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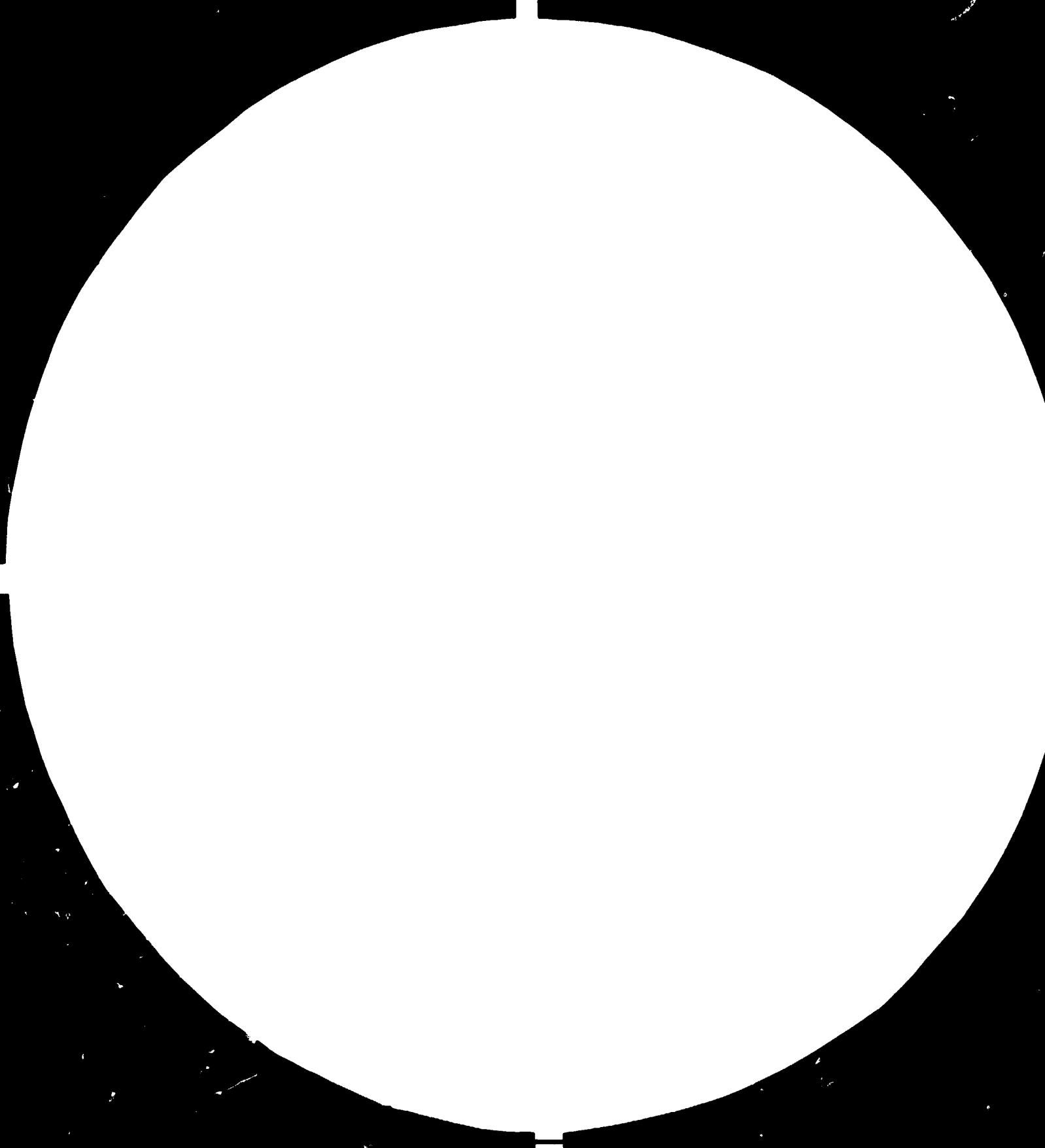
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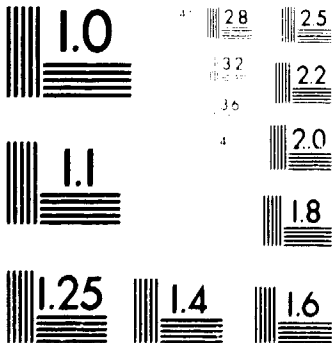
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24 January 1985
English

Mozambique.

ASSISTANCE TO THE ESTABLISHMENT OF AN ALUMINIUM
INDUSTRY IN MOZAMBIQUE (PHASE II)

DP/MOZ/82/011

MOZAMBIQUE

Terminal report*

Prepared for the Government of Mozambique
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of ALUTERV-FKI,
UNIDO Contract No.33/69

United Nations Industrial Development Organization
Vienna

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ABSTRACT

In response to a request from the Government of Mozambique, the UNIDO/UNDP agreed to provide assistance to the Government in carrying out the project entitled " Assistance in the Establishment of an Aluminium Industry" with its main objective being to assist the Aluminium Project Bureau in the Ministry of Industry and Energy in selecting the optimum feasibility package for the establishment of the aluminium smelter by evaluating in details and in comparative assessment of the detailed Feasibility Reports submitted by two bilateral partners (Italian and Soviet) to the Government of Mozambique.

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INTRODUCTION

Data on project

- Title of the project: the title of the project is Consulting and Evaluation Assistance to the Establishment of an Aluminium Industry /Phase II/ in Mozambique.
- Number of the project: the number of the project is DP/MOZ/82/011.
- Activity code: DP/01/31.8
- UNIDO contract number: the number of the contract between UNIDO and ALUTERV-FEI/HUNGALU ENGINEERING AND DEVELOPMENT CENTRE is 83/69/SM.

Concerning fulfilment of the Contract No.83/69/SM of the Mozambique Aluminium Smelter Project tripartite discussions were held at UNIDO Headquarters, Vienna, on 26.09.1984. This FINAL REPORT has been prepared in accordance with agreements summarized in Minutes of Meeting para b and c /see Annex 3/.

Project background

The great importance attached by the Government of Mozambique to the setting up an aluminium industry is originated from the following main reasons, further confirmed and reinforced as brought out in the preparatory activities of the previous, first phase of the Project referred to below:

- a/ While Mozambique has already a large hydroelectric power base at Cahora Bassa /2000 MW/ with the potential of almost doubling this capacity from the same dam at Cahora Bassa it has little outlet for such quantum of power within the country itself /total present power load of Mozambique being about 200 MW only/.
- b/ Electrical power being one of the main inputs for production of primary aluminium metal /accounting for nearly 25-35 % of the cost of production in to-day's context/ an Aluminium Smelter of the capacity envisaged /150 000 TPF/ provides a ready means of utilizing part /about 250 MW/ of the available surplus power and also exporting it in form of aluminium metal. Nearly 90 % of the metal production will be exported in the initial years.
- c/ It has already been established in the various international forums and from indications available elsewhere that not only there was little chance of new aluminium smelters coming up in the developed countries in the world /due to scarcer and expensive power/ but the trend of massive cut back in smelter operations will continue at least in Japan and Europe, and most probably also in the USA while the world requirement of aluminium may grow until the turn of the century.

