October/November when the area becomes partially submerged. While this work was being done, it was proposed to expose another 40 to 80 kms of pipe and recoat it with an anti-corrsive substance. Work was also necessary at the two pumping stations, one at Beira and the other at a point about half-way along the pipeline. On the basis of these requirements the reopening date was rescheduled for the end of 1981 or early 1982. Added complications resulted, however, when the Pungwe bridge was sabotaged in October and the pipeline was left sagging without any support. It was not certain that the pipeline would be reset using the bridge for support or in some other manner.

Once the pipeline is reactivated, moreover, the issue of its capacity remains. By the mid-1980's the demand for fuel in Zimbabwe could exceed the one million ton capacity of the pipeline.

---

[1]Note: This compared to requirements of about 545,000 tons in 1980

[2]Spur pipes would have to be laid to connect with storage tanks at both end of the pipeline.

The addition of two new pumping stations could increase capacity by 25 percent to 1.25 million tons a year, but after that there will either have to be a second pipeline or Zimbabwe will be faced by reliance on rail transport again for a portion of its fuel requirements.

In the midst of all these problems, there is another consideration relative to the use of the pipeline. Mozambique is upset over the loss of revenue for their railway if the pipeline is used, and supposedly the GRM is demanding up to Z$30 a ton for pumping fuel through the pipeline. Diliberation between the two governments was underway in early 1982 and a special delegation headed by the Mozambique Minister of Ports and Surface Transport Mr. Alcantara Santos was in Salisbury to carry out negotiations. Once these negotiations have been completed the pipeline is ready to resume operation.

ANNEX II. National Railways of Zimbabwe: Clarifications Relative to PID Preparation for the Technical Training Wing, NRZ Training Center, Bulawayo, Zimbabwe.

M/T-125

MEMORANDUM

TO: __D. Pfeiffer __AFR/SA TRP File

__L. Hausman __S/TRP File

FROM: Philip Moeller

SUBJECT: Clarifications Relative to PID Preparations for the Technical Training Wing at the NRZ Training Center in Bulawayo.

(The following memorandum has been prepared in conjunction with a field trip to Bulawayo for discussions with Mr. David Fyfe and other members of the staff of the NRZ relative the proposed project. Mr. Fyfe was infomred of the proposed arrival of the AID team on Friday January 29, 1982 and he confirmed his availability.

Contact by Phone 19-72211 ext 74

CAPACITY/TRAFFIC

The major factor affecting the capacity of the NRZ has been directly linked to locomotive power. Indirectly this is linked to manpower considerations in that the lack of suffient traction was the result of a lack of manpower to maintain and repair exisiting equipment. In order to solve the shortage of locomotive power the NRZ has:

- Delayed the retirement of steam locomotives from the system, originally scheduled for 1980, and has, in fact, made major progress in the rehabilitation of a complement of 87 steam locomotives;
- Initiated re-engining of diesel/electric units
- Arranged to lease locomotives to replace a portion of those returned to the RSA in June of 1981. (The RSA locomotives are now again available for use by the NRZ)
- Arranged for the purchase of new locomotives under programs with the United States and Canada.

In January , 1982, for the first time in almost a year the NRZ was able to provide service for all orders on demand. At present the NRZ is confident that congestion should not result from a lack of locomotives (assuming no major rush by exporters) The problem that they now see is keeping the locomotives on line available for service.

38

The drain of artisans and attrition expected in management are still very serious concerns. The former relates especially to the ability of the NRZ to maintain and repair its traction units. The current drain will leave the NRZ technically understaffed and will also affect the number of part-time trainers used throughout the various training programs. Thus, for at least a two year period there will be a serious gap even if the Technical Training Wing (TTW) is constructed. The duration of the problem will depend ultimately on the rate at which attrition/wastage continues.

Because of the structural changes underway in the economy it is difficult to predict future traffic and the requirements in terms of both staff and locomotives for the future. Originally the NRZ hoped to move about 13.6 million metric tons during 1980/1981 of which not quite 10 percent was to be transit traffic for Zambia and Zaire. Actually only about 12 million metric tons was moved, at best. The portion of transit traffic is not projected to increase in NRZ estimates for the next five years (a factor which would probably only result because of artifical restraints) but overall traffic is projected to increase to just over 19 million metric tons by 1985-1986. This represnts an increase of almost 60 percent over the current level. The majority of traffic represented in the increase would constitute internal traffic and exports. Specific breakouts of the NRZ projections have been placed in the Salisbury TRP Files. Breakouts of the commodities involved in NRZ traffic by type and tonnage has also been obtained and placed in the Salisbury TRP Files.

ATTRITION/WASTAGE

The NRZ finds little value in the TRIMAC report, primarily as a result of the assumption made in the report that wastage during 1981 would fall to half the 1980 level.(See M/T-114 and M/T-124) The NRZ has done a limited assessment of the situation which reveals that for the six month period, July 1981 to December 1981 in grade 1-10, including artisans, there was a total wastage of 736 positions. Of this 35 or about 5 percent were grades 1-3, 87 or about 12 percent were grades 4-5, 395 or about 54 percent were grades 6-10, and 218 or about 30 percent were artisans. (See attached breakouts for these figures)

WASTAGES OF GRADES 1-3 : JULY 1981 - DECEMBER 1981.

GRADE.	JULY.	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL.
Admin. Officer to G.M.			1				1
Asst. Chief Elect. Eng.		1					1
Asst. Civil Eng/Officer		1	1			2	4
Asst. Computer Officer.		1					1
Asst. Electrical Eng/Officer.			1			1	2
Asst. Mechanical Eng/Officer.		2				1	3
Asst. Signal Eng/Officer.				1			1
Asst. Structural Officer.	1				1		2
Audit Officer.			1				1
Chief Systems Analyst.			1		1		2
Estates Officer.						1	1
Liaison Officer.	1						1
Mechanical Eng/Officer.				1			1
Personnel Officer.			1				1
Quantity Surveyor.			1				1
Safety Officer.			1				1
Senior Accountant.						1	1
Senior Personnel Officer.					1		1
Traffic Officer.			1	1	1		3
Traffic Superintendant.		1		1			2
Trainee Officer.	2				1		3
Works Engineer.		1					1
TOTAL.	4	7	9	4	5	6	35

WASTAGES OF GRADES 4 - 5 : JULY 1981 - DECEMBER 1981.

GRADE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
DISTRICT STOREKEEPER				1	1		2
DRAUGHTSMAN/WOMAN GRADE 1	1	1	2			1	5
ELECTRICAL INSTRUCTOR						1	1
ENGINEERING ASSISTANT	2		1	1	1		5
ENGINEERING TECHNICIAN				2			2
FOREMAN	5		3		6	3	17
FOREMAN CARRIAGES & WAGON EX.						1	1
LABORATORY TECHNICIAN						1	1
LNR, DRAUGHTSMAN/WOMAN	3		2		1	3	9
LOCOMOTIVE INSPECTOR					1	1	2
MATERIALS INSPECTOR (CIVIL)					1	1	2
MATERIALS INSPECTOR (SUPPLIES)	1						1
MECHANICAL PLANT INSPECTOR						1	1
MECHANICAL INSTRUCTOR						1	1
OPERATING ASSISTANT				1			1
PERMANENT WAY ASSISTANT						1	1
PERSONNEL ASSISTANT				1		2	3
PROGRAMMER	2	1				1	4
PUPIL TECHNICIAN			1	1	1	1	4
RUNNING FOREMAN (GRADE 2)						1	1
SENIOR CLERK (GRADE 1)	1		1			1	3
SENIOR DRAUGHTSMAN/WOMAN					1		1
SENIOR ENGINEERING ASSISTANT			1				1
SENIOR FOREMAN				2	1		3
SENIOR PERSONNEL ASSISTANT						1	1
SENIOR PROGRAMMER			1			1	2
SHED MASTER	1						1
STATION MASTER (GRADE 1)			1			1	2
STORES INSPECTOR						1	1
SUB-ACCOUNTANT			1			2	3
TECHNICAL ASSISTANT (ST. DEP)				1			1
TRAFFIC INSTRUCTOR			1			1	2
TRAINS INSPECTOR	1				1		2
TOTAL	17	2	15	10	15	28	87

WASTAGES OF GRADES 6 - 10 : JULY 1981 - DECEMBER 1981.

