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UNITED NATIONS INDUSTRIAL  
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Distr.  
RESTRICTED  
UNIDO/EX.34  
30 January 1978  
ENGLISH

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FINANCIAL AND ECONOMIC REVIEW  
OF PROPOSAL FOR THE ESTABLISHMENT OF A  
500,000 METRIC TON/YEAR PORTLAND CEMENT PLANT  
FOR THE  
SOCIETE DES CEMENTS D'ONIGBOLO  
PEOPLE'S REPUBLIC OF BENIN \*  
(SI/BEN/77/802)

by

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TABLE OF CONTENTS

	Page
LIST OF TABLES AND CHARTS	(iii)
PREFACE	(iv)
I. INTRODUCTION	
1.1 Preceding Events	1
1.2 Purpose and Scope of Review	3
1.3 Basic Assumptions	5
II. SUMMARY OF CONCLUSIONS	8
III. SUMMARY OF RECOMMENDATIONS	10
IV. PROFITABILITY AND CASH FLOW	
4.1 Operating Costs and Sales Revenues	12
4.2 Conclusions	19
V. PRE-OPERATIONAL PERIOD	
5.1 Introduction	26
5.2 General Comments	27
5.3 Process Equipment	30
5.4 Quarry Equipment	31
5.5 Mobile Equipment	32
5.6 Spare Parts	32
5.7 Factory Buildings	32
5.8 The Housing Colony	34
5.9 Engineering and Technical Services	35
5.10 Management, Training and Technical Assistance	36
5.11 Erection of Machinery and Equipment	37
5.12 Freight and Insurance	37
5.13 Increase due to Revised Terms of Payment	38
5.14 Interest during Construction	39
5.15 Other Financial Charges	39
5.16 General Conclusions	40
VI. CONTRACTUAL TERMS AND CONDITIONS	
6.1 Introduction	41
6.2 Object and Scope of the Contract	42

	<u>Page</u>
6.3 Contract Machinery and Equipment	43
6.4 Engineering and Technical Services	44
6.5 Financial Arrangements	45
6.6 Guarantees	45
6.7 Conclusions	47
VII. FINANCIAL STRUCTURE OF THE PROJECT	
7.1 General Comments	50
7.2 The Equity Base	51
7.3 The Supplier Credits	51
VIII. SUGGESTED IMMEDIATE WORK PROGRAM	
	53

TABLES AND CHARTS

	<u>Page</u>
TABLE I - PRODUCTION AND OPERATING COSTS	13
TABLE II - DEPRECIATION SCHEDULE	16
TABLE III - LOAN REPAYMENT SCHEDULE	18
TABLE IV - PROFITABILITY AND CASH FLOW PROJECTIONS - CASE I	20
TABLE V - PROFITABILITY AND CASH FLOW PROJECTIONS - CASE II	21
TABLE VI - BREAK-EVEN POINT ANALYSIS	24
CHART - BREAK-EVEN POINT CHART	25
TABLE VII - BREAKDOWN OF PROJECT COSTS	28

## P R E F A C E

This evaluation has been carried out upon the request of the Government of the People's Republic of Benin within the framework of the Special Industrial Services (SIS) programme co-operatively administered by the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO).

The analysis is submitted as an intermediate step toward the successful conclusion of a mutually acceptable contract for the construction of the portland cement plant near Onibolo. As such, it is hoped that this report accomplishes its intended purpose of drawing attention to some of the problems that need to be resolved and suggesting some avenues that the Government might fruitfully explore in its forthcoming negotiations.

I would like first of all to express my gratitude to the Government of the People's Republic of Benin for its confidence and in particular to Mr. Justin Gnidehou, Directeur de la Planification d'Etat, for his invaluable assistance and guidance. I would also like to thank Mr. H.A. Behrstock, UNDP Resident Representative a.i.; Mr. Patrice Logoussou, Director; Mr. Charles Do Reno, Technical Officer-in-Charge and Mr. Marc Pavot, UNIDO Project Manager, of the Bureau Central de Projects in Cotonou, as well as to their staff, for their aid and cordial hospitality.

Finally, I would like to express my thanks to my superiors and colleagues at UNIDO headquarters for their encouragement and support.

## I. INTRODUCTION

### 1.1 Preceding Events

- 1.1.1 In March 1977, F.L. Smith and Company A/S of Copenhagen, Denmark (hereinafter referred to as the "Contractor") submitted to the Government of the People's Republic of Benin (hereinafter referred to as "the Government" and "Benin" respectively) a comprehensive feasibility study setting forth its findings on the technical and economic viability of constructing a complete portland cement plant in the vicinity of Onigbolo, Benin.
- 1.1.2 Geological investigations carried out by the Contractor in the selected quarry led to their conclusion that limestone and clay deposits of adequate quality and in sufficient quantities were available to provide the basic raw materials for a cement plant with an initial production capacity of about 500,000 metric tons (MT) per year.
- 1.1.3 A marketing survey conducted by the Contractor revealed the existence of sufficient potential demand within Benin and in the countries adjacent thereto, most particularly in Nigeria.
- 1.1.4 Based on its positive findings and in conjunction with the said feasibility study, the Contractor also submitted a proposal including capital cost break-downs for the construction of a complete cement plant designed to produce 500,000 metric tons per year for an estimated total cost of the equivalent of 412,755,000 Danish Kroners, subject to adjustment of the price of the foreign supply of machinery, equipment and services in accordance with certain formulas.

- 1.1.5 It was envisaged that the factory would be constructed as a partial turnkey operation by the Contractor, who would supply all of the machinery, equipment, spare parts and an initial supply of consumable stores, engineering and supervisory services needed for the construction, erection and start-up of the plant designed to produce 500,000 MT of cement per year. The Contractor would in addition provide management and other technical services before and subsequent to the commencement of normal production and undertake the foreign and in-plant training of selected local supervisory and management staff, all for a lump-sum price of about 205 million Danish Kroners.
- 1.1.6 In October 1977, the Contractor submitted a revised quotation with capital cost break-downs, at a cash price of the equivalent of 492,505,000 Danish Kroners for all of the machinery, equipment and spare parts, civil works, housing and technical, supervisory and management services specified in the Contractor's earlier proposal of March, 1977.
- 1.1.7 The revised capital cost break-downs were further developed on a number of alternative bases, including modified payment terms and the pre-financing of interest during construction and other financial charges, totalling about 80 million Danish Kroners.
- 1.1.8 A financing plan was also submitted involving Belgian and Danish supplier credits amounting to an aggregate of the equivalent of 482,195,000 Danish Kroners, to be refinanced through the Belgian and Danish Export Finance Corporation, and to supplement a share capital assumed at the equivalent of 120,000,000 Danish Kroners.
- 1.1.9 A further loan (EURO-loan) of 30,000,000 Danish Kroners was proposed to be raised at the end of the first year of operation to finance the anticipated cash flow deficit and to provide supplemental working capital.



1.1.10 The Government, through the United Nations Development Programme (UNDP), requested the assistance of the United Nations Industrial Development Organization (UNIDO), for a technical and economic evaluation of the above proposals. Mr. Harald Boeck, UNIDO cement expert, arrived in Cotonou on 10 October 1977 to review the technical aspects of the project. The writer, Gregory V. Goekjian, UNIDO Industrial Development Officer, visited Cotonou from 7 to 26 November 1977 inclusive, to review economic and financial aspects of the proposed project. Mr. Boeck's report, whose contents have to a limited extent been taken into account in the preparation of this report, should be read in conjunction with the present appraisal.