Thus Mozambique may become one of the favoured places for setting up new smelting facilities on account of its renewable source of available low cost hydroelectric energy.

d/ The impact on the national economy of such an aluminium smelter can be quite considerable and manifold through:

- generation of sizable foreign exchange, having a beneficial effect on the country's balance of payments
- generating employment potential in the country both directly and indirectly
- assisting in general industrial growth of the country through integration of down-stream facilities and a host of ancillary and auxiliary industries connected with the use of aluminium
- since Mozambique will be probably the sole producer of aluminium in this African region /with the exclusion of South Africa/ it will put the country in the leading position among the neighbouring countries in the field of aluminium industry.

Objectives of the Project

- Development Objectives

The contract No. 83/69/SK is part of DP/MOZ/82/011 and had the objectives to assist the Government in the establishment of an aluminium industry in Mozambique.

- Immediate Objectives

The UNITED NATIONS DEVELOPMENT PROGRAMME /UNDP/ in response to a request from the Government of Mozambique, has agreed to provide assistance to the Government in carrying out the project entitled "Assistance in the Establishment of an Aluminium Industry /Phase II/ in Mozambique", and UNIDO, acting in agreement with the Government, engaged ALUTERV-FKI as Contractor to provide the relating services.

- The immediate objective was

to assist the Aluminium Project Bureau in the Ministry of Industry and Energy in selecting the optimum feasibility package for the establishment of the aluminium smelter by evaluating in details and in comparative assessment of the Detailed Feasibility Reports submitted by two bilateral partners /Italian and Soviet/ to the Government of Mozambique.

Scope of consulting services

The consulting services included the following tasks to be fulfilled:

- a/ to make comparative techno/economic evaluation of feasibility studies prepared by Fata Hunter /Italy/ and VANI /USSR/, as the main task to be fulfilled
- b/ to provide consulting services in the preparation and carrying out within the time scope of assistance of financial and commercial negotiations between the Aluminium Project Bureau and foreign partners in Maputo and in third European countries in connection with the smelter project
- c/ to provide consulting services in preparation of relevant bid invitations and evaluations if any drawing up contents of the basic engineering package of the new aluminium smelter as required by Aluminium Project Bureau.

Evaluation of Detailed Feasibility Studies submitted to the
Government of Mozambique

New Hunter Engineering of Italy and VAMI of USSR have prepared Feasibility Studies for the establishment of an Aluminium Smelter in Mozambique.

We have evaluated the Feasibility Studies and expressed our opinions concerning the Studies based on their contents.

Our Interim Report dated on 14. February 1984. has been worked out according to the requirements detailed in the Substantive Terms of Reference of the Contract.

The comparative techno/economic evaluation of the Feasibility Reports submitted to the Government of Mozambique included the following subjects elaborated upon in both reports:

- 1/ Market Analysis and Considerations
Supporting Capacity and Product Mix
- 2/ Infrastructure Requirements for
Various Locations
- 3/ Critical Analysis of Locations
- 4/ Level and Choice of Technology
- 5/ Layout of Facilities in Battery Limits
of the Plant
- 6/ Type of Construction of Main Buildings
- 7/ Projected Investment Cost of the Plant
- 8/ Economic Indices

The analysis was given in three parts. In Part 1. and Part 2. we have dealt with the Italian and the Soviet Study separately. Part 3. included the comparison between the two Studies bringing out features which have been considered common, superior and inferior.

During the final discussions on VAMI Study held in Maputo the parties agreed on the remarkable decrease of investment costs. In the Interim Report the modifications were taken into account as far as it was possible due to the belated receipt of undetailed data, and relating to results of modifications addenda were attached to the respective paragraphs.

At the end of our evaluation, in Part 3. of the Interim Report we presented an optimal alternative based on lowered investment cost, improved technical parameters as well as economic indices.

The Interim Report in its draft form was discussed by the representatives of Aluminium Project Bureau and ALUTERV-FKI's Consultant Team in Maputo from 23.01.1984 to 05.02.1984.
/See Annex 1./

As a result of examination of the draft report certain areas were identified for further discussion and clarification. Conclusions emerging thereof were suitably incorporated in the main body of the Interim Report.

Evaluation of Kaiser Aluminium and Chemical Corporation's
"desk-top" study

In December 1983. began the discussions regarding the possible redeployment of parts of Kaiser Aluminium and Chemical Corporation's Chalmette smelter to Mozambique. ALUTERV-FKI's representative took part in the meetings held at Oakland, California, during the week of March 5-7, 1984. concerning the Mozambique Aluminium Smelter.

Kaiser Aluminium and Chemical Corporation has prepared a so-called "desk-top" study of capital and operating costs in connection with the construction and operation of a Soederberg horizontal stud electrode equipped aluminium smelter in Mozambique.

The desk-top study of Kaiser Aluminium and Chemical Corporation regarding the redeployment of its permanently stopped Chalmette smelter in Mozambique represented a new alternative, the examination of which required a method that technically and with respect to the financing model differed from the evaluation method applied earlier in the course of evaluation of the two feasibility studies made by Hunter of Italy and VAMI of the Soviet Union.

Based on the limited information available and taking into consideration several assumptions we prepared an Economic Evaluation dated on 15. April 1984.

This Economic Evaluation was dispatched to Aluminium Project Bureau and to UNIDO.

Certain aspects of the abovesaid "Report" were discussed during the meetings held in Budapest at ALUTERV-FKI's Headquarter in the period of 08.06-12.06. 1984.

Representatives of Aluminium Project Bureau and ALUTERV-FKI clarified some of the points of Kaiser Aluminium an Chemical Corporation's desk-top study /see Annex 2/.

The main points clarified and revised were as follows:

1. Cost of Engineering, Design, Procurement and Know-how was included in Kaiser's study
2. Extra contingency cost figuring in ALUTERV study should be deleted
3. An equity of 165,6 MUSD has to be taken into consideration comprising the shares of both Kaiser /in the form of the redeployable old smelter/ and of Government of Mozambique constituting the indigenous component of the total outlay.

In the next part of the Final Report we present a Revised Economic Evaluation of the desk-top study of Kaiser Aluminium and Chemical Corporation.

Revised Economic Evaluation of the desk-top study of Kaiser
Aluminium and Chemical Corporation

As we were informed, revamping of Tete - Beira railway line is already part of the national plan, and location of the smelter in the Tete region is almost decided by the Government of Mozambique.

Therefore in this evaluation infrastructure cost was reduced to the level given in Hunter's feasibility study for version Tete /figure corrected in accordance with the figures given in Kaiser's desk-top study/.

For price of Chalmette equipment we accepted Aluminium Project Bureau's estimation.