GRADE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
APPRENTICES	1	2	4	1	3	8	19
BOILER ATTENDANT	1			1	2		4
CAFETARIA SALESMAN						1	1
CARRIAGE & WAGON EXAM.		1	1	2	2	2	8
CARRIAGE & CLEANING OVERSEER						1	1
CHECKER	1	3	1		1	2	8
CLERK (GRADE 3)	12	9	6	5	9	21	62
COACH ATTENDANT						1	1
COMPUTER OPERATOR			1	1			2
CONDUCTOR		2	3		1	1	7
CONTROLLER C.T.C.	1						1
COOK	1	3		1		1	6
CRANEDRIVER/HANDYMAN GRADE 1	2	1		1			4
DRAUGHTSMAN/WOMAN GRADE 2			1			1	2
ENCODER OPERATOR		2	1			2	5
GASKET CUTTER		1					1
GUARD	3	2	1		1		7
HANDYMAN (GRADE 1)		1		1	1	1	4
HANDYMAN SPECIAL	1						1
INSPECTOR'S ATTENDANTS	2						2
INTERPRETER		1	1				2
JUNIOR ENGINEMAN	1	1	4	1	6	2	15
LADY CLERK SPECIAL	1	1			1	2	5
LADY CLERK TYPIST						4	4
LDG. CARRIAGE & WAGON EXAM.						1	1
LDG. WAGON REPAIRER			1				1
LEADING WORKER	2	2				1	5
LNR. ENCODER OPERATOR	2	2					4
LEARNER ENGINEMAN		1			3	1	5
LEARNER MACHINIST	1					1	2
MACHINE ATTENDANT				1			1
MACHINE OPERATOR (ACCOUNTS)	1						1
MACHINIST GRADE 1 & 2	1	1					2
MAINLINE ENGINEMAN	1	1	1		2	1	6
NURSING SISTER				1			1
OFFICE ASSISTANT GRADE 1	4	4		2	1	4	15

GRADE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
PLANNING PUPIL	1						1
PLATELAYER		1				2	3
PUMP ATTENDANT				1			1
ROAD MOTOR DRIVER	1						1
ROAD MOTOR INSPECTOR					1		1
ROAD MOTOR TRAILER FITTER			1				1
SECRETARY/TYPIST						1	1
SECURITY GUARD (SERGEANT)		2					2
SECURITY GUARD (CONSTABLE)						1	1
SECURITY INSPECTOR		1					1
SENIOR CHECKER						1	1
SENIOR CLERK (GRADE 2)	2		3	4	3	6	18
SENIOR ENGINEMAN	4	8	6	2	10	3	33
SENIOR INTERPRETER		1					1
SENIOR STATION FOREMAN				1			1
SHED ENGINEMAN				1		1	2
SHUNT ENGINEMAN		1	1	1	3	3	9
SHUNTER	2	1	2	2	2	3	12
STATION FOREMAN		1				1	2
STATION MASTER (GRADE 3)	1						1
STOREMAN (SUPPLIES)	1						1
STOREMAN (SPECIAL)				1	1		2
STORES DEPOT SUPV.					1		1
SUPERVISOR TELEX		1					1
TELEPHONIST					1	2	3
TELEPRINTER OPERATOR		2			1	1	4
TICKET ISSUER						1	1
TRACK PATROLMAN		4	2	1	1		8
TRACK WELDING OPERATOR				1			1
TRAFFIC RECORDER			2				2
TRANSPORT DRIVER		2				3	5
TYPING SUPERVISOR						1	1
TYPIST	2			3	3	5	13
TYPIST/OFFICE ASST. (GRADE 1)	1	4	1	2	2	4	14
TYPIST/RECEPTIONIST			1		1		2
WAGON REPAIRER		3	2	1	1	5	12
WAGON REPORTER						1	1

43

GRADE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
WARDEN			1		1		2
WARDKEEPER	1	1				1	3
WORK STUDY OBSERVER			1			1	2
WORK STUDY TRAINEE				1			1
YARD FOREMAN			1	1		1	3
YARDMAN		1	1			2	4
TOTAL	55	75	51	41	65	109	396

WASTAGES OF ARTISANS : JULY 1981 - DECEMBER 1981.

GRADE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
BLACKSMITH			2	1	2	1	6
CARPENTER	2	1	2	1	1	2	9
COACH & BODY BUILDER	1		2	2	1	1	7
COACHPAINTER			2	2	1	1	6
COPPERSMITH	1						1
DIESEL ELECTRICIAN	3	3	1		1	6	14
DIESEL FITTER	10	2	2	4	3	7	28
ELECTRICIAN	4	2	1	3	4	8	22
FITTER	8	7	10	7	8	11	51
MASON	1	2		1			4
MILLWRIGHT	1	1				1	3
MOULDER	2	1	2		1	1	7
MOTOR MECHANIC	1			2		2	5
PAINTER			3	1			4
PLATERWELDER	2	3	6	3	3	1	18
PLUMBER	1		3		1		5
TURNER	1	3	2	3	3	2	14
SIGNAL TECHNICIAN/ARTISAN		2	4	3	3	1	13
SPRAYPAINTER/PANELBEATER	1						1
TOTAL	39	27	42	33	32	45	218

Compared to an authorized complement of 11,234, this represents a wastage rate of 13.1 percent projected for a 12 month period, or twice the rate projected by TRIMAC for the same period.

A separate survey was also run by the NRZ which examined wastage for those artisan positions which the NRZ consideres to be crucial to both operations and maintenance. Included were:

- Diesel Fitters
- Diesel Electricians
- Steam Fitters
- Electricians
- Turners
- Millwrights
- Coach and Body Builders
- Plate Welders

In these catagories during the period July-December 1981 there was a total wastage of 142 positions, leaving a total of 236 vacancies. This when compared to an authorized complement of 763 gave a 12 month projected wastage rate of 37.2 percent. (See attached breakouts). (pp 10-12)

The facts are that artisans are leaving the NRZ at such a rate every month that it is extremely difficult to keep up to date but a projection has been made to the end of December 1982 and this reveals the following :

Based on the average wastage and Recruitment figures for the period 1st May 1981 to 19th January 1982, the position of the Artisan Grades will be as follows :-

NOTE: The figures in brackets indicate the monthly average of wastage and recruitment for the year ending 30th April 1981.

DIESEL FITTERS

Vacancies as at 31.12.81		73
LESS RITES		53
		- 20
Average monthly wastage	9 (6)	
Average monthly recruitment	4 (4)	
Vacancy projection as at 31. 3.82.		26
Vacancy projection a at 30. 6.82.		32
Vacancy projection as at 30. 9.82.		38
Vacancy projection as at 31.12.82.		44

DIESEL ELECTRICIANS

Vacancies as at 31.12.81.		59
LESS RITES		40
		- 19
Average monthly wastage	3 (3)	
Average monthly recruitment	2 (2)	
Vacancy projection as at 31. 3.82.		22
Vacancy projection as at 30. 6.82.		25
Vacancy projection as at 30. 9.82.		28
Vacancy projection as at 31.12.82.		31

STEAM FITTERS

Vacancies as at 31.12.81.	22
LESS RITES	10
	- 12

47

Average monthly wastage	8 (6)	
Average monthly recruitment	5 (4)	
Vacancy projection as at 31. 3.82.		21
Vacancy projection as at 30. 6.82.		30
Vacancy projection as at 30. 9.82.		39
Vacancy projection as at 31.12.82.		48
LESS Apprentices qualifying 1982		12
SHORTFALL		36

ELECTRICIANS

Vacancies as at 31.12.81.		20
Average monthly wastage	4 (3)	
Average monthly recruitment	1 (2)	
Vacancy projection as at 31. 3.82.		29
Vacancy projection as at 30. 6.82.		38
Vacancy projection as at 30. 9.82.		47
Vacancy projection as at 31.12.82.		56
LESS Apprentices qualifying 1982		2
SHORTFALL		54

TURNERS

Vacancies as at 31.12.81.		16
LESS RITES		9
		7
Average monthly wastage	3 (1)	
Average monthly recruitment	1 (1)	
Vacancy projection as at 31. 3.82.		13
Vacancy projection as at 30. 6.82.		19
Vacancy projection as at 30. 9.82.		25
Vacancy projection as at 31.12.82.		31
LESS Apprentices qualifying 1982		5
SHORTFALL		26

Page 3 /

MILLWRIGHTS

Vacancies as at 31.12.81.		7
Average monthly wastage	1	
Average monthly recruitment	½	
Vacancy projection as at 31. 3.82.		9
Vacancy projection as at 30. 6.82.		10
Vacancy projection as at 30. 9.82.		11
Vacancy projection as at 31.12.82.		13
LESS Apprentices qualifying 1982		1
SHORTFALL		12

COACH AND BODY BUILDERS

Vacancies as at 31.12.81		15
Average monthly wastage	1	
Average monthly recruitment	1	
LESS Apprentices qualifying 1982		3
SHORTFALL		12

PLATER WELDERS

Vacancies as at 31.12.81.		24
Average monthly wastage	3	
Average monthly recruitment	1	
Vacancy projection as at 31. 3.82.		30
Vacancy projection as at 30. 6.82.		36
Vacancy projection as at 30. 9.82.		42
Vacancy projection as at 31.12.82.		48
LESS Apprentices qualifying 1982		7
SHORTFALL		41

The total number of vacancies at end of December 1982 will be :

Diesel Fitters	44
Diesel Electricians	31
Steam Fitters	36
Electricians	54
Turners	26
Millwrights	12
Coach & Body Builders	12
Plater/Welders	41
	256
Less artisans to be obtained from Pakistan recently authorised	40
	216
Add Supervisors in ratio of 1 : 10	22
	238

25th January 1982

49

ECONOMIC JUSTIFICATION

Section III in the main report discusses the inter-relationships between the NRZ and import/export sectors on the economy. In brief, the inability of the NRZ to move all trafic on demand has restricted current and future sales of exports. This has, in turn, reduced the inflow of foreign currnecy which is a crucial requirement in the current economy for both rehabilitation and expansion not to mention maintenance of present levels of productivity.

It is difficult to place an economic value on either the actual earnings lsot during 1981 or the potential earnings lost for future years. During 1980 the total value os exports reached Z$ 909.4 million or an average of Z$ 75.8 million a month. Trade figures for 1981 were not readily available at the time this memorandum was prepared but may be available by the time of the PP preparation. Never-the-less, one can make some extrapolations. Comparing the monthly averages for the first four months in 1980 (Z$ 82.85m.to that for the first four months in 1981 (Z$72.9 million) results in a differential of Z$ 9.95 million a month or almost almost Z$ 120 million for a 12 month period. Using the four month average in 1981 compared to the 12 month average in 1980 gives a monthly differential of about Z$ 2.9 million or about Z$. 36 million for a 12 month period. Both the volume and value of exports for 1981 were expected to exceed levels in 1980, even adjusting fo price differentials. Assuming that the primary reason for lower export values was a result of the transport backlog, one could project an annual loss of at least Z$ 36 million for a 12 month period . This figure would not include any calculation of revenue loss to the NRZ itself.