## 1.2 Purpose and Scope of Review

1.2.1 Discussions were held on 8 November 1977 with Mr. Justin Gnidehou, Directeur de la Planification d'Etat, to clarify the purpose of this evaluation and consequently, to define its scope. Mr. Gnidehou indicated that the Government had some general reservations on some unspecified aspects of the project which might be confirmed or otherwise clarified by the UNIDO evaluation. Accordingly, he would expect the review to critically assess all major aspects of the proposals.

1.2.2 Mr. Gnidehou further stated that the Government would seek the continued assistance of UNIDO in the various phases of contract negotiations and, in the event of the successful conclusion of a construction contract, to call for further UNIDO assistance as consultants to the Government in the periodic supervision of the construction contract until commencement of production.

- 1.2.2 It was also stated that in light of the historical background of the Onicholo project and the advanced stage of negotiations with the Contractor, the Government's present plans envisioned the negotiation and execution of a mutually acceptable turnkey construction contract with the Contractor. Accordingly, alternative strategies for the construction of the cement plant were not now being considered.
- 1.2.4 In view of the preceding, the scope of this review has been expanded beyond a mere financial analysis to include a discussion of all the major elements of the proposals, including the financing plan and the terms and conditions of the contractual arrangements. It will thus attempt to highlight some areas that lend themselves to fruitful negotiation.
- 1.2.5 The review will draw attention to certain areas where further clarification and additional investigations will need to be undertaken to justify the various components of project costs and to support the basic assumptions in the profitability and cash flow projections submitted. It will also attempt to indicate some additional heads of expenditure which do not appear to have been provided for in the proposals.
- 1.2.6 It is stressed that in view of the brevity of the mission, it has not been possible to verify a number of important costs and revenue figures. Accordingly, this review is not sufficiently exhaustive nor is it presented in sufficient detail to serve as a basis for final investment decision-making. It is, however, hoped that it will be a useful tool for further negotiations.

### 1.3 Basic Assumptions

- 1.3.1 The factory will be designed to produce 500,000 metric tons of cement per year of about 312 days when running at full capacity; internationally acceptable quality standards will be achieved and the plant will reach and sustain such a production level from the first full year of operation.
- 1.3.2 The factory will be constructed as a complete turnkey operation by the Contractor who will supply, delivered on the plant site, all machinery and equipment including a two-year supply of spare parts and an initial supply of consumable stores; all necessary quarry equipment including a two-year supply of spare parts therefor; process control, laboratory and mobile equipment; the complete civil works including fencing and internal roads, the water installation, the housing colony, the administration buildings and all ancillary buildings; will perform all detailed engineering for the plant and civil constructions, will supervise the construction and erection as well as erect all machinery and equipment; will supervise the commissioning and start-up of the plant; will conduct additional geotechnical investigations and open the quarry; and will provide management and training services in the starting up and operation of the factory, all for a lump sum price, subject to price adjustment on the basis of certain formulas.
- 1.3.3 The Contractor will provide supplier credits amounting to D.Kr. 482,195,000 to cover the foreign currency component of the project costs inclusive of interest during construction, bank charges and credit insurance premiums, and will subscribe to and fully pay in, ten per cent, or D.Kr. 12,000,000, in the share capital of the Société des Ciments d'Onigbolo (hereinafter referred to as the "Company").

- 1.3.4 Appropriate institutions of the Government of Benin and the Government of Nigeria, acceptable to the lenders, will jointly and severally guarantee the repayment of the principal amounts of the supplier credits, including accrued interest on all outstanding balances.
- 1.3.5 The Government of Benin and Nigerian interests will subscribe to the share capital of the Company in the amounts of D.Kr. 66 million and D.Kr. 42 million equivalent, respectively. Such subscriptions, together with the Contractor's subscription, will provide the Company with a fully paid up share capital of the equivalent of 120,000,000 Danish Kroners, and will be available on or about the effective date of the construction contract.
- 1.3.6 The supplier credits and share capital amounting to a total of D.Kr. 602,195,000 will be utilized exclusively to finance the costs connected with the construction of the proposed cement plant, inclusive of initial working capital. In addition, the Government will, at its own cost and expense, provide all of the power and other infrastructure necessary for the setting up and operation of the factory.
- 1.3.7 The major portion of the factory's cement production will be exported in 4-ply paper bags to Nigeria, mainly by road transport, and sold at internationally competitive prices.
- 1.3.8 The Company will benefit from the provisions of the Benin Investment Code, Regime "C", and will be exempted from all taxes, duties or other administrative charges on all machinery, equipment, spare parts and other materials needed for the setting up of the factory and, except as specifically provided for on page 10 vol. IV and pages 15.1 and 16.3 of vol. V of the Contractor's proposal, from taxes, duties and other governmental charges during the period of operation covered by said proposal.

- 1.3.9 The factory will be established and operated by the Company and initially managed by the Contractor on sound management principles with specific commercial and financial objectives.
- 1.3.10 Exchange rates are fixed at 1.00 Danish Kroner equals 5.79 Belgian Francs equals 39.37 FCFA.

## II. SUMMARY OF CONCLUSIONS

- 2.1 The overall conclusion reached in this evaluation is that even under optimum operating conditions, the profitability and cash flow of the project provide at best a nominal return on invested capital and seriously impair the Company's ability to discharge its financial obligations.
- 2.2 This conclusion is attributable to three main correlated factors. Firstly, to the high fixed investment cost resulting in part from the all-inclusive lump sum (complete turnkey) approach to the construction of the factory, and from the apparently high costs of some of the individual heads of capital expenditure. Secondly, to the high financial costs reflecting the insufficiency of the equity input and magnitude of borrowings, the somewhat prolonged delivery and construction schedule, and to the absence of a careful and detailed plan for the utilization of the available funds. And thirdly, to the disequilibrium in the cost-volume-profit relationships reflected in the composition of the operating costs and the assumptions relative to output and value of sales.
- 2.3 The net effect of these factors has been to undermine the Company's financial viability by raising its profit break-even point to a level which allows the project only a marginal capacity to absorb the impact of anticipated breakdowns and other interruptions in operations or of temporary fluctuations in the price of its product. And more drastically, by raising its cash break-even level to an unacceptably high point above the Company's maximum projected sales revenues.
- 2.4 Cumulatively, these factors clearly indicate that significant modifications in the project structure would be required to achieve a more balanced investment which relates the capital assets to a realistic production volume based upon a careful analysis of sales demands.
- 2.5 The nature of these modifications is largely inherent in the contributory factors outlined above and discussed in some detail throughout this report. Their positive impact on the future

viability of the project will depend, on the one hand, upon the extent to which any new information emerging from the negotiations and the recommended investigations alter the present conclusions, and on the other, upon the degree to which the costs of some of the capital assets are successfully reduced.

- 2.6 Lastly, it seems probable that the permanent working capital built into the financial plan is inadequate. This element will need to be re-examined in the light of credit facilities that might have to be offered to the Company's Nigerian customers to realize the sales forecasts, the volume and payment terms relative to the inventories of imported production materials that would have to be maintained to avoid interruptions and the terms of payment for such major cost items as power and fuel oil.
- 2.7 For the time being, no attempt has been made to assess the economic benefits, the budgetary costs resulting from the incentives to be granted under the Benin investment code, nor of the foreign exchange implications of the project. In light of the current findings, it is felt that these issues are better dealt with at a later date when the overall picture of the project becomes clearer.
- 2.8 The conclusions reached in the course of this evaluation are substantially based on the data contained in the Contractor's revised proposal of October 1977 and on the basic assumptions outlined in the introductory section of this report. To alleviate the negative impact of the various factors examined on the financial viability of the project, some recommendations are offered which could be usefully explored in the negotiations. They are also offered with the parallel conviction that with the co-operation of all parties, a revised strategy can be formulated for the effective realization of the project.