Investment cost break-up

<u>ITEM</u>	<u>MUSD</u>	<u>% of Total</u>
<u>Direct costs</u>		
Material Handling and Storage, Port Facilities		
Alumina, pitch and bagged materials unloading, store, load, Storage for 40 days	16,700	
Plant material handling facilities, 15 day storage	4,700	
Fuel Oil Storage	1,200	
Electric Power Supply /within battery limits/	31,669	
Carbon Plant, anode paste and storage	7,151	
Reduction Plant	64,800	

ITEM	MUSD	% of Total
Air Control		
Dry Scrubbers	4,725	
Cast House	14,889	
Pot Relining Facilities	600	
Site Development	5,400	
Plant Utilities	3,400	
<u>General Plant Buildings and Stores</u>		
- Administration	800	
- Personnel Medical	500	
- Security, Fire Patrol		
Change House	870	
- Maintenance	1,060	
- Laboratory	750	
- Operating Office	650	
Mobile Equipment	640	
Distributable Direct Costs	21,113	
Disassembly and Retrofitting of Chalmette equipment	23,200	
Price of Chalmette equipment /estimation of Aluminium Project Bureau /	64,250	
Subtotal:	269,067	73,6

ITEM	MUSD	% of Total
<u>Indirect Costs</u>		
Construction Management	13,281	
Engineering, Design and Procurement	14,132	
Pre Operating expense	4,400	
Taxes and Fees	6,470	
Start-up	4,768	
Initial Complement	6,470	
Training in Collaborator's works	5,000	
Contingency /20 % on direct costs, Chalmette equipment excluded/	36,323	
Contingency /10 % on indirect costs/	5,452	
Subtotal:	96,296	26,4
Grand Total of Direct and Indirect Costs	365,363	100,00
Working Capital	46,109	
Infrastructure	105,300	
Total Investment Cost:	516,772	

Our economic evaluation is prepared on the basis of Memorandum on meetings held in Oakland, in March, 1984., and on supplementary information got from Aluminium Project Bureau's representatives.

Production and Sales

The production capacity of the aluminium smelter is projected to be 154,460 mtpa in order to have a better basis for comparison to the previous feasibility studies.

Production starts up in the third year following implementation /construction/. Production running-in is projected as follows:

3th year: 30,000 t
4th year: 126,000 t
5th year: 154,460 t

We have taken ALCAN List Price of 1982 to calculate Sales Revenue. Sales Revenue includes 2 % freight.

Estimate of Sales Revenues

Years	Description	Unit Price USD/t	Quantity t	Sales Revenue MUSD
3th	ingot	1,750	30,000	154,460
4th	ingot	1,750	126,000	220,500
5th	ingot	1,750	154,460	270,305

Production Costs

Production Costs have been taken from the Memorandum. Extra production costs have not been taken into account for production running-in.

Production Cost Schedule

Description	Year 3 30,000 t		Year 4 126,000 t		Year 5 154,460 t	
	Cost/t USD	Annual Cost MUSD	Cost/t USD	Annual Cost MUSD	Cost/t USD	Annual Cost MUSD
Operating Cost	1,120	33.60	1,120	141.11	1,120	172.98
General Sales and Admin.	150	4.50	36	4.50	29	4.50
Depreciation	-	-	155	19.61	153	23.53
Interest: long Term Loan	-	-	94	11.79	84	13.03
Production Cost	1,270	38.10	1,405	177.01	1,386	214.04

Capital Costs

Projected costs of the implementation of the aluminium smelter:

Aluminium Smelter:	365.36	MUSD
Infrastructures:	105.30	MUSD
<u>Total Investment Cost:</u>	<u>470.66</u>	<u>MUSD</u>
Working Capital:	46.11	MUSD
<u>Total Capital Cost:</u>	<u>516.77</u>	<u>MUSD</u>

For the replacement of amortized fixed assets following the implementation of the aluminium smelter we have projected 1 % of Direct Investment Costs.

Depreciation

We have calculated 5 % depreciation on Investment Costs.

Financing Model

The Chalmette equipment of Kaiser Aluminium and Chemical Corporation to be redeployed in Mozambique are considered as Kaiser's Equity.

Aluminium Project Bureau have assumed an equity of 165,6 MUSD comprising the shares of both Kaiser and of Government of Mozambique.

By this equity we have lowered the sum of total capital requirement for which we have projected a long term loan with 10 % interest rate and a 15-year paying off period. Since the economic analysis is based on 1982 fixed prices the interest rate may be lowered by the expected rate of inflation. According to our assumptions the rate of inflation will be around 6 % therefore we have reduced the actual interest rate to 4 % in our calculations.

Economic Indices

In order to overview the economic results of the aluminium smelter we have worked out the tables of Net Income Statement and Cash Flow.

SOURCES AND APPLICATIONS OF CAPITAL COSTS

Period Year	Construction Period Start-up Full Capacity								Total	
	1st	2nd	3rd	4th	5th	6th	7th	8-27		
<u>Application</u>										
1. Fixed Investment Costs	18.27	142.50	168.06	36.53						365.36
2. Infrastructure	9.60	46.70	49.00							105.30
3. Replacement					2.69	2.69	2.69	53.80		61.87
4. Working Capital Increase			23.06	23.05						46.11
Total Capital Cost	27.87	189.20	240.12	59.58	2.69	2.69	2.69	53.80		578.64
<u>Sources</u>										
1. Long Term Loan	19.59	124.61	163.95	43.02						351.17
2. Net Income					2.69	2.69	2.69	53.80		61.87
3. Kaiser's and Mozambique's Equity	8.28	64.59	76.17	16.56						165.60
Total Sources	27.87	189.20	240.12	59.58	2.69	2.69	2.69	53.80		578.64

INTEREST TABLE, LONG TERM LOAN

					MUSD
Period		Assignment	Interest 4 %/year	Principal	Outstanding Debt
-12	1st year	19.59	0.07		
13-18	2nd year	81.90	1.64		
19-24		144.20	2.88		
25-30	3rd year	226.18	4.52		
31-36		308.15	6.16		
37-38		351.17	2.34		368.78
39-42	4th year	368.78	4.92	25.41	343.37
43-48		343.37	6.87	11.70	331.67
49-54	5th year	331.67	6.63	11.70	319.97
55-60		319.97	6.40	11.70	308.27
61-66	6th year	308.27	6.16	11.70	296.57
67-72		296.57	5.93	11.70	284.87
73-78	7th year	284.87	5.70	11.70	273.17
79-84		273.17	5.46	11.70	261.47
85-90	8th year	261.47	5.23	11.70	249.77
91-96		249.77	5.00	11.70	238.07
97-102	9th year	238.07	4.76	11.70	226.37
103-108		226.37	4.53	11.70	214.67
109-114	10th year	214.67	4.29	11.70	202.97
115-120		202.97	4.06	11.71	191.26
121-126	11th year	191.26	3.82	11.71	179.55
127-132		179.55	3.59	11.71	167.84
133-138	12th year	167.84	3.36	11.71	156.13
139-144		156.13	3.21	11.71	144.42
145-150	13th year	144.42	2.89	11.71	132.71
151-156		132.71	2.65	11.71	121.00
157-162	14th year	121.00	2.42	11.71	109.29
163-168		109.29	2.19	11.71	97.58

INTEREST TABLE, LONG TERM LOAN

/continued/

Period	Assignment	Interest 4 %/year	Principal	Outstanding Debt
169-174 _{15th year}	97.58	1.95	11.71	85.87
175-180	85.87	1.72	11.71	74.16
181-186 _{16th year}	74.16	1.48	11.71	62.45
187-192	62.45	1.25	11.71	50.74
193-198 _{17th year}	50.74	1.02	11.71	39.03
199-204	39.03	0.78	11.71	27.32
205-210 _{18th year}	27.32	0.55	11.71	15.61
211-216	15.61	0.31	11.71	3.90
217-218 _{19th year}	3.9	0.08	3.90	-
<hr/>				
Interest on Outstanding				
Debt:		109.21		
Interest During				
Construction:		17.61		
<hr/>				
Total Interest Due:		126.82		