If one assumes that the economy could have exported at least twice decline, a conservative assumption compared to press accounts and interviews with forwarding agents, the monthly differential could increase to between Z$ 3 million and Z$ 20 million. Figures quoted in the Salisbury press as official government estimates indicated that the loss was as high as Z$ 5 million a week or at least as high as the

Z$ 20 million a month estimate extrapolated above. If the loss were to continue for a twelve month period, the figure would reach a quarter of a billion Z dollars. Assuming a full twelve month period at the full rate probably would not be accurate since the differential started to decline by the end of 1981; adding in the loss for future years on the basis of loss of confidence or simply advance orders already placed with non-Zimbabwean suppliers might balance the decline.

Although the primary reason for the decline in exports handled by the NRZ was insufficient locomotive power, this in turn was the result of manpower constraints which hindered maintenance and repairs and resulted in an availability rate of only slightly better than 50 percent of the traction units on hand. Although the NRZ is optimistic about its ability to provide service, especially by mid 1982, the ability of the NRZ to keep traction units in service will be constrained, again, by manpower considerations. The need for technical skills to be taught at the new TTW, therefore, is especially relevant to export movements in the future and the level of foreign exchange brought into the economy.

The NRZ has not made any cost/benefit analysis for the project not is there any analysis of cost per trainee or productivity/profit returns on investment. The NRZ is aware of the need for such analysis but has not had the resources to divert to it. It is uncertain that any additional information in this regard can be provided by the NRZ in time for use by either the PID or PP teams.

TRAINEE ENROLLMENT

The issue of the specific trainee numbers needed to compensate for wastage, not to mention to allow for growth, is difficult to answer in view of the continued uncertainties about wastage. Having just completed the analysis of wastage during the last six months, the NRZ is better prepared to present a projection of enrollment/capacity requirements for the TTW. The PID team may need to guide the NRZ staff in developing these requirements into something concrete enough to include in the PID or PP, but the issue has been raised with the staff. The lack of precision in this area is believed to be a reason why the Ministry of Transport has delayed passing on the request for assistance. The pre-PID Analysis Paper does give a general idea of exisiting capacity and proposed expansion, but this should be enriched by information to be provided by the NRZ.

CERTIFICATION/SYLLABUS (City and Guilds)

This issue remains as discussed in the pre-PID Analysis Paper. The NRZ is understanably reluctant to push the Technical College in Bulawayo or enter into direct negotiations with City and Guilds in London until the timing for the project is more certain. This is probably more a question of technicality than substance, for the same syllabus would be followed in any case.

MANAGEMENT TRAINING

In terms of both internal project consistency, ie. the TTW as a complete unit, and in terms of readiness by the NRZ it would seem best to offer any assistance for management training as a separate project rather than include it as a component in this project.

- The NRZ feels that it could profit from some technical assistance relative to management training, but it is concerned over the continuity such would provide. Basically they feel that funding is not the major obstacle they face and that given time they could develop their own program. Time, however, is in short supply and they are reluctant to take on a whole new influx which is not specifially related to program development underway.

- The issues discussed in the pre-PID Analysis Paper relative to the site and facilities to be used for a management training center still have to be decided. (As a temporary expedient the proposed auditorium could be used for this purpose)

- If assistance for management training would require the participation of nationals from other countries, such assistance would have to cover all the costs of:
  -- developing a more general instructional core
  -- at least the auditorium which is not now in the budget approved by the Ministry of Transport, and certain other facilities, especially for housing. The housing for manangement trainees would have to be a grade above that proposed for the training center itself.

- The NRZ has already redesigned some of its management training for the traffic branch, for example cutting down on the time required from four to two years. (See attachment, Traffic Branch- Trainee Officer Programme ,pp 17-19)

NOTE TO MAJOR PERSONNEL OFFICER (TRAINING)

TRAFFIC BRANCH - TRAINEE OFFICER PROGRAMME

1. (a) As directed, Messrs. Stokoe, Richards and myself have formulated proposals to shorten, streamline and restructure the training programme for Trainee Traffic Officers.

(b) Consideration was given to the 'key result areas' of the various sections of the programme so as to introduce a realistic and meaningful content and to avoid mundane and repetitive features.

2. (a) At Annexure 'A' is a summary of the existing programme with the present periods of training indicated on the left and the proposed periods of training indicated on the right.

(b) This reflects a reduction of 102 weeks on the existing programme. (It must be noted that the sequencing of the programme does not necessarily follow the listing).

3. At Annexure 'B' is a breakdown of the programme showing the present and proposed content of each section together with existing and proposed times.

4. (a) It is proposed that during the programme, the granting of vacational leave be discouraged, but that study leave required in connection with the M.C.I.T. qualification must be encouraged.

(b) After any period of authorised leave, the Trainee is to resume at the point that he left the programme.

5. It is proposed that to monitor progress the Trainee be required to submit a monthly report detailing progress, suggestions, problems encountered and details of study/progress made towards the attainment of the M.C.I.T. qualification.

2/.....

6. (a) Future Trainee Officer induction programmes should include an appreciation of the role that each Branch plays in the overall Railways organisation.

(b) It is suggested that video application could play an important part in this. Recorded programmes could be offered on 'an as and when' basis.

PERSONNEL OFFICER
(TRAINING)

MTC. 1001/3

8th January, 1982

55

ANNEXURE 'A'

OVERALL PROGRAMME

PRESENT PERIOD WEEKS)	SECTION	PROPOSED PERIOD (WEEKS)
Nil	Induction	1
10	Shunter	4
2	Guard	1
24	Station Foreman	17
6	C.T.C. Operator	3
24	Junior Station Master	16
12	Trains Correspondence	6
8	Traffic Inspector	4
6	Wagon Control (HQ)	Nil
4	Demurrage	1
4	Station Control	1
12	Controller C.T.C.	8
4	Colliery Statistics	Nil
6	Wagon Control (Area)	6
6	Working Time Table	1
6	General Office (HQ)	3
1	Development, Investigation and Standards	1
1	Rail Priorities	1
1	Staff Development	Nil
4	Chief Controller	4
4	Senior Traffic Assistant	4
12	Senior Station Master	8
9	Salisbury/Bulawayo Goods	6
6	Salisbury/Bulawayo Coaching	3
6	R.M.S. (Area)	2
23	Area Commercial Office	13
6	Understudy Traffic Officer	10
10	Commercial Branch (HQ)	3
8	Accounting Branch (Revenue & Budgets)	1
2	Civil Branch	1
6	Personnel Branch	2
233		131

There are numerous problems such as uncertainties about new government policies for quotas for senior management. The "openness" of the situation would make it difficult for the NRZ to develop any sort of rigid plan for project development. Limited assistance under some other source of funding for flexibile supplementation of NRZ program development requirements would probably be best.

A brief postion paper relative to this issue was prepared by the training center and is attached (See memo headed, Note to Personnel Manager and memo headed Memorandum to: Personnel Manager)

THE NRZ BUDGET

The NRZ budget is prepared on the basis of a three year,forward or rolling plan. Budget documents are rather detailed and bulky. A general financial statement for the year ending June 1981 is included in the 32nd Annual Report. A monthly survey of financial costs has also been provided by the NRZ. The NRZ will gladly provide more detailed information to the PID team during their visit to Bulawayo on the basis of specific requests. Training costs are not broken out as a separate catagory but are the responsibility of each branch. This is an obvious weakenss for both planning and control. As a general guide the accounting division suggested the figures shown in the table below.

NRZ Training Costs FY 1981-1982 (July1-June 30)

Branch	Z$
Engineering	3,000,000
Supplies and Stores	30,000
Accounting	300,000
Personnel	450,000
Occupational Health	15,000
Traffic(Includes Commerc.)	1,110,000
TOTAL	5,025,000

The drain of artisans and attrition expected in management are still very serious concerns. The former relates especially to the ability of the NRZ to maintain and repair its traction units. The current drain will leave the NRZ technically understaffed and will also affect the number of part-time trainers used throughout the various training programs. Thus, for at least a two year period there will be a serious gap even if the Technical Training Wing (TTW) is constructed. The duration of the problem will depend ultimately on the rate at which attrition/wastage continues.

Because of the structural changes underway in the economy it is difficult to predict future traffic and the requirements in terms of both staff and locomotives for the future. Originally the NRZ hoped to move about 13.6 million metric tons during 1980/1981 of which not quite 10 percent was to be transit traffic for Zambia and Zaire. Actually only about 12 million metric tons was moved, at best. The portion of transit traffic is not projected to increase in NRZ estimates for the next five years (a factor which would probably only result because of artifical restraints) but overall traffic is projected to increase to just over 19 million metric tons by 1985-1986. This represnts an increase of almost 60 percent over the current level. The majority of traffic represented in the increase would constitute internal traffic and exports. Specific breakouts of the NRZ projections have been placed in the Salisbury TRP Files. Breakouts of the commodities involved in NRZ traffic by type and tonnage has also been obtained and placed in the Salisbury TRP Files.