### III. SUMMARY OF RECOMMENDATIONS

- 3.0 To obviate the structural vulnerability of the project some suggestions are submitted below, in addition to the steps outlined in Section VIII and discussed in detail throughout this evaluation. These recommendations are concurrently aimed at reducing the magnitude of the capital investment, at maximizing the controls and options in the procurement of some of the goods and services, at increasing the margin of safety built into the financial plan, at establishing realistic forecasts of sales revenues and at lowering some of the major components of the direct manufacturing costs.
- 3.1 The various components of the capital expenditures should be carefully analyzed with a view to achieving reductions in their individual costs. Major emphasis should be placed on the civil works, the housing colony, the management and administrative fees, the erection of machinery and equipment, and the various financial costs.
- 3.2 The eventual turnkey construction contract should be modified to provide for lump-sum payment for certain equipment and services to be supplied directly by the Contractor, and other equipment, materials and services to be purchased through the Contractor on a cost-reimbursable basis.
- 3.3 All efforts should be exerted to accelerate the schedule of equipment deliveries and the timetable for the construction of the factory.
- 3.4 A finite work program along with a schedule of sources and uses of funds should be prepared to ensure the most efficient use of the available funds.
- 3.5 Negotiations should be entered into with the financing agencies towards determining the possibilities of extending the grace and repayment periods of the loans and towards the conversion of the supplier credits into buyer credits.



- 3.6 The equity base of the financial structure should be increased so that it represents approximately one third of the total fixed capital investment.
- 3.7 A comprehensive market study is required to pinpoint anticipated sales revenues and working capital needs, and to define the most advantageous distribution system for the export sales.
- 3.8 The composition of the management team, the timing of the management services and their terms should be reviewed and renegotiated.
- 3.9 A cost-benefit analysis should be made to determine the feasibility of establishing bag manufacturing facilities for the Company's own cement bag requirements and for sale to the grinding plant located in Cotonou.
- 3.10 The Government's engineering consultants should be instructed to review the process design and flow diagrams towards effectuating technically satisfactory modifications which would lower the production costs, especially in the area of power and fuel consumption.

#### IV. PROFITABILITY AND CASH FLOW

##### 4.1 Operating Costs and Sales Revenues

- 4.1.1 The estimates of operating costs and sales revenues used as a basis for the profitability, balance sheet and cash flow projections submitted have been examined with a view to determining the overall economic viability of the project.
- 4.1.2 Utilizing the data presented in the revised proposal and various calculations made with Mr. H. Roock, UNTAX cement expert, the variable cost elements have been slightly changed as to units of consumption per ton of cement and the costs of maintenance and repair have been increased. Provision has also been made for normal wastage and unforeseen expenditures at less than 1% of sales. Finally, all production costs of a semi-variable nature, have been proportionately distributed to the fixed and variable cost elements.
- 4.1.3 Apart from the non-variable portion of various manufacturing costs, management costs have been added to the fixed operating charges. A provision for indirect business overheads has been included and the annual depreciation has been recalculated. Finally, the interest on long-term debt has been averaged on an annual basis over the maturity of the loans (Table I). Some of these fixed costs are discussed below.

PRODUCTION AND OPERATING COSTS - TABLE T

	Variable Cost KOP/Cement	Annual Variable Cost	Annual Fixed Costs	Total Annual Cost at Full Production
	D.Kr.	----- D.Kr.000 -----		
<u>Cost of Goods Sold</u>				
- Bauxite	8.60	4,300	-	4,300
- Grinding Media	1.20	600	258	860
- Refractories	2.16	1,080	1,620	2,700
- Bags	32.34	16,170	-	16,170
- Other Materials	0.74	370	93	463
- Fuel	49.98	24,991	2,777	27,768
- Power	44.61	22,305	2,478	24,783
- Labor	-	-	4,675	4,675
- Maintenance	14.06	7,028	3,012	10,040
- Miscellaneous	2.55	1,275	1,275	2,550
Sub-Total	156.24	78,121	16,188	94,309
<u>Operating Expenses</u>				
- Management		-	3,283	3,283
- Administrative and Sales Expenses		-	4,715	4,715
- Depreciation		-	51,641	51,641
Sub-Total		-	59,639	59,639
<u>Financial Charges and Taxes</u>				
- Interest on Long-term Debt		-	20,365	20,365
- Sundry Taxes	0.56	280	-	280
Sub-Total	0.56	280	20,365	20,645
<b>Total Costs before Income Taxes</b>	<b>156.80</b>	<b>78,401</b>	<b>96,192</b>	<b>174,593</b>

- 4.1.4 Maintenance and Repair. As stated above, this item has been treated as a semi-variable cost. 70 % of the total estimated costs has been treated as a variable cost and 30 % has been considered as a fixed charge, arrived at as follows:

D. Kr. 000

50 % of the value of mechanical and electrical spare parts supplied and considered adequate for 2 years, at the base price of D.Kr. 11,790,000 plus pro rata shipping costs, or an annual cost of

6,660

10 % of the value of quarry and mobile equipment, inclusive of shipping costs, priced at D. Kr. 33,800,000, or an annual cost of

3,380

Total Annual Cost of Maintenance

10,040

of which 30 % or D.Kr. 3,012,000 treated as a fixed annual charge.

- 4.1.5 Management and Technical Assistance. As it is planned that the full complement of 7 management personnel will arrive for the start up of the plant 30 months after the effective contract date, and some of them continue into the 7th year after commencement of production, the costs are obviously a charge against operating income. Accordingly, the base price under this heading has been reduced by the provision for training services included therein, to arrive at a total management cost of D.Kr. 22,980,000. This cost has been distributed over the anticipated duration of the services at an average rate of D.Kr. 67,193 per man month multiplied by the total of 342 man/months proposed to be supplied. The annual costs based on the Contractor's schedules are calculated as follows:

		<u>D. Kr. 000</u>
Year 3 - 42 man/months	-	2,822
Year 4 - 84 "	-	5,644
Year 5 - 78 "	-	5,241
Year 6 - 60 "	-	4,032
Year 7 - 42 "	-	2,822
Year 8 - 18 "	-	1,210
Year 9 - 12 "	-	806
Year 10 - 6 "	-	403
<u>Total 342 man/months</u>		<u>22,980</u>

The average annual cost of management over the 7-year life of these services is thus D.Kr. 3,283,000.

4.1.6 Indirect Overheads. The variable, semi-variable and fixed costs excluding management, depreciation and debt service have been summed up and a conservative 5 % provision for indirect overheads has been applied to their total. This percentage, amounting to D.Kr. 4,715,000 annually, covers all the Company's costs not included elsewhere, such as: office expenses, telex, telephone, travelling costs, insurances, municipal and other fees and a contingency allowance to cover unforeseen items of expenditure.