NET INCOME STATEMENT /in MUSD/

Year	3th	4th	5th	6th	7th	8th	9th	10th	11th
Sales	52.50	220.50	270.30	270.30	270.30	270.30	270.30	270.30	270.30
Freight	1.05	4.41	5.41	5.41	5.41	5.41	5.41	5.41	5.41
Net Sales	51.45	216.09	264.89	264.89	264.89	264.89	264.89	264.89	264.89
Operating Costs	33.60	141.11	172.98	172.98	172.98	172.98	172.98	172.98	172.98
Gross Profit	17.85	74.98	91.91	91.91	91.91	91.91	91.91	91.91	91.91
General Sales and Administration	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Depreciation		19.61	23.53	23.53	23.53	23.53	23.53	23.53	23.53
Interest Expenses long Term Loan		11.79	13.03	12.09	11.16	10.23	9.29	8.35	7.41
Total Production Costs	38.10	177.01	214.04	213.10	212.17	211.24	210.30	209.36	208.42
Costs per Tonne	1270	1405	1386	1380	1374	1368	1362	1355	1349
Net Income or Less	13.35	39.08	50.85	51.79	52.72	53.65	54.59	55.53	56.47

NET INCOME STATEMENT /in MUSD/, /continued/

Year	12th	13th	14th	15th	16th	17th	18th	19th	20th
Sales	270.30	270.30	270.30	270.30	270.30	270.30	270.30	270.30	270.30
Freight	5.41	5.41	5.41	5.41	5.41	5.41	5.41	5.41	5.41
Net Sales	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89
Operating Costs	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98
Gross Profit	91.91	91.91	91.91	91.91	91.91	91.91	91.91	91.91	91.91
General Sales and Administration	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Depreciation	23.53	23.53	23.53	23.53	23.53	23.53	23.53	23.53	23.53
Interest Expenses									
Long Term Loan	6.57	5.54	4.61	3.67	2.73	1.80	0.86	0.08	
Total Production Costs	207.58	206.55	205.62	204.68	203.74	202.81	201.87	201.09	201.01
Costs per Tonne	1344	1337	1331	1325	1319	1313	1307	1302	1301
Net Income or Less	57.31	58.34	59.27	60.21	61.15	62.08	63.02	63.80	63.88

NET INCOME STATEMENT /in MUSD/, /continued/

Year	21th	22th	23th	24th	25th	26th	27th	Total
Sales	270.30	270.30	270.30	270.30	270.30	270.30	270.30	6489.90
Freight	5.41	5.41	5.41	5.41	5.41	5.41	5.41	129.89
Net Sales	264.89	264.89	264.89	264.89	264.89	264.89	264.89	6360.01
Operating Costs	172.98	172.98	172.98	172.98	172.98	172.98	172.98	4153.25
Gross Profit	91.91	91.91	91.91	91.91	91.91	91.91	91.91	2206.76
General Sales and								
Administration	4.50	4.50	4.50	4.50	4.50	4.50	4.50	112.50
Depreciation	23.53	23.53	23.53	23.53	23.53	23.53	23.53	560.80
Interest Expenses								
Long Term Loan								109.21
Total Production								
Costs	201.01	201.01	201.01	201.01	201.01	201.01	201.01	4935.76
Costs per Tonne	1301	1301	1301	1301	1301	1301	1301	1331
Net Income or Less	63.88	63.88	63.88	63.88	63.88	63.88	63.88	1424.25

CASH FLOW TABLE FOR FINANCIAL PLANNING /in MUSD/

Year	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
1. Sources									
2. Kaiser's and Mozambique's Equity	8.28	64.59	76.17	16.56					
3. Long Term Loan	19.59	124.61	163.95	43.02					
4. Net Sales			51.45	216.09	264.89	264.89	264.89	264.89	264.89
5. Total Sources	27.87	189.20	291.57	275.67	264.89	264.89	264.89	264.89	264.89
6. Applications									
7. Total Capital Costs including Replacements	27.87	189.20	240.12	59.58	2.69	2.69	2.69	2.69	2.69
8. Operating Costs			33.60	141.11	172.98	172.98	172.98	172.98	172.98
9. General Sales and Administration			4.50	4.50	4.50	4.50	4.50	4.50	4.50
10. Interest Expenses									
11. Long Term Loan				11.79	13.03	12.09	11.16	10.23	9.29
12. Repayment									
13. Long Term Loan				37.11	23.40	23.40	23.40	23.40	23.40
14. Total Applications	27.87	189.20	278.22	254.09	216.60	215.66	214.73	213.80	212.86
15. Surplus/Deficit	-	-	13.35	21.58	48.29	49.23	50.16	51.09	52.03
16. Cum. Cash Balance	-	-	13.35	34.93	83.22	132.45	182.61	233.70	285.73

CASH FLOW TABLE FOR FINANCIAL PLANNING /in MUSD/, /continued/

Year	10th	11th	12th	13th	14th	15th	16th	17th	18th
1. Sources									
2. Kaiser's and Mozambique's Equity									
3. Long Term Loan									
4. Net Sales	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89
5. Total Sources	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89
6. Applications									
7. Total Capital Costs including Replacements	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69
8. Operating Costs	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98
9. General Sales and Administration	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
10. Interest Expenses									
11. Long Term Loan	8.35	7.41	6.57	5.54	4.61	3.67	2.73	1.80	0.86
12. Repayment									
13. Long Term Loan	23.41	23.42	23.42	23.42	23.42	23.42	23.42	23.42	23.42
14. Total Applications	211.93	211.00	210.16	209.13	208.20	207.26	206.32	205.39	204.45
15. Surplus/Deficit	52.96	53.89	54.73	55.76	56.69	57.63	58.57	59.50	60.44
16. Cum. Cash Balance	338.69	392.58	447.31	503.07	559.76	617.39	675.96	735.46	795.90

CASH FLOW TABLE FOR FINANCIAL PLANNING /in MUSD/, /continued/

Year	19th	20th	21th	22th	23th	24th	25th	26th	27th
1. Sources									
2. Kaiser's and Mozambique's Equity									
3. Long Term Loan									
4. Net Sales	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89
5. Total Sources	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89	264.89
6. Applications									
7. Total Capital Costs including Replacements	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69
8. Operating Costs	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98	172.98
9. General Sales and Administration	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
10. Interest Expenses									
11. Long Term Loan	0.08								
12. Repaymen.									
13. Long Term Loan	3.90								
14. Total Applications	184.15								
15. Surplus/Deficit	80.74	84.72	84.72	84.72	84.72	84.72	84.72	84.72	84.72
16. Cum. Cash Balance	876.64	961.36	1046.08	1130.80	1215.52	1300.24	1384.96	1496.68	1554.40

According to our calculations the Net Income of the aluminium smelter in the initial years of production reaches the sum of 40 - 50 MUSD, and according to our Cash Flow calculations the Cumulative Cash Balance is positive every year.