ATTRITION/WASTAGE

The NRZ finds little value in the TRIMAC report, primarily as a result of the assumption made in the report that wastage during 1981 would fall to half the 1980 level.(See M/T-114 and M/T-124) The NRZ has done a limited assessment of the situation which reveals that for the six month period, July 1981 to December 1981 in grade 1-10, including artisans, there was a total wastage of 736 positions. Of this 35 or about 5 percent were grades 1-3, 87 or about 12 percent were grades 4-5, 395 or about 54 percent were grades 6-10, and 218 or about 30 percent were artisans. (See attached breakouts for these figures)

NOTE TO PERSONNEL MANAGER
(THROUGH SENIOR PERSONNEL OFFICER (TRAINING))

MANAGEMENT TRAINING : POSSIBLE USE OF OUTSIDE EXPERTISE

1.	Current Training	(i)	General man management training with content relevant to our own situation.
		(ii)	General management functions, i.e. Planning, Organising, Controlling etc.
2.	Proposed Training	(i)	As in 1 above plus specialised short duration programmes, inter alia, management accounting, computer appreciation, corporate planning, cost centre budget control, supplies procedures etc.
3.	Regional Training Concept	(i)	I am not aware of the current thinking in this regard, but our own house must come first.
4.	Premises for Training	(i)	Dependent on course content and numbers involved, it is intended to use existing facilities at the Training Centre (when available) or to use outside facilities, e.g. Hilltop Motel.
		(ii)	Ideally a separate establishment with residential, recreational etc., facilities, if finance available.
5.	Comment	(i)	As we know, the Railways is a specialised industry and whilst there are similarities in Railway systems world wide, there are also differences. The differences tend to preclude the use of expertise from other Railways or organisations in our management training.

2/.....

(ii) In the general management training area we have recently experienced the Industrial Society presenting their "Management for the 80's" programme, which although refreshing and well presented, simply expounded well established management principles/theories. It left us with nothing new except an updating in audio visual aids. We have yet to establish what improvements management have noted as a result of this programme.

MEMORANDUM TO : PERSONNEL MANAGER

TECHNICAL TRAINING

1. Your discussion and queries related to Dr. Moeller's visit on Monday 25th January, 1982 refer.

2. Firstly in relation to management training the attached has been submitted by Mr. Jeans.

2.1. My own personal feeling on this issue is that, because Management training has not, in the past, been standardised for all Branches, our most pressing need is to achieve at least a standard training period for Officer trainees, and then commence the compiling of job related training programmes. Mr. Jeans has been given this task and will, in the near future, begin to carry out job breakdowns and the preparation of scripts in accordance with the Technicon technique. He himself, as you know, completed the course in Durban and he will be assisted by one of the scriptwriters who have been trained by me. In this sphere I see no need for assistance from outside.

2.2. General management principles are perhaps an area where outside expertise can be utilised, but the danger here is that as soon as the "outsiders" disappear the newly acquired knowledge and skills are quickly lost. If Mr. Taylor of the Industrial Society is to return, I personally do not see a need for further outside assistance, particularly so if the approach is to be different.

3. Apprentice Training

3.1. City and Guilds examinations are written by all Apprentices except those in the Mechanical Industry, e.g. Fitters, Turners, who now write a Zimbabwean National Certificate.

2/.....

3.2. I have attempted to obtain a copy of the Apprenticeship Act for Dr. Moeller and was advised that legislation will, in fact, change next month.

3.3. Generally there is uncertainty as to whether or not links will remain with City and Guilds but if theoretical training is to continue at the Technical Colleges, it seems likely that this will be the course followed. To change to a Zimbabwean or any other course would involve a great deal of preparatory work, different examinations and new examiners, and there are not staff available in the colleges at the present time to cope with such changes.

3.4. If we were to change to say an American system of training it would have to be acceptable to Trade Unions and to the Apprenticeship Authority. In addition if the theoretical side were to be taught at the Colleges they would require additional staff with a change in approach - it is highly unlikely that this would be acceptable either at the College or to learners if the Certificate were not as widely recognised as the City and Guilds papers. If the Railway apprentices were the only ones doing this course it is even less likely to be accepted. Under the present system apprentices who successfully complete their practical trade test and who also pass City and Guilds examinations can go anywhere in the world and be accepted. A change to a less widely recognised certificate would, therefore, have certain disadvantages should artisans wish to leave the country and, in fact, even if they wished to move to another organisation within the country.

3.5. Should there come a time when Trade Unions amalgamate I envisage problems in gaining acceptance for a new theoretical training course applicable only to the Railways.

3.6. On the more positive side, as you are aware, the Colleges are becoming less able to cope with the numbers of Apprentices requiring training and it could be that, in time, organisations, such as this, will be required to do more and more of the theoretical training. In that event, with Trade Union and Apprenticeship Authority approval, it could become possible to change to a new theoretical syllabus. Should this happen, we would probably require assistance from outside in drawing up course material and re-training our Instructorate staff.

3/.....

4. Your query related to a technical liaison person for the new Technical Training Centre in fact relates to our request last year for the post of a Senior Engineering Assistant ~~post~~ within the Training Centre complement. This is exactly the type of role it is envisaged he would fill, as is the case with the existing Senior Personnel Assistant (Traffic Grades). It is not considered that an outside agency could provide us with a more capable person than we could at this time obtain from within the Railways.

5. I hope I have given a satisfactory answer to your queries. I have unfortunately been tied up with selection seminars for 3 days this week so have been somewhat limited by time. Should you require any further information on Monday I shall be glad to assist.

A F Moody

ACTING SENIOR PERSONNEL OFFICER
(TRAINING)

30:0465:84

22nd January, 1982

63

INTEREST OF OTHER DONORS

- ODA has already provided asstance for a modular program for management training. These were short seminars for in-service training. Further assistance is not anticipated.
- ODA is negotiating technical assistance for the NRZ with an emphasis on Electrical, Mechanical, and Civil Engineering. The majority of the technicians to be provided would not be involved in classroom instruction but perhaps five of them would be involved in work with training at the training center. The request to ODA is based on the present structure of the center and is not, therefore seen as a duplication of the request to AID. This is possibly a reason for uncertainty by the NRZ over the need for T.A. for the TTW. ODA is having problems recruiting personnel for the positions requested. Minutes of the meeting between ODA and the NRZ on January 19th, 1982 have been provided by the NRZ and have been placed in the NRZ TRP File.
- The EEC had approached the NRZ about a project, but the NRZ has heard nothing from the EEC since the initial contact. To their knowledge the Ministry of Transport has heard nothing either A copy of the suggested project is on file and further efforts will be made to contact the EEC to verify the situation.
- The Belgians had approached the Ministry of Transport about assistance, but they never have had discussions with the NRZ. They were primarily interested in the servicing of electrical equipment in support of one of their domestic firms. Funding is believed by the NRZ to have been diverted to rural development.
- Kuwait Funds are being administered by the IBRD to cover the costs of the 200 some Indians brought in under the program discussed in the pre-PID Analaysis Paper.

THE NRZ AS AN INSTITUTION

STRENGTHS

- The NRZ employs almost 20,000 individuals and represents a self sufficient institution with capabilities that exceed those of any other transport mode and most industrial enterprises in the country.
- As a development institution the NRZ has played a primary role moreover, through the modern economic period of the country.
- The NRZ has developed an internal system of testing and training personnel meshed with a stepped system of advancement: advancement has been linked to on-the job training and experience as well as education.
- Employement opportunities for the black African offered by the NRZ have long been considered advantageous. Progressive advancement to intermediate levels was based on performance and fairly objective evaluations.
- Primary orientation of the NRZ has been the efficient provision of transport service for a profitable return. Practicality and pragmatism have been inculcated.
- The NRZ thinks of itself as an non-dependent entity; its has tried to disassociate itself from government and politics and prefers to rely on its own resources whereever possible.
- The NRZ has demonstrated an ability to deal with problems in an innovative and creative manner.
- The NRZ management possesses broad understanding of operations, maintenance , and services required to provide rail service
- The NRZ has demonstrated an interest in advancing in-service black employees without being forced or directed to do such from the outside; later impositions by the government have in many cases matched what the NRZ was already undertaking.

WEAKNESSES

- The management of the NRZ has a skewed age structure; by 1985/86 half of the present expertise will be gone. There is inadequate time to transfer management skills and experience. A deterioration will be inevitable even with the use of expatriates for an interium period.
- The management of the NRZ is almost exclusively white. This added to the skewed age structure gives the impression that management is much more conservative than it actually is
- Employment by the NRZ is not especially sought after by young whites who regard such positions as having lower status than positions with other employers. This identification could also become accepted by qualified black africans seeking employment in management.
- The self-sufficient image the NRZ has of itself is a limit on its ability to deal with such government offices and agencies as the Ministry of Transport itself. An exclusive image often breeds suspicion.

ANNEX III. Study on Training Requirements for Zimbabwe Railways, Volume II, C-340-51 (TRIMAC)

UNITED STATES GOVERNMENT

memorandum

DATE: January 16, 1982

REPLY TO ATTN OF: Philip W. Moeller

SUBJECT: Study on Training Requirements for Zimbabwe Railways, Vol II, prepared by TRIMAC for the Commonwealth secretariat, 1981 C-340-51

TO: - D. Pfeiffer - L. Hausman - S/TRP files - AFR/SA files

Introduction

This volume is the second part of the report reviewed earlier in M/T-114 and as such it contains appendices to the main report contained in the first volume. A copy of volume II has been placed in the TRP/Salisbury file and another is being passed to the NRZ, which as of January 16, 1982 had not yet received a copy for its own use. There are a total of nine appendices in volume II, each of which is briefly reviewed or cited here.

I. Analysis of Staff Wastages 1975-1980

This analysis is confined to grades 5 to 10 for the six year period 1975-1980 but is broken out on a very job specific basis. The most significant fact revealed by the data is that annual staff wastage has varied from about 12 to 15 percent. The lowest 5 year rates by category included apprentices (30%) and guards (38%) bu the highest included electricians (266%) and fitters (221%) followed by signals technicians (163%), all of whom can readily find employment outside the NRZ at very competitive salaries. Additionally it should be noted that wastage of white skilled personnel has not declined since 1980 as had been anticipated by the TRIMAC Team and may, in fact, have increased.

Appendix II Detailed First Priority Manpower Profiles Function and Subfunction.