4.1.7 Depreciation. A detailed depreciation schedule (Table II) has been prepared, including the estimated price escalation of D.Kr. 42,682,000, which is summarized as follows:

	<u>Value D.Kr.000</u>	<u>Period</u>	<u>Annual Depreciation D.Kr.000</u>
All civil works, including housing, water installation and related service and financial charges at 5 % annually	245,793	20 yrs	12,290
All mechanical and electrical equipment, fully erected, including shipping and related service and financial charges at 10 % annually	259,963	10 yrs	25,996
All quarry, mobile and miscellaneous equipment including shipping and financial charges, and opening of the quarry at 20 % annually	<u>66,773</u>	5 yrs	<u>13,355</u>
Totals	<u>572,529</u>		<u>51,641</u>

DEPRECIATION SCHEDULE - TABLE II

	D.Kr.000	D.Kr.000	D.kr.000
<b>A. CIVIL WORKS</b> <sup>1/</sup>			
1. Factory Buildings	183,186		
2. Housing	21,305		
3. Water Installation	3,310		
4. Supervision of Construction	2,537		
5. Geotechnical Investigations	2,642		
6. Administration	14,404		
7. 8.055 Estimated Escalation <sup>2/</sup>	18,523	245,793	
20 Years - 5% Annually			12,290
<b>B. PROCESS EQUIPMENT</b> <sup>1/</sup>			
1. Mechanical Equipment	112,322		
2. Electrical Equipment	26,630		
3. Auxiliary Equipment	13,535		
4. Process Control Equipment	467		
5. Supervision of Erection and Startup	15,378		
6. Erection	46,286		
7. Pro-rata Freight and Insurance	22,775		
8. Administration	3,184		
9. 8.055 Estimated Escalation <sup>2/</sup>	19,380	259,963	
10 Years - 10% Annually			25,996
<b>C. QUARRY, MOBILE AND MISCELLANEOUS</b> <sup>1/</sup>			
1. Quarry Equipment	28,022		
2. Mobile and Miscellaneous Equipment	23,868		
3. Opening of Quarry	4,479		
4. Pro-rata Freight and Insurance	5,427		
5. 8.055 Estimated Escalation <sup>2/</sup>	4,977	66,773	
5 Years - 20% Annually			13,355
<b>TOTAL ANNUAL DEPRECIATION</b>			<b>51,641</b>

<sup>1/</sup> Costs inclusive of financial charges and interest during construction, exclusive of management services and training

<sup>2/</sup> Total estimated escalation D.Kr.42,682 applied proportionately to all assets, exclusive of spare parts and management services plus training

- 4.1.7 Interest on Long-Term Debt. The total debt service charges over the maturity of the long-term loans have been averaged to an annual cost of D.Kr. 20,355,000 (Table III).
- 4.1.8 No attempt has been made in the course of this evaluation to verify the individual prices of the various materials and other direct manufacturing costs.
- 4.1.10 Sales Revenues. The vital issue of establishing a realistic and supportable estimate of sales revenues has unfortunately been treated somewhat superficially in the marketing survey by the simple expedient of adopting the then current Benin export price of WCPA 14,500 (D.Kr. 358,03) per MT cement, ex works Cotonou.
- 4.1.11 While for purposes of this evaluation the above price has also been adopted, the marketing and distribution problem will need to be addressed in sufficient detail to satisfy both the investors and the lenders that at realistic levels of production and sales, costs could be met, instalments and interest paid on the loans and a reasonable return on the invested capital would be obtained. In particular, it should be borne in mind that since a substantial portion of the Company's production is destined for export, mainly to Nigeria, import parity prices can be expected to prevail. Accordingly, if the transportation and other distribution costs to Nigerian destinations are such as to increase the landed cost in Nigeria above import parity levels, the assumptions both as to volume of sales and prices may prove to be unattainable.
- 4.1.12 To get to grips with the problem, the exigencies of the Nigerian cement market will need to be carefully studied with a view, on the one hand, to determining the most advantageous distribution system and on the other, of accurately establishing all of the costs that would have to be added to the ex-mill price to arrive at a sustainable price to Nigerian consumers.

TABLE III

LOAN REPAYMENT SCHEDULE

Production Year	Time of Payment Months After Contract Date	LOAN I		LOAN II		FINANCIAL			Total Principal	Total Interest		
		Outstanding Balance D.Kr.000	Principal Repayment D.Kr.000	Interest at 8% D.Kr.000	Outstanding Balance D.Kr.000	Principal Repayment D.Kr.000	Interest at 7.75% D.Kr.000	Outstanding Balance D.Kr.000			Principal Repayment D.Kr.000	Interest at 8% D.Kr.000
1	36	279,031	-	-	203,164	-	-	-	-	-	31,952	16,000
2	42	279,031	17,440	11,161	203,164	14,512	7,873	-	-	-	31,952	17,000
3	48	261,591	17,440	10,464	188,652	14,512	7,310	-	-	-	31,952	17,000
4	54	244,151	17,440	9,766	174,140	14,512	6,748	-	-	1,200	31,952	17,000
5	60	226,711	17,440	9,068	159,628	14,512	6,186	-	-	1,200	31,952	17,000
6	66	209,271	17,440	8,371	145,116	14,512	5,623	-	-	1,200	31,952	17,000
7	72	191,831	17,440	7,673	130,604	14,512	5,061	-	-	1,200	31,952	17,000
8	78	174,391	17,440	6,976	116,092	14,512	4,499	-	-	1,200	31,952	17,000
9	84	156,951	17,440	6,278	101,580	14,512	3,936	-	-	1,000	36,952	17,000
10	90	139,511	17,440	5,580	87,068	14,512	3,374	-	-	800	36,952	17,000
11	96	122,071	17,440	4,883	72,556	14,512	2,812	-	-	600	36,952	17,000
12	102	104,631	17,440	4,185	58,044	14,512	2,249	-	-	400	36,952	17,000
13	108	87,191	17,440	3,488	43,532	14,512	1,687	-	-	200	36,952	17,000
14	114	69,751	17,440	2,790	29,020	14,512	1,125	-	-	-	31,952	17,000
15	120	52,311	17,440	2,092	14,508	14,512	562	-	-	-	31,952	17,000
16	126	34,871	17,440	1,395	-	14,512	-	-	-	-	17,440	17,000
17	132	17,431	17,431	697	-	14,508	-	-	-	-	17,431	17,000
Totals		279,031	272,031	94,867	203,164	55,045	30,000	5,000	512,915	162,000		



- 4.1.13 A suggestion has been made in the Market Analysis that a preferential duty and licensing treatment of the Company's cement be negotiated and agreed upon with the Nigerian Government. While there may be some justification for such preferential treatment in light of the Nigerian Government's equity investment and loan guarantee obligations, sales under normal, competitive conditions must be assumed until a formal agreement is reached and its revenue implications assessed.
- 4.1.14 Pending the resolution of this important issue two tables have been prepared setting forth the profitability and cash flow projections. Table IV has been calculated on the basis of full capacity production and sales from the first full year of operation onwards (an excellent performance) and Table V, which assumes that production in the first year will be at 80% of rated capacity, increasing at the rate of 5% annually until full production is achieved in the 5th year of operation (a realistic performance). These tables are termed Case I and Case II, respectively.

#### 4.2 Conclusions

- 4.2.1 The nature of the project's cash flow indicates very clearly the high cost of the capital assets, the insufficiency of the financing plan and the inadequacy of the equity input within the financing plan. These result in very high costs during the first several years of the plant's operation and, in view of the resulting cash deficits, cast some doubt as to the likelihood that the proposed financing arrangements will come to fruition without major modifications in the construction of the project plan and the financial structure. It also leads to the probable need for a major refinancing of the supplier credits almost immediately following the commissioning of the plant or to the more drastic alternative of a default situation necessitating a call on the guarantees.