The values of the major economic indices calculated on the base of the Total Capital Cost Are as follows:

$$\text{IRR} = 17,1 \%$$

$$\text{PBP} = 10,17 \text{ years}$$

$$\text{BEP} = 30,50 \%$$

The value of Internal Rate of Return /IRR/ calculated for the equity of Kaiser Aluminium and Chemical Corporation and of the Mozambican Government:

$$\text{IRR} = 17,07 \%$$

Comparative Evaluation of Present Alternative vs.
"Revised Variation Preferred" of our Interim Report

Comparing the above data to those of "Revised Variation Preferred" of our Interim Report the following may be seen:

ITEM	x INTERIM REPORT	xx KAISER - ALUTERV-FKI	DIFFERENCE
Production, mtpa	150,000	154,460	+ 4,460
Capital Cost, MUSD	790.8	516.77	- 274.03
Operating Cost, USD/t	1,052	1,120	+ 68
IRR	% 10.1	17.1	+ 7.0
PBP	years 20.6	10.2	- 10.4
BEP	% 41.3	30.5	- 10.8

x Location in Beira

xx Location in Tete region

The alternative of Kaiser Aluminium and Chemical Corporation has the characteristics as follows:

- The more favourable economic indices are explained by and large by MUSD 274 less Capital Cost requirement
- The economic indices of this alternative are improved by the projected 27-month construction period which is 44 months in case of the alternative for comparison. After sizing up local capabilities construction period may be revised
- There is an operating cost difference of 68 USD per ton of aluminium in favour of Interim Report's alternative partly due to the differing unit prices applied. Considering that Kaiser's calculation includes 10 per cent contingency further reduction of production cost may be presumed in the course of revision of costs
- Considering the Financing Model the comparative alternative of Interim Report presumed only long term loan including the interest costs on this, while Kaiser's and Mozambique's Equities are considered to be free of interest
- Despite the abovesaid uncertainties the alternative of Kaiser Aluminium and Chemical Corporation provides for remarkable advantages for the utilization of which further discussions and evaluations are advisable.

- Findings and recommendations regarding the Feasibility Studies of Hunter of Italy and VAMI of the Soviet Union were given in our Interim Report which is also part of the FINAL REPORT as it was indicated earlier.

- As to the alternative of redeployment of the stopped chalmette smelter in Mozambique it should be noted that the desk-top study prepared by Kaiser Aluminium and Chemical Corporation is a shortened document which due to its nature cannot be really compared to the detailed feasibility studies prepared previously. Nevertheless Kaiser's alternative as a feasible implementation is very much worth dealing with.

The total capital investment of the redeployment of the abovesaid old smelter will be significantly lower than those of the Feasibility Studies worked out earlier. This will reduce the financial charges owing to lesser interest on loans.

An other advantage of Kaiser's variation that Kaiser's redeployed plant will contribute towards equity in the total investment. This equity is considered to be free of interest.

The reduction of the construction period is also an advantage by which economic indices of this variation are improved substantially. The Detailed Feasibility Studies foresee a construction period of 44 and 60 months respectively.

A 44 months construction period seems to be more realistic considering the Mozambican local circumstances. The even further shortening of this construction period does not seem to be impossible provided a deviation from heavy building structures described in the feasibility studies to light building structures will be decided upon.

It is to be noted that construction period may be revised after sizing up local capabilities.

The production costs of Kaiser's alternative were calculated by taking into account that electric power costs 8 mills/kWh and the price of alumina is 276 USD/t. The comparative alternative of Interim Report presumed 15 mills/kWh power cost and an alumina price of USD 235/ton which give an operating cost difference in favour of Interim Report's alternative.

We feel that power supply as well as cost of power is the most critical point of the whole redeployment.

Utilization of low cost power is the main reason for the redeployment of the Chalmette smelter. Higher power cost may result in losing Kaiser's interest in contribution to the Mozambique Smelter Project.

As it may be seen from the comparative table given in our Revised Economic Evaluation the redeployment of the old aluminium smelter of Kaiser Aluminium and Chemical Corporation provides remarkable economic results due to the decrease of investment costs, the shorter construction period as well as the reduction of I.D.C.

As it was recognized by Aluminium Project Bureau, a major advantage of the Kaiser variation would be the greater confidence reposed in the project due to Kaiser's association and participation from its inception.

We have to emphasize again that the validity of the results of economic calculations will have to be verified by subsequent checking up with Kaiser Aluminium and Chemical Corporation and by the supervision of techno-economic aspects.

Justification of our present economic evaluation could be performed by the site examination of the redeployable equipment of Kaiser Aluminium and Chemical Corporation by assessing the status of technology of the various units of the Chalmette aluminium smelting plant and by the checking up of data included in the present report.

- Depending on the progress made with Kaiser Aluminium and Chemical Corporation and other likely participants further consultancy will be required during 1985 and beyond. Since ALUTERV-FKI is already familiar with the details and related activities of the project, Aluminium Project Bureau would prefer the extension of the existing contract with ALUTERV-FKI or its suitable amendment defining the exact scope of the consultancy rather than initiate a new tender.

ALUTERV-FKI's consultant team is ready for further activity providing both direct consulting services and evaluation studies as required by Aluminium Project Bureau. ALUTERV-FKI's offer regarding the extension of Contract No. 83/69/SM for the year 1985 has been worked out and was presented to Aluminium Project Bureau and UNIDO during the tripartite discussions held in Vienna on 26.09.1984. /see Annex 3./.

ANNEX 1

MINUTES "A"

Subject:

(Discussions on the report of the two Feasibility Studies by Aluterv-FKI).

The report of Aluterv-FKI on the two studies, namely on the study prepared by VAMI of USSR and that by NEW HUNTER of Italy in its draft form was discussed by the representatives of Cabinet de Aluminio and the representatives of Aluterv-FKI at Maputo from 23.01.84 to 04.02.1984.

As a result of examination of the draft report certain areas were identified for further discussion and clarification as under.

It was agreed that the conclusions emerging thereof would be suitably incorporated in the main body of the report.

The discussions were attended regularly on behalf of:

Cabinet de Aluminio
by

Mr. Zandamela, A.

Dr. Singh, T.B.

Aluterv-FKI
by

Dr. Kelenyi Miklos

Mr. Varga Laszlo

Mr. Molnar Andras

Mr. Nemeth Vilmos

and part time on behalf of:

Direccao Nacional de Tecnologia
de Construcao - NCA

by

Mr. Kiskun Kalman

1. Repair of Pots in the Cell House itself.

Originally VAMI had proposed to reline the pots in a separate pot repair shop. During the final discussions with VAMI's representatives held in Maputo the separate pot repair shop was deleted in order to reduce the investment cost by about USD 16.8 millions.

We feel that while this is possible, the situation may be a little tight in respect of space available.

2. Justification for 4 (four) Cranes per Potroom.

There are 4 pot tending cranes provided for 96 pots for 155 kA current intensity, in VAMI Study.

Prima Facie the number appears to be high. On examination it appears that it cannot be helped since pots are arranged in 2 (two) rows in end-to-end fashion and alumina distribution to the pots is done by the same cranes.