This Appendix represents a projection of wastage for Management and Traffic, Civil Engineering, Mechanical Engineering, Electrical Engineering, and Signals based on 1980 vacancies. The projection, summarized in table 1 TRIMAC Report: actual and Projected Wastage of NRZ Personnel 1980-1990) is of reduced value since the rate of wastage since 1980 is known to exceed the rate used in the projection for that period as well as for subsequent wastage. The NRZ has given urgent status to a reassessment of wastage and estimates the availability of at least a provisional report by early February. The NRZ has been alerted to the priority the PID would place on such a reassessment as well as other issues relative to preparation of the final PID.

OPTIONAL FORM NO. 10
(REV 1-80)
GSA FPMR (41 CFR) 101-11
5010-114

Table 1. TRIMAC Report: Actual and Projected Wastage of NRZ Personnel 1980 - 1990.

Reference	Category by Function (Grade)	Authorized	Actual	Vacant 1980	Super-numerary	Wastage by 1982	By 1984	By 1986	By 1988	By 1990	After 1990	TOTAL
1.1	*Management Function (1-10)	10	8	2	0	2	2	2	-	1	1	10
1.2	*Senior Management, Traffic (1-3)	30	29	1	0	6	10	2	6	3	1	29
1.3	Intermediate Management (4)	29	25	4	3	9	6	3	3	-	4	29
1.4	Junior Management (5)	122	117	5	1	17	22	11	18	17	32	122
1.5	Senior Tradesmen & Supervisors (6)	667	586	81	12	46	50	45	33	27	380	667 (1)
1.6	Skilled Tradesmen & Supervisors (7)	244	217	27	1	14	19	21	29	18	120	244
1.7	Skilled Personnel (8)	1,314	1,034	280	43	37	40	27	35	21	874	1,314
1.8	Semiskilled and Training (9)	1,087	945	142	129	10	13	8	9	10	895	1,087
1.9	Attendants & Assistants (10)	1,178	1,068	110	122	-	-	152	-	169	747	1,178
2.1	*Senior Management & Engineering (1-3)	40	33	7	-	5	5	5	2	1	15	40
2.2	Intermediate Management (4)	53	52	1	7	3	6	3	5	2	33	53
2.3	Junior Management (5)	126	86	40	25	4	8	8	8	6	52	126
2.4	Senior Fitters and Artisens (6)	62	49	13	20	1	2	2	1	2	41	62
2.5	Senior Artisens (7)	175	151	23	11	13	11	16	14	6	92	175
2.6	Other Trades (8)	185	169	16	7	5	2	10	5	3	144	185
2.7	Other Trades (9)	136	101	35	32	6	6	5	8	8	67	136 (2)
2.8	Other Trades (10)	532	466	66	23	38	46	44	49	66	227	532 (3)
3.1	*Senior Management, Mechanical Eng. (1-5)	31	30	4 (4)	3	2	-	5	2	1	17	31
3.2	Intermediate Management (4)	56	54	2	3	13	6	8	9	5	13	56
3.3	Junior Management (5)	192	182	10	10	10	25	33	30	19	65	192
3.4	Senior Fitters and Artisens	821	573	248	147	29	29	36	31	26	422	821
3.5	Senior Artisana (7)	158	101	57	5	6	4	17	5	13	56	158
3.6	Other Trades (8)	558	420	138	95	17	10	13	17	13	350	558
3.7	Other Trades (9)	158	137	21	62	5	3	9	5	5	110	158
3.8	Other Trades & Appentices (10)	513	503	10	40	19	30	17	24	38	375	513
4.1	Senior Management, Electrical (1-3)*	20	16	4	5	-	-	-	-	-	16	20
4.2	Intermediate Management (4)	26	22	4	4	2	1	4	1	4	10	26
4.3	Junior Management (5)	32	32	-	3	3	1	2	1	-	25	32
4.4	Senior Fitters and Artisens (6)	108	93	15	4	7	1	5	4	3	73	108
4.5	Other Trades (8)	9	4	5	-	-	-	-	-	-	4	9
4.6	Other Trades (9)	64	45	19	1	-	-	-	-	-	44	64
4.7	Other Trades & Appenticeship (10)	171	125	46	1	1	1	-	1	2	120	171

Reference	Category by Function (Grade)	Authorized	Actual	Vacant 1980	Super-	Wastage by 1982	By 1984	By 1986	By 1988	By 1990	After 1990	TOTAL
5.1	Senior Management, Signals (1-3)*	14	14	-	5	-	2	-	-	2	10	14
5.2	Intermediate Management (4)	18	14	4	-	2	-	1	3	-	8	18
5.3	Junior Management (5)	19	13	6	-	1	1	-	1	1	9	19
5.4	Senior Fitters & Artisens (6-7)	137	72	65	4	4	5	2	6	2	53	137
5.5	Other Trades (8-9)	44	39	5	-	1	1	2	1	3	31	44
5.6	Other Trades and Appentices (10)	93	91	2	0	-	1	-	1	1	88	43

Key: The data use to prepare this table was taken from tables 1.1 - 5.6 of appendix II in Study on Timing Requirements for Zambabwe railways, appendices, Vol. II, Trimac, Albert Canada for the Commonwealth Secrebarial, C-340-51 April 1981. The original data includes breakouts by

* Includes certain portions not in numerical classification system.

(1) Actual total = 662, source of discrepancy is uncertain.

(2) Actual total = 135, source of discrepancy is uncertain.

(3) Actual total = 536, source of discrepancy is uncertain.

(4) Discrepancy in vacanies reported versus authorized and actual; total and authorized are equivalent.

III. Representative Job Descriptions

The issue of the number of and detail included in job descriptions used by the NRZ is discussed in volume I. The TRIMAC team supported the NRZ position that union demands for more of each are really excessive. This issue is really not especially relevant to the task of the PID team.

IV. Procedural Order for the Establishment of Manppwer planning and Development Section within Personnel Branch and Manpower Planning and Development Progress Report, December 1980.

The Procedural Order is followed by two organizational charts which are reproduced here. Over half of the December 1980 report is too faint to read but the information it contains is obviously dated.

V. Traffic Function Training Modules

These training modules provide especially useful insights into training personnel for the operational needs of the NRZ. They are, therefore, attached to this report.

VI. Representative Apprenticeship Training Requirements

(Self Explanatory)

VII. Minutes and submissions from Training Sub-Committee Meeting in Interrailway Conference, Malawi January 23 to January 25, 1981.

Although the information in this section is over a year old, it is the best example of the different levels of development and directions of manpower training for railways in the region. It is too lengthy to be included here but provides useful evidence for the PID team of problems in consideration of training programs below the management level based on a regional basis.

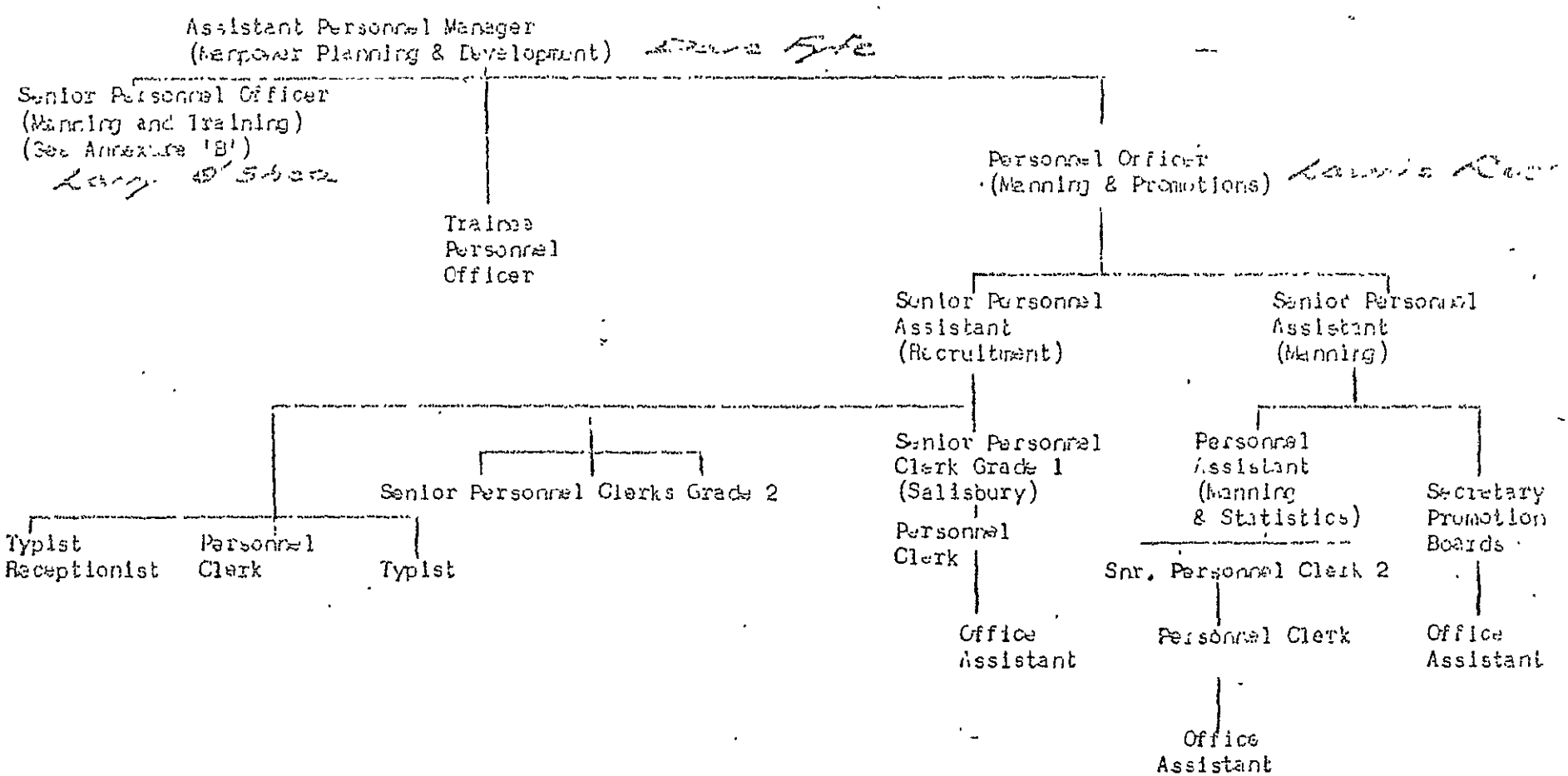
VIII. Review of the results of the Second South African Development Co-Ordination Conference (useful bit dated and available elsewhere).