Production - 100 Percent

Start-up - 100 Percent

Year - 1964

Net Sales Revenues - D.Kr. 100%	15,347	15,347	15,347	15,347
Cost of Goods Sold	(21,266)	(21,266)	(21,266)	(21,266)
Materials, Supplies & Utilities	4,330	4,330	4,330	4,330
Labor	3,261	3,261	3,261	3,261
Maintenance and Repair	1,675	1,675	1,675	1,675
Waste & Incidentals	1,520	1,520	1,520	1,520
<u>Gross Profit</u>	13,130	13,130	13,130	13,130
<u>Operating Expenses</u>				
Management	2,720	2,720	2,720	2,720
Administrative & Sales Expenses	1,166	1,166	1,166	1,166
Depreciation	1,104	1,104	1,104	1,104
<u>Operating Profit</u>	13,130	13,130	13,130	13,130
Financial Charges and Taxes				
Other than income taxes	1,104	1,104	1,104	1,104
Interest on Long-term Debt	1,104	1,104	1,104	1,104
Sundry Taxes	1,104	1,104	1,104	1,104
<u>Net Profit (Loss) before Income Tax</u>	13,130	13,130	13,130	13,130
Income Taxes	(1,104)	(1,104)	(1,104)	(1,104)
<u>Net Profit (Loss)</u>	12,026	12,026	12,026	12,026
<u>Cash Flow - Sources</u>				
Internal Generation - Net Profit (Loss)	12,026	12,026	12,026	12,026
Depreciation	1,104	1,104	1,104	1,104
Borrowings	1,104	1,104	1,104	1,104
<u>Net Available Cash Flow</u>	14,234	14,234	14,234	14,234
<u>Application of funds</u>				
Working Capital	(1,104)	(1,104)	(1,104)	(1,104)
Replacement of 50% of Quarry & Mobile Equipment	(1,104)	(1,104)	(1,104)	(1,104)
Price Escalation	(1,104)	(1,104)	(1,104)	(1,104)
Principal Repayments	(1,104)	(1,104)	(1,104)	(1,104)
<u>Net Cash Outflow</u>	(4,416)	(4,416)	(4,416)	(4,416)
<u>Annual Cash Surplus (Deficit)</u>	9,818	9,818	9,818	9,818
<u>Cumulative Cash Surplus (Deficit)</u>	9,818	19,636	29,454	39,272



- 4.2.2 The cash flow figures also raise questions as to two of the essential assumptions to the analysis: namely, that the plant will operate at full rated capacity from the first year of production and that it will be able to sell all of its output at the price indicated.
- 4.2.3 The high ratio of fixed charges to variable costs of about 55:45, especially when considered in light of the fact that debt service and depreciation together account for nearly 75% of the total fixed costs, similarly leads to the conclusion that significant project cost reductions will be needed if the project is to be realized.
- 4.2.4 A break-even analysis has been made in terms of units of production and volume of sales. The analysis (Table VI) and chart show the profit break-even point at over 90% of full capacity and at an annual volume of sales of about D.Kr. 167 million. This high break-even point strongly suggests that the base underlying the Company's anticipated earnings is very precarious since any production level below 90% or any drop in the ex-mill sales price below about D.Kr. 335 or FCFA 13,200 per ton at full rated capacity, would result in operating losses.
- 4.2.5 To reduce the break-even level, either the sales price would have to be raised and/or the variable and fixed costs reduced. However, in view of the wide gap between the assumed sales revenues and the variable costs, any change in either of these two factors would have a relatively modest influence on the break-even level, and efforts would have to be concentrated on lowering the fixed costs.
- 4.2.6 Since depreciation and debt service together amount to some D.Kr. 72,000,000 annually, it is evident that the efforts to lower the fixed costs would have to be concentrated on reducing the cost of the capital assets, on increasing the equity base and thus diminishing the magnitude of borrowings.

A careful strategy would be required to make the best use of the resources available with special emphasis on maximizing procurement options, modifying the work plan and contractual arrangements and finally on speeding up the schedule of equipment delivery and the timetable for completion of construction of the factory to reduce the interest during construction.

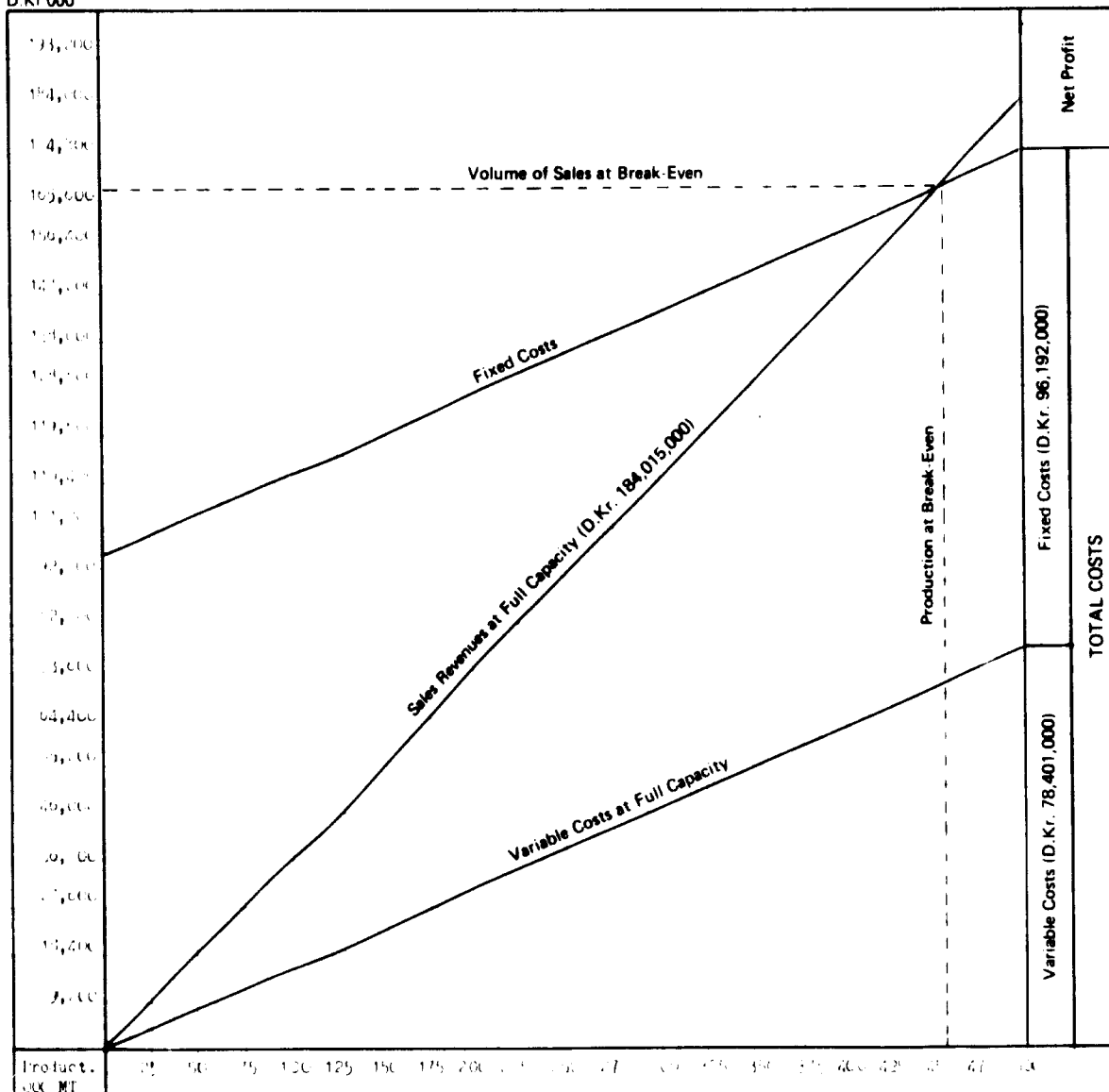
BREAK-EVEN POINT ANALYSIS - TABLE VI

I. Cost Components	Fixed Costs		Variable Costs		Total Costs
	%	D.Kr.000	%	D.Kr.000	D.Kr.000
1. Labour	100	4,675	-	-	4,675
2. Fuel	10	2,777	90	24,991	27,768
3. Power	10	2,478	90	22,305	24,783
4. Bags	-	-	100	16,170	16,170
5. Gypsum	-	-	100	4,300	4,300
6. Maintenance	30	3,012	70	7,028	10,040
7. Grinding Media	30	258	70	602	860
8. Refractories	60	1,620	40	1,080	2,700
9. Other Materials	20	93	80	370	463
10. Management	100	3,283	-	-	3,283
11. Administrative and Sales Expense	100	4,715	-	-	4,715
12. Wastage and Incidentals	50	1,275	50	1,275	2,550
13. Depreciation	100	51,641	-	-	51,641
14. Interest on Long-Term Debt	100	20,365	-	-	20,365
15. Sundry Taxes	-	-	100	280	280
Total		96,192		78,401	174,593
Percentage		55.1%		44.9%	100%
Cost D.Kr.MT/Cement		192.38		156.80	