3. Side and End Crust Breaking besides Central Crust Breaking.

In VAMI Study while the pots are provided with central crust breaking, there are also provided facilities for side and end crust breaking. This is not quite clear.

4. Alumina Distribution System from Silos to the Pots.

VAMI Study provides for a pneumatic system to transport alumina from the central storage silos (4 x 3,000 metric ton capacity) to service silos (10 x 3,000 metric ton capacity) located on both sides of the potrooms.

The number of service silos is rather on the high side but it also cannot be helped due to the double-row arrangement of pots.

Total storage capacity comes to 42,000 metric tons which is equivalent to the amount required for 55 days of operation.

HUNTER Study proesents a simple solution to transport alumina by conveyors from the central storage silos to the 4 (four) dry scrubbing units.

Total storage capacity comes to be 50,000 metric tons which is equivalent to the amount required for 63 days of operation.

5. Operating Floor Level.

The pot tending level (operating floor level) is at 0.8 m level in case of HUNTER Study and the same is at 4.0 m level in the case of the VAMI Study.

The 4.0 m level appears to be rather high and would account for the high cost of building. This however according to VAMI Study is considered essential to ensure satisfactory working conditions.

It is felt that this might need further examination.

6. Pollution Control.

HUNTER Study provides for dry scrubbing of pot fumes while the VAMI Study has gone in for wet scrubbing.

The exhausted volume of pot fumes per ton of aluminium is 134,176 m³ (cubic meter) in case of HUNTER, and 269,538 m³ (cubic meter) in the case of VAMI.

VAMI's figure is considered to be high. This is resorted to by VAMI apparently to ensure improved working conditions in the pot rooms. One wonders if the same purpose could not be served by effective hooding and accepted pot tending practices.

Emissions from the Potrooms

ITEM	HUNTER	VAMI
total F (fluorine) emission; kgF/tAL	0.463	2.27
scrubbing efficiency for solids; %	98	35
scrubbing efficiency for gases; %	99	93

It can thus be seen that while the working environment in the potroom itself may be somewhat better in case of VAMI as compared to HUNTER, the total emission from the potrooms to the environment is substantially higher including fluoride particulates in case of VAMI than in the case of HUNTER.

7. Relative size of Potroom Buildings per Unit of Aluminium Production.

<u>ITEM</u>	<u>HUNTER</u>	<u>VAMI</u>
Specific area/ton capacity (of 4 potrooms); m ² /t	0.3416	0.503
Specific enclosed volume per ton capacity, m ³ (of 4 potrooms); m ³ /t	4.7824	9.9844

It is quite obvious that the specific area and volume per ton of capacity in case of VAMI is a good deal larger than in the case of HUNTER.

In the course of discussions VAMI explained that these specific figures had to be high in order to ensure satisfactory working conditions.

From the preceding paragraph on the examination of pollution control, however this does not appear to be fully justified.

8. Anode Plant

(i) Equipment Types and Numbers

As for the key equipment of the anode plant both HUNTER and VAMI studies provide for the same kind of production units, most cases even of the same make.

It is felt that only one (1) continuous mixer is sufficient to produce the required amount of paste instead of two (2) as projected by the VAMI Study.

The number of rod mills (2) and that of anode forming machines (2) may be reduced to one (1) respectively in the case of the HUNTER Study.

(ii) Layout and Flow of Materials

Due to the arrangement of anode producing facilities proposed by the VAMI Study the amount of internal flow of materials appears to be unnecessarily long and somewhat not well streamlined.

As to the alyout presented by VAMI the buildings of green anode preparation and rodding occupy about twice as large an area as that what could be considered as usual.

(iii) Baking Cycle

For the anode baking furnace the following firing cycle has been indicated in VAMI Study;

Out of 20 sections in a firing cycle:

- stand-by section:	1
- sections on fire:	6
- sections on cooling:	8
- sections on loading, unloading and repair:	5

Total number of sections:	20
---------------------------	----

As per the technological requirements the number of sections under fire and cooling ought to be by and large the same. This aspect would need to be examined.

9. Norms of Consumption

CONSUMPTION	HUNTER	VAMI
(DC) Power; kwh/t Al	14,000	14,580
Fluorides; kg/t Al	25	28
Cryolite; kg/t Al	0	10
Anode:		
- Net: kg/t Al	460	465
- Gross: kg/t Al	580	560
Alumina: kg/t Al	1,930	1,940

Except gross anode consumption all the figures given in the VAMI Study are higher than in the case of the HUNTER Study.

Aluterv-FKI is of the opinion that VAMI's figures are effected to a large extent by unskilled operators for Mozambican smelter

10. Manpower Requirements

ITEM	HUNTER	VAMI
Manpower requirement:	1,880	3,076

Manpower is rather excessive in VAMI Study. It is felt that even in a developing country like Mozambique manpower requirement could be kept between 1,800 to 2,000 for the operation of facilities within battery limits.

11. Civil Construction Aspects and Related Costs

The volume and extent of civil works beginning with the amount of excavation involved, concreting, steel structures, etc. are markedly different between VAMI and HUNTER Studies as is evident from the requirement of main bill of material in the two studies reproduced below:

ITEM	HUNTER	VAMI
Concrete; m ³	170,000	273,255
Cement;	45,000	93,220
Reinforcement bars, t	10,000	15,093
Steel Structures; t	3,000	27,192

Much larger bill of materials projected in the case of VAMI is mainly due to the following reasons:

- a) Substantially higher specific areas and enclosed volumes in case of smelter and other buildings, too;
- b) Smelter buildings to support a high capacity maximum size crane (160 tons in case of VAMI compared to 60 tons cranes of HUNTER);
- c) Incidentally, the seismicity as indicated for both Gaia and Beira are the same, namely 8 on NCS scale. For Tete, however the same is lower by a degree or two.

It is suggested that in the sloping terrain of Caia suitable terracing could be resorted to site different groups of production and other buildings instead of reducing the entire floor of the battery limits of plant to the same level. This would appear to be feasible and reduce the amount of excavation required quite significantly.

The size of the potrooms in case of VAMI is nearly twice that of HUNTER. This is partly due to the arrangement of pots in two rows. Reducing the level of the working floor in case of VAMI which is presently at 4.0 meters as against 0.8 meter in case of HUNTER could reduce the related cost by about 10%.

The overall difference, however, will still be quite large.

12. Site Location

Merits and demerits of locating the plant between Beira and Tete were further examined and discussed. The relevant figures pertaining to related capital investment and also the operating expenses on account of infrastructure required in the two cases as given in HUNTER Report are reproduced below:

ITEM	BEIRA	MACAJO	Difference in comparison to Beira, (in million USD)	
			disadvantage	advantage
Capital costs				
Port facilities	20.3	20.3	-	-
External transport, (Hunter 2.1 + 2.2 + 5.2)	11.1	45.7	-	34.6
External water supply	0.5	2.4	-	1.9
Village	3.8	4.7	-	0.9
Power supply	121.0	21.8	99.2	-
Location cost increase	17.0	38.5	-	20.6
	(pile found)	(manpower)		
Other civil works	7.7	13.0	-	5.3
Total:			99.2	63.3
Difference:				MUSD 35.9

Operation costs

Transportation cost:

$$\frac{170}{38} \text{ Ht} = 4.47 \text{ USD/t/600 km} \times 590,000 \text{ t/year} = \text{MUSD } 2.6/\text{year}$$

Loss on transmission line: = MUSD 2.7/year

Railway line reconstruction: MUSD 37.5 MUSD 35.9

As the above figures reveal there is a lesser capital investment on account of infrastructure in case of Tete as compared to Beira which is mainly on account of additional power lines that would be required. If, however, an additional cost of revamping the railways between Beira and Moatize is taken into account this difference will become very small.