IV. The New Single Battery National Railways of Zimbabwe Aptitude Test.
(See discussion in M/T-114).

BEST AVAILABLE

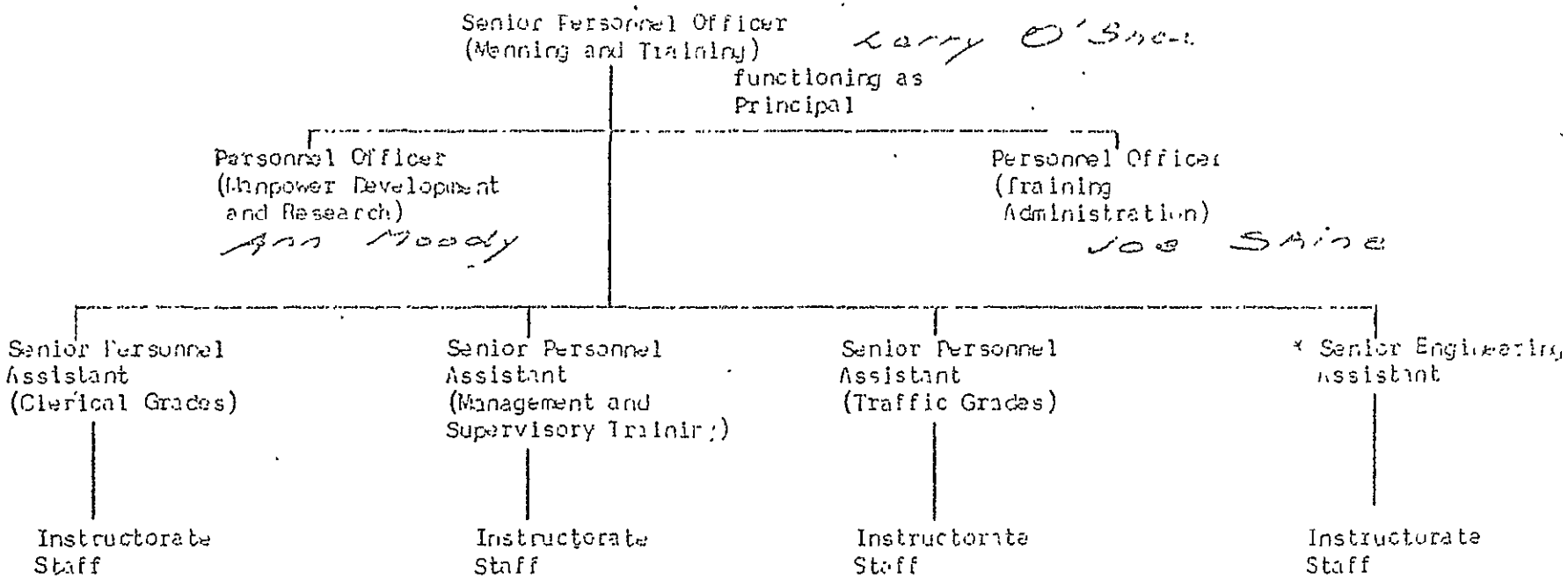
ANNEXURE 'A'

MANPOWER PLANNING AND DEVELOPMENT ORGANISATION



TRAINING CENTRE ORGANISATION

ANNEX 'B'



* The Senior Engineering Assistant is a new post and the incumbent will assume responsibility for the development and administration of technical training courses in conjunction with the Engineering Branches and Personnel training staff.

BEST
AVAILABLE

MODULE NO. 1 - SHUNTING
(up to 10 weeks)

1. OBJECTIVE

a) To qualify as a shunter by receiving instruction at the training centre and on job training in the shunting yards.

b) To spend a period of up to six weeks working as a member of a shunting crew.

2. ASSIGNMENT

1. Discuss the training of a shunter and offer your opinion of the effectiveness of this training.

2. Do you consider the shunter to be a skilled, semiskilled or unskilled worker? How worthwhile is his labour and how may he best be motivated?

3. How important is the shunter in the railway organization, and how would you assess his contribution to the aims of the traffic branch?

4. How do you think the shunter sees himself? Does he obtain job satisfaction? Is he ambitious?

5. Consider the marshalling and breaking up of trains in the Greater Bulawayo Complex. Is this done efficiently? Are facilities adequate?

6. Outline your thoughts on our services to private siding holders.

7. Discuss the problems of roughing shunting and careless shunting.

8. What are your thoughts on yard supervision, and do you think the chain of command and communication is correctly set?

9. What are the attributes you would look for in a good shunter?

10. What have you, personally, gained from this experience?

11. What changes, if any, would you propose in the shunting yards?

12. Discuss any other aspect of the job which has been of particular interest to you.

MODULE NO. 2 - GUARDS DUTIES
(two weeks)

BEST AVAILABLE

1. OBJECTIVE

To gain an understanding of the duties of a guard, without actually qualifying in the grade.

2. ASSIGNMENT

1. Discuss the role of the guard in the overall context of the railway organization.

2. What part does the guard play in meeting the requirements of our customers?

3. Outline some of the guard's responsibilities in maintaining safety in the working situation.

4. Discuss, in general terms, what a guard does when working:

   i) a passenger train
   ii) a mixed train
   iii) a pick up train
   iv) a goods train.

5. How necessary do you believe the guard to be in the running of trains?

6. Outline any other facets of this job which you feel are worthy of comment.

7. Assess how valuable your association with this job has been.

Best Available Document

BEST
AVAILABLE

MODULE NO. 3 - DUTIES OF A STATION FOREMAN
(up to 24 weeks)

1. OBJECTIVES

   a) To receive instruction at the training centre and on job training at designated stations prior to qualifying as a station foreman.

   b) To perform fully independently as a station foreman.

2. ASSIGNMENT

   1. Discuss the training received by a station foreman in the classroom and in the on job situation.

   2. Consider the part played by the station foreman within the overall scope of the traffic branch; and assess his contribution to railway objectives.

   3. What are the station foreman's relationships with other members of the training branch, and how may he best foster these relationships?

   4. What contact does the station foreman have with other branches? How important are these contacts?

   5. Outline the station foreman's responsibilities and priorities.

   6. How involved must the station foreman be in the working of the station traffic yard and sheds?

   7. How does the foreman plan and arrange the efficient movement of trains?

   8. Is liaison between the foreman and the controller, important, and if so, why?

   9. Do you consider that the station foreman's responsibilities become fewer as he gains confidence in his own ability?

   10. Do you see the station foreman's job as being worthwhile in itself, or should it be considered as a stepping stone to a higher position?

   11. What have you, personally, gained from this experience?

   12. What changes, if any, would you make, to the station foreman's job?

Best Available Document

BEST
AVAILABLE

MODULE NO. 4 - DUTIES OF C.T.C. OPERATOR
(up to 6 weeks)

1. OBJECTIVES

To qualify as a C.T.C. operator by on job training, and to work independently in the grade for a given period.

2. ASSIGNMENT

1. Compare the methods of trainworking with which you have been involved, and analyze the advantages and disadvantages of the different systems.

2. Discuss the job of C.T.C. operator and identify its place in the overall railway undertaking.

3. How important is communication between the operator and trainmen?

4. What are the social implications to an employee who chooses to become a C.T.C. operator?

5. Are there any circumstances where trolleys may be given precedence over trains on C.T.C. territory?

6. C.T.C. is recognized to be a safer form of trainsworking than paper orders. How vigilant must the operator be, compared with the station foreman?

7. What does the operator concern himself with apart from arranging train crossings?

8. What are the promotional prospects of the C.T.C. operator, and do you believe them to be adequate to provide for an employee of average ambition?

9. Who does the operator refer to for guidance and advice?

10. What have you gained from your period as a C.T.C. operator?

Best Available Document

BEST
AVAILABLE

MODULE NO. 5 - STATION MASTER GRADE 3
(approximately 24 weeks)

1. OBJECTIVE

a) To qualify as a grade 3 station master by passing the relevant commercial examination after receiving intensive classroom and on job training.

b) To be certified as competent in the grade by the area traffic manager after being attached to a small station for at least two months.

c) To perform independently as a grade 3 station master for a period to be determined by the chief traffic manager.

2. ASSIGNMENT

1. Discuss all aspects of your training in this grade, commenting on any area of difficulty you may have encountered.

2. Discuss the commercial activity at the station you ran independently.

3. Comment upon your operating involvement at this station.

4. Outline your responsibilities in the matter of general organization and staff control.

5. Consider the extent to which you were involved in direct contact with railway users, and offer comment upon this importance of good customer relations.

6. Has the junior station master any place in local society, and if so, is it important to the station master? The public? The railways?

7. Examine the role of the station master in local disputes, accidents, derailments, etc.

8. To what extent should the station master refer to the area commercial officer when problematical matters are encountered?