II. Annual Sales Revenues (D.Kr. 368.03 MT/Cement)	D.Kr.000 184,015
III. Debt Repayment (Loans I,II and Euroloan)	64,025
IV. Profit Break-Even Point (% Capacity)	91.08%
V. Profit Break-Even Point (Volume of Sales)	167,600
VI. Cash Break-Even Point (% Capacity)	102.80%
VII. Cash Break-Even Point (Volume of Sales)	189,175

**BREAK-EVEN POINT CHART**

Sales  
D.Kr 000



V. PREF-OPERATIONAL PERIOD - PROJECT COSTS5.1 Introduction

- 5.1.1 Estimates of total project costs including a price quotation for machinery, equipment, spare parts and supervisory services, were submitted by the Contractor in March 1977 totalling D.Kr. 412,755,000.
- 5.1.2 This proposal did not include a financing plan and consequently, no provision was made for interest during construction and other financial charges.
- 5.1.3 The original plan appears to have been for the construction of the factory as a partial turnkey operation with the Contractor's responsibilities limited to the supply of all machinery, equipment and engineering and supervisory services needed for the construction, erection and starting up of the plant, all for a lump sum price subject to adjustment for inflation. In addition, certain management and training services were to be provided.
- 5.1.4 Accordingly, all project costs not specifically included in the Contractor's supply of equipment and services would appear to have been intended to be the responsibility of the Company.
- 5.1.5 In October 1977 the Contractor submitted a revised quotation for the complete plant, apparently to be constructed as a full turnkey operation, for a basic lump sum price of D.Kr. 492,505,000.
- 5.1.6 Subject to final approval by the Belgian and Danish Export Finance Corporation, the Contractor proposed to arrange supplier credits totalling D.Kr. 482,195,000 to supplement the equity capital of D.Kr. 120,000,000. On the basis of this financing plan, the Contractor submitted alternative cash price quotations providing for (a) revised terms of payment, (b) the pre-financing of interest during construction, and (c) the pre-financing of bank charges,



credit insurance premiums and other unspecified financial charges.

5.1.7 The various alternative quotations have been consolidated under main heads of expenditure and the percentage increase in each case calculated on the base prices in the March and October 1977 quotations. (Table VII).

## 5.2 General Comments

5.2.1 The overall investment cost, based on the October 1977 cash price of D.Kr. 492,505,000 plus financial costs aggregating D.Kr. 80,110,000 and a probably inadequate price escalation of D.Kr. 42,682,000, reaches the somewhat exorbitant figure of D.Kr. 615,297,000 broken down as follows:

	<u>D.Kr.000</u>
A. Base Price - October 1977	492,505
B. Adjustment for Revised Payment Terms	6,355
C. Danish Interest during Construction and Financial Charges	<u>34,670</u>
Sub-total	533,530
D. Adjustment for Inflation - 8%	42,682
E. Belgian Interest during Construction and Financial Charges	<u>39,085</u>
<u>Total Investment Cost</u>	<u>D.Kr. 615,297 *)</u>

\*) The difference between the Contractor's total cost figure of D.Kr. 616,002,000 and the above figure, is accounted for by an apparent error in the calculation of the price adjustment of the local costs and a slight understatement of the escalation on the Danish supply.

5.2.2 To the above investment costs some other items, such as all-risk insurance which has been specifically excluded by the Contractor, would have to be added. Furthermore provision would need to be made for pre-investment costs and other unforeseen expenditures.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Breakdown of Project Costs - Table VII

Head of Expenditure	Cost Estimates March 1977	Quotation October 1977	Percentage Increase	Quotation Basis Revised Payment Terms	% above March Quotation	% above October Quotation	Quotation Incl. Danish/Belgian Interest during Construction (1)	% above March Quotation	% above October Quotation
					.....D. Kr. 000.....				
<b>Machinery and Equipment</b>									
Mechanical	96,280	96,280	0	97,917	1.7	1.7	108,002	12.74	11.0
Electrical	21,210	22,820	+ 7.6%	23,208	9.42	1.7	25,535	20.4	11.0
Auxiliary	10,760	11,600	+ 7.8%	11,796	9.63	1.69	12,995	29.9%	11.0
Process Control	370	400	+ 8.1%	407	10.00	1.75	449	21.32	11.0
Sub-total	128,620	131,100	+ 1.9%	133,328	3.66	1.7	146,981	14.28	11.0
Quarry	22,310	24,000	+ 7.6%	24,410	9.41	1.71	26,823	20.2	11.0
Mobiles and Miscellaneous	19,020	20,460	+ 7.6%	20,807	9.4	1.70	22,941	20.62	11.0
Sub-total - Machinery and Equipment	169,950	175,560	+ 3.3%	178,545	5.06	1.7	196,745	15.77	11.0
<b>Spare Parts</b>									
Mechanical	9,240	9,950	+ 7.75%	10,119	9.51	1.7	11,161	20.8	11.0
Electrical	1,710	1,840	+ 7.6%	1,871	9.41	1.68	2,064	20.7	11.0
Sub-total - Spare Parts	10,950	11,790	+ 7.7%	11,990	9.5	1.7	13,225	20.8	11.0
<b>Civil Works</b>									
Factory Buildings	120,170	159,500	+12.7%	159,500	32.7	32.7	174,834	45.4%	9.0
Water Installation	2,640	2,840	+ 7.6%	2,890	9.47	1.76	3,188	20.76	12.0
Housing	15,000	17,900	+19.3%	18,550	23.67	3.63	20,333	35.55	13.0
Sub-total - Civil Works	137,810	180,240	+37.8%	180,940	31.3	0.04	198,355	43.93	10.0
<b>Engineering and Technical Serv.</b>									
Supervision of Construction	2,000	2,180	+ 9.0%	2,211	10.55	1.42	2,436	12.18	11.0
Supervision of Erection and Start-up	12,280	13,210	+ 7.6%	13,403	9.14	1.46	14,771	20.29	11.0
Geotechnical Investigations	2,000	2,300	+15.0%	2,300	15.0	-	2,521	26.05	11.0
Sub-total - Technical Serv.	16,280	17,690	+ 8.7%	17,914	10.04	1.27	19,728	21.18	11.0
<b>Management, Training and Admin. Services</b>									
Management and Training	23,125	24,880	+ 7.6%	25,292	9.37	1.66	27,892	20.61	11.0
Administrative Charges	-	15,145	-	15,402	-	1.7	16,989	-	11.0
PLS Administration	-	15,145	-	-	-	-	-	-	-
Sub-total - Management Serv.	23,125	40,025	+73.1%	40,694	75.3	1.67	44,881	94.08	11.0
<b>Erection</b>	30,280	39,000	+28.8%	40,300	33.09	1.03	44,174	45.88	11.0
<b>Freight and Insurance</b>	22,000	24,300	+10.5%	24,777	11.17	1.14	27,052	22.96	11.0
<b>Opening of Quarry</b>	2,360	3,900	+65.3%	3,900	65.3	-	4,275	81.14	11.0
<b>GRAND TOTAL</b>	412,755	492,505	+19.32%	498,860	20.86	1.29	548,435	32.87	11.0