Operation costs on account of infrastructure more or less balance each other in the two cases. While Tete will mean additional railway freight there will be power losses in the line of the same value in case of Beira because of it being so far located from Cahora Bassa.

A doubt, however, was raised that although a railway tariff of 170 Meticais per ton was being charged in case of coal between Moatize and Beira Port, this was a low rate and appeared to be subsidized. If this tariff were to go up substantially the balance will tip in favour of Beira location so far as operation costs were concerned. It was stated by Cabinet de Aluminio that power tariff of 15 mills assumed in the report too was lower than the international price of energy and on this basis the value of power lost in transmission could also go up in case of Beira.

The other consideration in locating the plant in Tete was the nearness to the source of power, i.e. Cahora Bassa, and hence better reliability due to much shorter transmission involved.

While it is possible to store alumina it is not possible to store power in case there were some failures in transmission lines. A power outage in a smelter of more than 4-6 hours can prove to be very disastrous.

Aluterv-FKI, however, felt that from an overall consideration Beira port area appeared to be the better of the two.

13. Economic Indicators

The economic indicators were examined for the two studies including the one which got markedly revised as in the case of VAMI as a result of the discussions that took place with their team in Maputo in October 1983.

IRR figures including infrastructure worked out to 8.75% and 7.80% in case of HUNTER and VAMI (revised) studies respectively.

The payback period, however, are projected in a markedly different way for the two studies.

It (inclusive of infrastructure in both cases) is 17 years in case of HUNTER Study for Tete and 12.8 years in case of VAMI's initial report and 9.5 years in case of the revised version for Caia location.

This is entirely because HUNTER has calculated the payback period in the conventional way of identifying the year in what the cumulative cash flow (which is after payment of loan) equals the total investment, while in the case of VAMI for some reason they have taken the gross profit without allowing even for interest payments and depreciation.

Incidentally the break-even-point, as reported by VAMI in the original version was 173.2%. This has now been worked out by them to 74.0% in the revised version.

HUNTER has used an effective interest rate of 4.0% in all their computations against the supposedly prevalent rate of 10% for "consensus" loan. This is done on the plea that there is an inflation rate of about 6% and if allowance for this is made the effective interest rate ought to be $10\% - 6\% = 4\%$. Aluterv-FKI also subscribes to this view, Cabinet de Aluminio, however, felt that this was not yet a generally accepted practice and it was customary in most of the feasibility studies to adopt the prevailing interest rates.

02.02.1984

On behalf of UNIDO's
Contractor

Sd/-
Kelenyi Miklos

On behalf of Cabinet de Aluminio

Sd/-
A. Zandamela

Sd/-
T.B. Singh

ANNEX 2.

MINUTES

on the meetings held in Budapest, Hungary, at the offices of ALUTERV-FKI in the period of 08.06 - 12.06.1984 concerning the Mozambique Aluminium Smelter Project.

The discussions entailed the quotations emerged in connection with the activity of ALUTERV-FKI regarding the UNIDO contract No. 83/169/SM.

The meetings were attended by:

Mr. Alessandro Zandamela,	Asst. to Director of the Mozambique Aluminium Project Cabinet.
Mr. Tej Bahadur Singh,	UNIDO Consultant at the Mozambique Aluminium Project Cabinet.
Dr. Fekete, Gyula,	ALUTERV-FKI, Head of Dept., Foreign Trading.
Dr. Kelenyi, Miklos	ALUTERV-FKI, Head of Dept., Metallurgy.
Varga, Laszlo	ALUTERV-FKI, Adviser, Civil Engineering, part time.
Molnar, Andras	Head of Div., Economics, part time.
Gazda, Istvan	ALUTERV-FKI, Advisor of the Director.
Dr. Csak, Jozsef	Head of Div. Metallurgy of ALUTERV-FKI, who welcomed the guests.

Aluminium Project Bureau & ALUTERV-FKI representatives clarified some of the points related to Kaiser's desk top study.

The main points clarified were as under:

- a) Cost of Engineering Design & Procurement & Know-How was included in Kaiser's study. The additional cost therefore included in ALUTERV study on these counts will be deleted.

It was, however, agreed that training cost will have to be included additionally.

- b) The extra contingency cost figuring in ALUTERV study will also be deleted.
- c) Although 'Distributable Direct Cost' of 21,113 MUSD adopted by Kaiser supposedly covers ocean freight, the sum of 11.9 MUSD included additionally by both Aluminium Project Bureau & ALUTERV-FKI will be retained subject to further clarification from Kaiser or on deeper examination of the subject.
- d) It was noted that ALUTERV study has assumed Beira location. The Aluminium Project Bureau have projected their Financial Statements based on Tete location and the assumptions enumerated above.
- e) Aluminium Project Bureau have assumed an equity of 165.6 MUSD comprising the shares of both Kaiser, mainly in the form of the redeployable old plant/ and of Govt of Mozambique generally.

constituting the indigenous component of the capital outlay.

- f) Aluminium Project Bureau have also included the infrastructure cost as considered applicable to the situation by them.

In the light of the above ALUTERV may go through financial projection made by Aluminium Project Bureau for comments if any.

- Site selection Tete vs. Beira. The case to be fully stated with plus and minus points in each case.
- Cost of civil works as projected in both Hunter and VAMI studies are unusually high. The corresponding figures for different areas like Western Europe, Hungary and India could be given for comparison.

This will have to be worked out realistically at the Basic Engineering Stage for Mozambique.

- HUNTER have projected downstream facilities also for coils, sheet and even some foil while this may improve the overall financial picture, Aluminium Project Bureau may consider phasing this if financial constraints arise.

ALUTER-FKI presented a break-up of manmonths used up to 08.06.1984 as follows:

Contract No. 85/69/SW /Dated 19.10.1983/

I. Needed m/m according to the contract

	<u>field</u>	<u>home</u>
-Comparative techno-economic evaluation of studies	2,5	10,0
-Interim Report		
-Draft final report		
-Tripartite dicussion on Final Report	1,0	2,0
-Consulting services according to D/c and D/d	3,5	2,0
<u>TOTAL</u>	<u>7,0</u>	<u>14,0</u>

II. m/m used effective

	<u>field</u>	<u>home</u>
-Comparative techno-economic evaluation of studies		
-Interim Report	2,5	10,0
-Evaluation work in con- nection with modifica- tion of Soviet study		1,5
-Evaluation of Kaiser study and asst in disc.	0,4	2,7
<u>TOTAL up to 03.06.1984</u>	<u>2,9</u>	<u>14,2</u>
-Needed m/m for Draft Final Report and Tri- partite Disc. on Final Report	1,0	2,0
<u>TOTAL</u>	<u>3,9</u>	<u>16,2</u>

1 field m/m = 2 home m/m

Available m/m for further services required:

I-I = / $2 \times 7 + 14 / - 2 \times 2, 9 + 16, 2 / = 28 - 24 = 4$ m/m home or 2 m/m field.