9. What do you consider to be the main responsibilities of a junior station master in his capacity of line manager?

10. Of what value has this experience been in your personal development?

Best Available Document

BEST AVAILABLE

MODULE NO. 6 - TRAINS CORRESPONDENCE

(approximately 12 weeks)

1. OBJECTIVES

To gain a good understanding of the various sections within the area train correspondence offices, and to demonstrate an ability to perform certain duties with an acceptable degree of efficiency : this will include understudying the clerk in charge for a period of up to two weeks.

2. ASSIGNMENT

1. Comment upon the activities of the trains correspondence office in general terms, and say how you see this office in relation to other traffic pursuits.

2. Why is it important to minimize train delays, and what measures are employed to combat delays?

3. What basic considerations would you employ in the application of discipline?

4. Examine the differences between fact finding and disciplinary inquiries?

5. Discuss disciplinary processes in general, with particular reference to consistency and parity in its application.

6. State what you know of the procedures followed in the acceptance of abnormal loads, and of how transit is arranged.

7. What methods are used in the control, allocation and movement of service coaches and private saloons?

8. Describe the interaction between the clerk in charge and his staff, and with the members of other sections on the area.

9. How important is the correspondence office as a link between:

   i) the area and traffic branch headquarters?
   ii) the railways and users?
   iii) the area traffic function and other railways departments?

10. How has your association with the trains correspondence office been of benefit to you?

BEST
AVAILABLE

MODULE NO. 7 - DUTIES OF TRAFFIC INSPECTOR
(approximately 8 weeks)

1. OBJECTIVE

To consolidate what has already been learnt by assuming the full duties of a traffic inspector, [illegible] by undertaking any special tasks stipulated by the area traffic manager.

2. ASSIGNMENT

1. Outline the role of the traffic inspector as you see it, and comment upon the effectiveness of this grade in maintaining optimum standards.

2. What should a traffic inspector become involved in during visits to stations?

3. What should he concern himself with while travelling between station?

4. How can the traffic inspector assist in maintaining discipline among traffic branch grades?

5. What, basically, are the differences between the duties of traffic and trains inspectors?

6. How competent must a traffic inspector be in commercial matters?

7. Discuss the methods a traffic inspector might use to motivate staff to achieve maximum efficiency.

8. Comment upon any special duties which were allocated to you as a traffic manager.

9. Analyze the effectiveness of the traffic inspector as a means of liaison between the area offices and those working on the line of rail.

10. Examine the benefits you have derived from this job, and how you see it assisting in your development.

BEST
AVAILABLE

MODULE NO. 8 - WAGON CONTROL (HEADQUARTERS)
(4 weeks)

1. OBJECTIVE

To gain a sound understanding of the basics of computerized wagon control, embracing the work of the message switching centre, advance train information sections and the other specialized jobs in the TRACE section.

2. ASSIGNMENT

1. Outline the function of the TRACE office in general, and the A.T.I. and M.S.C. section in particular.

2. What is the purpose of loco validation, and how is information obtained and used?

3. Discuss the overall concept of wagon control, touching upon what you see as its limits, or potential for expansion.

4. Outline what you have learned of unit control as it is practised in a number of sections within the TRACE office.

5. Consider the control of the various hire accounts : how is revenue protected, and what methods are employed to achieve accuracy?

6. What do you believe to be the main advantages of:

   i) advance train information
   ii) terminal control information.

7. What are your views on the section concerned with error corrections?

8. Comment upon the duties of the traffic assistant and those of senior operating clerk, grade 1.

9. Are you able to identify any problems which are peculiar to the running of the wagon control section?

10. Have you learned anything from this training module which will assist you in understanding other operation sections better?

BEST
AVAILABLE

MODULE NO. 9 - DEMURRAGE
(Waiver)

1. OBJECTIVE

To gain a reasonable grounding in the application of demurrage, and an understanding of the principles involved in the raising of demurrage.

2. ASSIGMENT

1. Outline the basic procedures of raising demurrage.

   i) at station level
   ii) at area level.

2. Do you consider demurrage to be a good method of raising revenue?

3. What steps can users take to avoid demurrage charges?

4. What steps can the railways take to avoid imposing demurrage?

5. Discuss what you understand by 'wagon turn-round' and offer suggestions as how this is best achieved.

6. List the circumstances in which, in your opinion, demurrage should be waived.

7. Consider the level of demurrage charges, and offer your opinion of the effectiveness of the charges.

8. Is it necessary to advise a customer of the arrival of a wagon before raising demurrage and are you able to suggest how the system may be improved?

9. Apart from routing office duties, describe in what other spheres the clerk in charge makes a positive contribution to the overall railway effort.

10. Of what value has this attachment been to you, other than giving you an insight into fundamental work in the demurrage office?

BEST
AVAILABLE

MODULE NO. 10 - STATION CONTROL
(4 weeks)

1. OBJECTIVE

To learn the principles of link working, and to achieve proficiency in the compilation of rosters.

2. ASSIGNMENT

1. Comment upon link working as a method of apportioning duty, and offer your opinion as to its flexibility or rigidity of application.

2. Outline the advantages and disadvantages of link working from the point of view of:

   i) the employees
   ii) the administration.

3. Examine the provision of 'red' and 'blue' rest days: say what these terms mean and consider if they are equitable to the railways and to employees.

4. List the other duties undertaken by the roster clerk and the shift clerk.

5. Consider the possible consequences of last minute alterations to the roster in conjunction with:

   i) caboose working
   ii) round trip working
   iii) book off working.

6. In the compilation of links, what does the term 'lay' mean, and do you see this as wasteful in productive man-hours?

7. Discuss the social cost/benefit of correctly planned and administered link working.

8. What methods are used in filling link vacancies, and are these methods always reliable?

9. What procedures must be followed before a new link is brought into effect?

10. What have you derived, as a trainee officer, from your association with this job?

BEST
AVAILABLE

MODULE NO. 11 - CONTROLLER C.T.C.
(12 weeks)

1. OBJECTIVE

To learn the duties of controller, C.T.C. by on-job training and by drawing on previous experience gained in associated areas. To perform independently the duties of a controller to the satisfaction of the area traffic manager.

2. ASSIGNMENTS

1. Examine the role of the controller vis-a-vis those of C.T.C. operators and station foremen, and identify his place in the general marshalling scene.

2. Discuss the extent of the controller's authority.

3. What are the fundamental differences between the controller's duties at Bulawayo, and those at points such as Gwelo and Salisbury?

4. What, in your opinion, is the prime function of the controller?

5. Outline the call-out procedure adopted in the event of a major accident, derailment, or washaway.

6. State what you know about the preparation and issue of train orders.

7. Does the controller concern himself with traffic clearances in section, or is this solely the province of wagon control in liaison with official in charge at stations?

8. Discuss the problems related to locomotive allocation and outline the extent of the controller's involvement.

9. List some of the circumstances in which a controller will independently:

   i) cancel a train
   ii) announce the running of a special train.

10. Examine the ways in which your association with this job has assisted your understanding of railway operating.

BEST
AVAILABLE

MODULE NO. 12 - COLLIERY STATISTICS
(4 weeks)

1. OBJECTIVE

To obtain, compile and initially process the statistical data required to maintain the optimum flow of coal products at Coalfields Area.

2. ASSIGNMENT

1. Outline the sources from which the basic statistical information is obtained.

2. How are the statistics collated and what deadlines must be met.

3. Offer your opinion as to why the statistics are required.

4. What influence does this job have on traffic movement on other parts of the system?

5. Why are these statistics seen to be important as a tool to management?

6. Discuss the scope of the several other activities attached to the job.

7. What is the value of the Coalfields Area contribution to the daily traffic conference?

8. Consider the interaction of activity among the various yards at Coalfields Area, and suggest any improvements which may occur to you.

9. Discuss the extent of contact between Coalfields Area and Livingstone, and assess its import[illegible]

10. How do you rate the value of the knowledge you have acquired in this job?

BEST AVAILABLE

MODULE NO. 13 - WAGON CONTROL (AREA)
(6 weeks)

1. OBJECTIVE

To acquire a good working knowledge of area wagon control in all aspects, including a familiarization period at an 'outside' depot and understudying the traffic assistant (wagon control) for one week.

2. ASSIGNMENT

1. Outline the relationship between wagon control on the area with wagon control headquarters.

2. Discuss the use of A.T.I. at depot stations.

3. Consider the role of the wagon reporter, and describe how his duties are a part of wagon control.

4. What are 'daily orders', and how important are they?

5. Describe what is meant by the 'zone', and comment upon the basic statistics required.

6. What have you learned about the allocation and clearance of livestock wagons?

7. What measures are taken to ensure that wagon control work at 'outside' depots is efficiently performed?

8. What are the overall responsibilities of the traffic assistant, and how can he ensure optimum working performance from his staff?

9. Comment upon the principles of job rotation you may have observed within wagon control.

10. Has your own understanding of the traffic branch benefited by your attachment to wagon control?

86

ANNEX IV. National Railways of Zimbabwe (NRZ): Audio-Visual Production at the Training Center

NRZ: Audio/Visual Production at the Training Center

As discussed in the Pre-PID Analysis Paper the NRZ Training Center has initiated an audio-visual program, technical assistance and additional equipment for which are included in the request for assistance prepared by the NRZ and prevent to AID in November, 1982. The issue of audio visual production is especially relevant to the NRZ Training Center. Audio visual techniques are not an entirely new method of instruction for Zimbabwe and there is a relatively modern audio-visual unit associated with the University of Zimbabwe in Salisbury and such equipment as over head projectors are used in instructional programs in certain schools throughout the country. The interests of the NRZ are rather specialized and sophisticated, they wish to not only process an in-house production capability but they also wish to innovative use this capability to record existing skills held by current white operational and management staff who are scheduled for retirement in the next few years.