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Breakdown of Project Costs - Table VII

above March quotation	above October quotation	Quotation Incl. Danish/Belgian Interest during Construction (1)	% above March Quotation	% above October Quotation	quotation Incl. Belgian Financial Charges (2)	% above March Quotation	% above October Quotation	Quotation Incl. Interest During Construction and Financial Charges All Sources	% above March Quotation	% above October Quotation
.....D. Kr. 000.....										
12.7	1.7	108,002	12.74	12.74	108,002	12.74	12.74	112,322	16.67	16.67
24.4	1.7	25,535	20.4	11.9	26,020	22.68	14.02	26,636	25.58	16.72
24.63	1.29	12,995	29.95	12.03	13,122	21.95	13.12	13,535	25.79	16.68
12.7	1.75	449	21.32	12.25	449	21.35	12.25	467	26.22	16.75
24.6	1.7	146,981	14.28	12.11	147,593	14.75	12.58	152,960	18.92	16.67
24.41	1.71	26,823	20.2	11.75	27,600	23.71	15.00	28,022	25.60	16.76
24.4	1.75	22,941	20.62	12.21	23,004	20.95	12.43	23,868	25.49	16.66
24.4	1.7	196,745	15.77	12.07	198,197	16.62	12.94	204,850	20.54	16.68
24.41	1.7	11,151	20.8	12.17	11,161	20.8	12.17	11,607	25.62	15.65
24.41	1.75	2,064	20.7	12.17	2,064	20.07	12.17	2,147	25.56	15.68
24.5	1.7	13,225	20.8	12.17	13,225	20.08	12.17	13,754	25.61	66
24.7	12.7	174,834	45.49	9.61	183,186	52.44	14.85	183,186	52.44	14.85
24.47	1.75	3,188	20.76	12.25	3,188	21.76	18.25	3,316	25.61	16.76
24.77	3.63	20,333	35.55	13.59	21,305	42.03	19.02	21,305	42.03	19.02
24.7	0.24	198,355	43.93	10.05	207,679	50.07	15.22	207,806	50.79	15.29
24.7	1.42	2,436	12.18	11.74	2,454	22.7	12.57	2,531	26.85	16.38
24.14	1.46	14,771	20.29	11.82	14,869	21.08	12.56	15,378	25.23	16.41
24.7	-	2,521	26.05	9.61	2,642	32.1	14.87	2,642	32.1	14.87
24.4	1.27	19,728	21.18	11.52	19,965	22.64	12.86	20,557	26.27	16.21
24.37	1.55	27,892	20.61	12.11	27,927	20.77	12.25	29,013	25.46	16.61
-	1.7	16,989	-	12.18	16,989	-	12.18	17,668	-	16.66
24.3	1.57	44,881	94.08	12.13	44,916	94.23	12.22	46,681	101.86	16.63
24.34	1.03	44,174	45.88	13.27	46,285	52.86	18.68	46,286	52.86	18.68
11.17	1.14	27,052	22.96	11.33	27,471	24.87	13.05	28,202	28.19	16.06
24.3	-	4,275	81.14	9.62	4,479	89.79	14.85	4,479	89.79	14.85
24.85	1.29	548,435	32.87	11.36	562,218	36.21	14.15	572,615	38.73	16.27

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5.2.3 Attention also needs to be drawn to the possible inadequacy of the provision of working capital which will initially be required to finance the costs of staffing and inventory build-up of various production materials such as gypsum, bags, etc. and to pay for fuel and power. An amount equal to the value of one month of sales (about 15 million Danish Kroners) has been included in the financial plan to cover pre-start up needs to be supplemented by a similar amount to be either borrowed from the Eurodollar market at the end of the first year of full operations or obtained from internally generated resources. As such a plan may turn out to be somewhat unrealistic in light of the projections set out in Tables IV and V, a careful recalculation is indicated based on which additional sources for supplementary working capital should be explored.

5.2.4 Subject to the above reservations, the present cost estimates translate into the following economic unit costs:

A. Cost per annual MT Cement .....	D.Kr.	1,230
B. Cost per daily MT Clinker .....	D.Kr.	384,560
C. Cost per Unit of Employment Created .	D.Kr.	1,610,725

5.2.5 On the basis of these general criteria, the proposed investment appears to be at best marginal. On the other hand, it is felt that the overall viability of the project could be significantly improved through a negotiation of the price of some of the major heads of expenditure, through an increase in the equity base and through modifications in the construction plan.

5.2.6 Some of these major cost components are discussed in the ensuing section with a view to suggesting possibilities for cost reductions. It is, however, stressed that the extent of savings, if any, will be subject to the clarifications given by the Contractor and, ultimately, to their assessment by a competent consulting engineering firm with up to date knowledge of equipment prices and other costs related to the establishment of cement plants in developing countries.

Furthermore, since debt service and other financial costs would vary with changes in the project cost components and possible modifications in the financial structure, only the base price quotations totalling D.Kr. 492,505,000 are used in the ensuing discussion.

### 5.3 Process Equipment

- 5.3.1 An aggregate of D.Kr. 131,100,000 has been quoted for process equipment comprising the mechanical, electrical, auxiliary and process control components.
- 5.3.2 A rough yardstick sometimes used to arrive at a preliminary assessment as to the reasonableness of the price is to measure the cost element as a percentage of the total project cost. This is a somewhat unreliable approach as the conditions for the construction of the plant will vary substantially from one case to another and there may be provisions for certain facilities and services included in one but not in another.
- 5.3.3 Another method would be to apply an F.O.B. price per kilogram net weight to the total net weight of the machinery and equipment specified. While this approach may be somewhat more reliable, substantial variations may result from the design and detailed specifications of the machinery and equipment to be supplied.
- 5.3.4 Neither of these yardsticks can be properly applied in the present circumstances since information on a comparable project is not available and since the net weights of the machinery and equipment have not been provided in the proposals.
- 5.3.5 The preferred methodology would be to retain the services of an independent consulting engineer, specialized in the cement industry and with up to date knowledge of the prices of cement-making equipment. Such a consulting engineer can

be expected to evaluate the reasonableness of the prices, to guide and assist the Government in its negotiations, and to quantify any modifications that may be made in the design and specifications of the equipment.

#### 5.4 Quarry Equipment

- 5.4.1 On the basis of limited price information available in UNIDO, a rough check has been made of the cost of the quarry equipment specified in the Contractor's proposal at the price of D.Kr. 24,000,000, with the preliminary conclusion that the indicated price is rather on the high side.
- 5.4.2 As suggested by Mr. Boeck in his report, it is recommended that offers be obtained from a number of manufacturers of quarry equipment. It is added that, in the event the contractual arrangements provide for the purchase of some of the equipment on a cost-reimbursable basis, the quarry equipment and possibly the mobile equipment, might be included in a procurement program outside the lump sum component of the Contractor's supply.
- 5.4.3 An issue also raised by Mr. Boeck concerning the selection and procurement of the quarry equipment is stressed. It is vital to the operations of the plant that the equipment be purchased to the maximum extent feasible from a single supplier and especially one with extensive service facilities and spare parts inventories in the West African region. It is understood that the equipment specified in the proposal is manufactured by a number of European enterprises which do not at present carry the requisite spare parts or maintain service facilities in the region. Under these circumstances, it becomes clear that the Company would have to adopt the somewhat costly alternative of maintaining its own spare parts inventories for diverse equipment and providing the personnel and facilities to service and maintain the equipment.