Mozambique Aluminium Project Cabinet is requested to send requirements regarding the utilization of the available man months.

- Aluterv-FKI also suggested that in view of the additional consultancy services that might be necessary for Aluminium Project Bureau, it may be a good idea to consider a general frame contract as an extension of the existing one. At this stage although the general nature of consultancy and the areas covered are known it is not possible to work out a precise time schedule.

Aluterv-FKI therefore suggested that there ought to be some elasticity in this general frame contract.

Aluminium Project Cabinet representatives agreed to have this aspect examined and convey their response after discussions with the Director of Aluminium Project Bureau, in a short time. The Parties also agreed that instead of submitting a final report a second interim report could be prepared by them summarizing all the activities and main conclusions.

11.06.84 Budapest.

ANNEX 3.

Minutes of Meeting.

The discussions were held at UNIDO Headquarters on 26.09.1984 concerning the Contract No. 83/69/SM of the Mozambican Aluminium Smelter Project, DP/MOZ/82/011.

The tripartite discussions were attended by the following:

Mr. E.T. Balazs, Head, IO/MET.
Mr. W. Shen, UNIDO, Senior Industrial Development Officer, MET.
Mr. A.P. Casimiro, Director of Mozambican Aluminium Project Bureau.
Mr. T.B. Singh, UNIDO Expert (field)
Dr. Gy. Fekete, Aluterv-FKI, Head of Department (Foreign Trading)
Dr. M. Kelenyi, Aluterv-FKI, Head of Dept. (Metallurgy)

Representatives of UNIDO, Mozambican Aluminium Project Bureau and Aluterv-FKI, discussed about the fulfilment of the abovementioned contract and related manmonths used and to be provided for till the date (see Annex 1)

Parties agreed that:

- a) As requested by the Mozambican Aluminium Project Bureau, the Contractor should provide further the remaining 2.8 m/m expert service (for field work) till 31.12.1984.
- b) Contractor will prepare the Final Report (according to the existing contract) and submit to UNIDO by 31.11.1984. Therefore the Final Report will not cover the activity of contractor to be fulfilled during the fourth quarter of 1984.
- c) The remaining progress payments on account of the contract price set forth in para 4.01 of the Contract shall be made on receipt and acceptance of Contractor's Final Report by UNIDO.

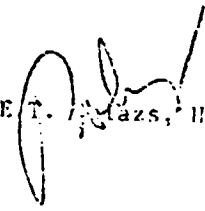
Aluminium Project Bureau stated that the need and exact nature and scope of further consultancy that may be required during 1985 and beyond will depend on the progress made with Kaiser Aluminium and other likely collaborators possibly in the course of the next 2-3 months i.e. by the year end. Aluminium Project Bureau further indicated that after the need for such a consultancy was established by December 1984 end it would prefer the extension of the existing contract with Aluterv or its suitable amendment defining the exact scope rather than initiate a fresh tender. This would not only save time but also cost, since Aluterv is already familiar with the details and related activities of the project by virtue of their earlier involvement.

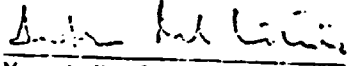
Contractor (Aluterv-FKI) is ready for further activity providing direct consulting services, or providing evaluation studies as required.

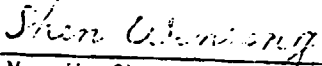
Contractor's offer for the year 1985 has been worked out in two phases and attached in Annex 2.

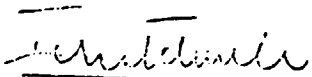
Contractor should prepare and submit an Interim Report and a supplementary Report covering the work performed during the periods of the two phases. UNIDO informed the parties that allocation of fund for the first phase is available on project DP/MOZ/80/022 while allocation for the second phase needs further provision in project specification third phase.

After getting the documents required and subject a positive decision of the Committee on Contracts to amend the existing contract, UNIDO will award the Amendment of the Contract to Aluterv-FKI, for signing as soon as possible.

Noted:  Mr. E.T. Glazs, Head, IO/MET.

Signed: 
Mr. A.P. Casimiro, Director, Aluminium Project Bureau.


Mr. W. Shen, Senior Industrial Development Officer, MET.


Dr. Gy. Fekete, Head of Dept. Muterv-FKI.

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STATEMENT OF MAN/MONTH PROVIDED FOR AND USED TILL DATE

26.09.1984

/1 PA M/M = 0,5 H m/m

Assistance activities	Provision in the Contract 83/69/SM		Actual		m/m still required		TOTAL	
	Project Area	Home	P.A.	H	P.A.	H.	P.A.	H.
Comparative T.E. Evaluation of the studies	2.5	10.0	-	10.0	-	-	-	10.0
Interim Report	-	-	2.5	-	-	-	2.5	-
Evaluation work in connection with modification of VAMI Study.	-	-	-	1.5	-	-	-	1.5
Evaluation of Kaiser Study assistance in discussions	-	-	0.2 a/	2.7	-	-	0.2	2.7
Draft final report	-	2.0	-	-	-	2.0	-	2.0
Tripartite discussion on Final Report	-	-	-	-	-	-	-	-
Assistance in Vienna and Switzerland	-	-	0.4	-	-	-	0.4	-
Consulting services according to D/c	4.5	2.0	-	-	2.8	-	2.8	-
Total	7.0	14.0	3.1	14.2	2.8	2.0	5.9	16.2

a/ Assistance on negotiation with Kaiser in Oakland / 6 Days/30 = 0.2 m/m

b/ To be adjusted by reducing P.A. m/m by 1,1 m/m / 2.2/2 = 1,1 m/m

Contractor's offer regarding extension of
Contract No.83/69/SM for the year 1985

Contractor's services are divided into two phases.

Cost estimate:

<u>Phase 1</u>		<u>Phase 2</u>	
0,9 m/m P.A.	US\$5,400	1,6 m/m P.A.	US\$9,600
3,2 m/m H	US\$9,600	5,8 m/m H	US\$17,400
Subsistence			
27xUS\$85	US\$2,300	48x85 US\$	US\$ 4,080
Travel and Transp.			
4 trip x 500 US\$ = US\$2,000		8 trip x 500 US\$	US\$ 4,000
Salary during travel			
4x200 US\$	US\$ 800	8x200 US\$	US\$ 1,600
		Other costs	500

Total	US\$20,100		US\$37,180

Offer (reduced price)

	<u>P.A.</u>	<u>H</u>	<u>Total</u>	<u>US\$</u>
Phase 1. Consulting services	0.9 m/m	2.2 m/m	3,1 m/m	18,000
Interim report	-	1,0 m/m	1,0 m/m	-----
Phase 2. Consulting services	1,1 m/m	5,3 m/m	6,4 m/m	32,000
Supplementary report	0,5 m/m	0,5 m/m	1,0 m/m	-
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Total:	2,5 m/m	9,0 m/m	11,5 m/m	50,000
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