The interest of the NRZ in establishing an audio-visual production capability is clearly set in the "cultural" context of the NRZ itself, ie. tied to the values and attitudes which the NRZ as an institution sees as essential to the efficient operation of rail service. This is an approach well understood and followed by industrial and corporate training programs in the United States. In essense, it is easier, more effective, and, depending on scale, often less costly to build your own training program, with the ability to adjust it to your evolving needs than to rely on an outside source to do much. Thus, even if the NRZ Training Center were located in Salisbury -- where access to the University of Zimbabwe facilities might be more practical than with the location of the center in Bulawayo -- the NRZ would have adequate justification for creating an in-house capability relative to the training of its staff of nearly 20,000 employees.

Three very important factors need to be stressed relative to the training needs of the NRZ which reinfroce the rationale for the creation of an in-house audio visual capacity for the Training Center.

- first, as alluded to above, training programs must be keyed to change, ie. the needs of the institution set in its environment are not constant.

- Secondly, the high level of wastage, including the projected retirement of 50 percent of all management personnel by the year 1985, places a heavy demand on the training capabilities of the center both absolutely and relatively.

- thirdly, training personnel for an operation as comlex as NRZ requires recurrent training of personnel throughout the majority of their employment, even at the management level.

If the NRZ is to meet these three demands it is understandable that they would require an in-house audio-visual capability as an essential element of their overall training program.

The initial steps taken by the NRZ to establish its own audio-visual program have already been briefly discussed in the Pre-PID Analysis Paper. The seriousness of the interest of the NRZ in developing this capability is perhaps best demonstrated by the fact that, in recognition of the fact that it is usually esier to obtain equipment than to train personnel to use it, the center has already begun training in script writing. The methodology being taught the trainees concerns sophisticated analysis developed with the context of modern communcation theory. Procedurally this involves analysis of the total occupational element as below:

I Define Specific Environment
- A Systems Analysis (total jobs)
- B Process Flow

II Determine Target Objectives and Behavior
- A Target Syllabus
- B Target Timetable

III Analysis Occupation Content in Detail
- A Systems analysis of Specific Process
- B Listing "things, words, and functions"
- C Stripping and assembly
- D Fault Identification
- E Fault Diagnosis and Correction

IV Define Learning Skelaton
- A Learning skelaton (I)
- B Learning skelaton (II)

V Write Learning Material
- A Audio-visual aid script
- B Course controller's text

VI Schedule Development of Learning Aids Including Audio Visual Work Plan

At each step of analysis and preparation the student uses a large form subdivided into categories relevant to that task. This same process is then to be used on the job in the preparation of audio-visual teaching aids for the center. Examples of alternate pattersn used in institution and development of a script are attached at the end of this discussion.

The methodology being used is based on training received by two members of the staff, including the director, in the RSA. The staff is interested in exposure to other concepts and approaches and possible assistance in the adaptation of the current approach and other approaches to better fit the needs of the NRZ. Similarly, although the NRZ has made plans to hire a technician in filming and production they feel assistance in this area could greatly improve the effectiveness and quality of their output. They are particularly interested in receiving such assistance from the United States where they feel the field of audio-visual production is most advanced.

January 26, 1982

89'

BEST AVAILABLE

DETAILED ANALYSIS

In the Analysis of any learning sequence either one or a number of forms may have to be used. Written out below are the forms which will be normally used in analysing different items in the target syllabus or target timetables. For convenience we have used the target syllabus numbers.

1.00 Introduction

Generally not analysed as only a brief introduction to the course and teaching method.

2.00 Target Concept

Information would come from the Elements in Action to be dealt with later.

3.00 Iconics Naming and Functioning of Parts

a) Listing Things Words and Functions

4.00 Elements In Action Outputs

a) Listing Things Words and Functions
b) Fault Identification
c) Fault Diagnosis and Correction

5.00 Elements in Actions Inputs

a) Listing Things Words and Functions
b) Fault Identification
c) Fault Diagnosis and Correction

6.00 Elements in Action Processes (possible forms for use)

a) Systems Analysis
b) Listing Things Words and Functions
c) Stripping and Assembly
d) Fault Identification
e) Fault Diagnosis and Correction

7.00 Elements in Action, Controls Feedback and Feedforward

a) Listing Things Words and Functions

8.00 Elements in Reaction

Servo Mechanisms - Listing Things Words and Functions
Communications - Listing Things Words and Functions

9.00 Time Framework

General Safety - Listing Things Words and Functions
Patrol, Inspection and Shift Rountines - Listing Things Words and Functions
Promotion - Listing Things Words and Functions

BEST AVAILABLE

TARGET SYLLABUS - STANDARD TRADING [illegible]

SET NO.	SYLLABUS HEADING	SUB SET NO.	SYLLABUS SUBJECT
1.00	Introduction	1.10	Introduce Learning Method
2.00	Target Concepts	2.10	The ... In Action
3.00	Iconics - Naming and Functioning Parts	3.10	
		3.20	
4.00	Elements In Action Outputs	4.10	
		4.20	
5.00	Elements In Action Inputs	5.10	
		5.20	
6.00	Elements In Action Process	6.10	
		6.20	
7.00	Elements In Action Controls	7.10	Feedback ...
		7.20	Feedforward ...
8.00	Elements In Reaction	8.10	Servo's ...
		8.20	Communication ...
		8.30	Fault Identification ...
		8.40	Fault Diagnosis ...
9.00	Time Frame work	9.10	General Safety
		9.20	Patrol Inspection and Shift Routine
		9.30	Promotion

LEARNING SKELETON - STANDARD HEADINGS

BEST AVAILABLE

PROCESSES OR ACTIONS

SET CODE	SET	SUB SET CODE	SUB SET
1.00	Introduction	1.10	What the student will learn in this sequence.
		1.20	Why is this significant.
2.00	Pre Test	2.10	Instructions - Can You?
3.00	Picture of End Result	3.10	
4.00	Outputs	4.10	
		4.20	
		4.30	
5.00	Inputs	5.10	
		5.20	
6.00	Processes	6.10	
		6.20	
7.00	Controls	7.10	
		7.20	
		7.30	
8.00	Criterion Test	8.10	Instructions - Can You?

LEARNING SKELETON - STANDARD HEADINGS

NON - ACTIONS

BEST AVAILABLE

Example for Naming Parts

SET CODE	SET	SUB SET CODE	SUB SET
1.00	Introduction	1.10	What the Student will learn
		1.20	Why Is This Significant
2.00	Pre-Test	2.10	Instructions - Can You?
3.00	Picture of End Result	3.10	
4.00	Listing Things Words and Functions	4.10	
		4.20	
or		4.30	
4.00	Fault Identification	4.40	
5.00	Criterion Test	5.10	Instructions - Can You?

BEST
AVAILABLE

DETAILED ANALYSIS

In the Analysis of any learning sequence either one or a number of forms may have to be used. Written out below are the forms which will be normally used in analysing different steps in the target syllabus or target timetables. For convenience we have used the target syllabus numbers.

1.00 Introduction

Generally not analysed as only a brief introduction to the course and teaching method.

2.00 Target Concept

Information would come from the Elements in Action to be dealt with later.

3.00 Iconics Naming and Functioning of Parts

a) Listing Things Words and Functions

4.00 Elements In Action Outputs

a) Listing Things Words and Functions
b) Fault Identification
c) Fault Diagnosis and Correction

5.00 Elements in Actions Inputs

a) Listing Things Words and Functions
b) Fault Identification
c) Fault Diagnosis and Correction

6.00 Elements in Action Processes (possible forms for use)

a) Systems Analysis
b) Listing Things Words and Functions
c) Stripping and Assembly
d) Fault Identification
e) Fault Diagnosis and Correction

7.00 Elements in Action, Controls Feedback and Feedforward

a) Listing Things Words and Functions

8.00 Elements in Reaction

Servo Mechanisms - Listing Things Words and Functions
Communications - Listing Things Words and Functions

9.00 Time Framework

General Safety - Listing Things Words and Functions
Patrol, Inspection and Shift Mountings - Listing Things Words and Functions
Promotion - Listing Things Words and Functions

TARGET SYLLABUS - STANDARD HEADING

BEST AVAILABLE

SET NO.	SYLLABUS HEADING	SUB SET NO.	SYLLABUS SUBJECT
1.00	Introduction	1.10	Introduce Learning Method
2.00	Target Concepts	2.10	The ... In Action
3.00	Iconics - Naming and Functioning Parts	3.10	
		3.20	
4.00	Elements In Action Outputs	4.10	
		4.20	
5.00	Elements In Action Inputs	5.10	
		5.20	
6.00	Elements In Action Process	6.10	
		6.20	
7.00	Elements In Action Controls	7.10	Feedback ...
		7.20	Feedforward ...
8.00	Elements In Reaction	8.10	Servo's ...
		8.20	Communication ...
		8.30	Fault Identification ...
		8.40	Fault Diagnosis ...
9.00	Time Frame work	9.10	General Safety
		9.20	Patrol Inspection and Shift Routine
		9.30	Promotion

LEARNING SKELETON - STANDARD HEADINGS

PROCEDURES OR ACTIONS

BEST AVAILABLE

SET CODE	SET	SUB SET CODE	SUB SET
1.00	Introduction	1.10	What the student will learn in this sequence.
		1.20	Why is this significant.
2.00	Pre Test	2.10	Instructions - Can You?
3.00	Picture of End Result	3.10	
4.00	Outputs	4.10	
		4.20	
		4.30	
5.00	Inputs	5.10	
		5.20	
6.00	Processes	6.10	
		6.20	
7.00	Controls	7.10	
		7.20	
		7.30	
8.00	Criterion Test	8.10	Instructions - Can You?