### 5.5 Mobile Equipment

5.5.1 The comments related to the quarry equipment apply equally to the mobile equipment, both as to price and procurement procedures.

### 5.6 Spare Parts

5.6.1 Upon application of a rule of thumb percentage to the value of the mechanical and electrical equipment and on the premise that the proposed supply of spare parts will be guaranteed to be sufficient for two years of normal operations, the provision as a whole appears reasonable.

5.6.2 Given the total value of nearly 12 million Danish Kroners however, the Company should ensure that the right items and quantities are supplied. To this end, it is suggested that the provision for spare parts be treated as a reserve until the Contractor submits a detailed list of spare parts with firm individual prices valid for a minimum of 90 days. Such a list should be submitted within 10 to 12 months after the effective contract date, checked carefully both as to quantities and prices, and purchased by incorporation in the basic contract.

5.6.3 The proposal also makes reference to the supply of other spare parts for the quarry equipment and possibly the mobile equipment. These should be similarly clarified as to prices and adequacy before final procurement.

### 5.7 Factory Buildings

5.7.1 The factory buildings, inclusive of internal roads and fencing, are priced at D.Kr. 159,500,000 equivalent. They represent the largest single project cost element amounting to over 32% of the total base price of the project and on the order of half the value of physical assets.

- 5.7.2 Reference is made in this regard to Mr. Boeck's report and specifically to his comments relative to the high building costs which he is unable to evaluate with the information provided in the Contractor's proposal.
- 5.7.3 Attention is also drawn to the fact that of the total increase in the base price from March to October 1977, nearly half (D.Kr. 39,330,000) is accounted for by the increased cost of the factory buildings. This suggests that either the March estimate was grossly miscalculated or conversely, that there may be some error in the October price. In any event, detailed justification for the present cost of the factory buildings should be provided by the Contractor before an evaluation can be made.
- 5.7.4 The data justifying the cost should include bills of quantities for the main items of works such as the various classes of reinforced concrete for foundations, tie beams, supports, columns, silos, floors, etc.; structural steel and reinforcing bars; roofing materials including trusses and purlins; the walls, doors and windows, the fencing, roads and other major items. Furthermore an explanation of the proposed method of sub-contracting the works and the items and quantities of imported construction materials should be sought.
- 5.7.5 The above information is vital, first and foremost to determining the validity of the price. At the same time, it will be essential to determining the cost adjustments that may result from any modifications in the overall design of the plant and buildings due to technical considerations. Some of these, such as raw meal storage and cement silos are mentioned in Mr. Boeck's report.
- 5.7.6 Finally, the merits of establishing the head office of the



Company in leased premises in Cotonou should be given serious consideration. If such a decision is made, which is considered more practical, the size of the administrative building at the mill site could be cut down.

#### 5.8 The Housing Colony

- 5.8.1 It is recognized that housing of acceptable international standards are required to attract and hold the many expatriate engineers, erectors and managers required for the setting up and operation of the plant. It is also recognized that similar facilities would have to be provided to attract the local supervisory, administrative and management counterpart personnel.
- 5.8.2 Several aspects of the plans, however, need careful consideration. First, the proposal for pre-fabricated housing seems obviously expensive and local brick construction might be considered as an alternative. Second, the size and furnishings of some of the units might be re-examined as 240 square meters of living space seem rather excessive for expatriate personnel who, given the educational facilities, will likely have their children in boarding schools. Third, the total number of housing units and lodging in the two club-houses should be examined to determine whether a reduction is practical. In general, it is vital that the housing colony be cut down to the bare essentials during the construction and initial operation of the factory and the facilities gradually expanded and improved out of earned income. Fourth, the needs should be reassessed in light of the decision on the location of the head office. Finally, some of the savings thus generated might be utilized for recreational and sanitary facilities such as library, cinema, swimming pools, tennis courts, football field and a small clinic.

### 5.9 Engineering and Technical Services

- 5.9.1 Under this heading are included design and civil engineering, supervisory services for civil construction, erection and start-up of the plant and additional geotechnical investigations. The total quoted base price amounts to D.Kr. 17,690,000 equivalent.
- 5.9.2 This quoted figure includes D.Kr. 2,300,000 equivalent for additional geotechnical investigations, assumed to involve costs related to the opening of the quarry. Mr. Boeck has, in his report, pointed to the need for more intensive geological investigations as a precondition to a basic determination of the raw material resources and specifically towards a decision of where the quarry face should be located. On this premise, the price for geotechnical investigations might either be assigned to preinvestment costs or to the provision for opening of the quarry. In the latter case, the cost of opening of the quarry would reach D.Kr. 6,200,000 equivalent, which may be somewhat excessive.
- 5.9.3 Consideration might also be given to conducting the additional geotechnical investigations through local institutions under the supervision of the Contractor. If special equipment is required for this purpose, some arrangement for rental or purchase may be made.
- 5.9.4 As to the pricing of engineering and supervisory services, the provision seems, at first glance, quite reasonable. However, the addition to these services of the "7% FLS administration" changes the picture. The Contractor should be requested to explain and justify the administrative costs to ensure that they do not duplicate the cost of supervisory services.

#### 5.10 Management, Training and Technical Assistance

- 5.10.1 The assessment of the cost-effectiveness of the proposed training program is not within the purview of the writer's competence. The selection, timing and training courses should, however, be evaluated.
- 5.10.2 The basis adopted for the cost of management services appears to be more applicable to short-term specialized engineers and erectors than to long-term salaried and contractual management personnel. This to an extent explains the high cost since it has been calculated on a daily basis over 360 days a year plus daily subsistence allowances and an additional provision for head office support services. By this method, the average cost reaches D.Kr. 67,193 or over \$11,000 per man/month.
- 5.10.3 The qualifications and functions of the management personnel proposed, as well as the timing and duration of their stay, should be carefully reviewed. Consideration might also be given to the execution of a separate management contract providing for the payment of actual salaries of the personnel, their relocation costs and local income tax liabilities, provision of furnished housing, the transportation costs of their annual vacations, plus an overhead factor to cover headquarters and on-site support services. An incentive arrangement to compensate the management company on the basis of various levels of net income before corporate income taxes might also be considered.
- 5.10.4 In any event, the total capitalization of this cost component and prepayment therefor should be avoided. By any accounting principle, the management fees should be treated as an annual operating charge and only the portion applicable to the start-up period of six months and the training costs might be capitalized.

5.10.5 Furthermore, if the eventual contract also involves a cost-reimbursable arrangement, the entire concept of the management services would probably need to be modified to provide for management services starting very early after the signing of the contract.

#### 5.11 Erection of Machinery and Equipment

5.11.1 The cost of erection at the base price of D.Kr. 39,000,000 comes to nearly 30% of the quoted price for all mechanical, electrical and auxiliary equipment. Without the benefit of knowledge as to the procedure proposed to be adopted or the nature and availability of erection tools and equipment, the figure seems to be very substantial.

5.11.2 There is some indication that the erection work is proposed to be sub-contracted, probably to a Belgian firm. If this is the case, and subject to the flexibility possible within the terms of the supplier credits, consideration might be given to either sub-contracting or recruiting a team of erectors from one of the developing countries, such as India. The writer adopted such a procedure as general manager of a paper mill and converting plant construction project in Ethiopia at substantial savings and with completely satisfactory results. Such a team, properly selected, could also contribute to other appreciable cost savings in the on-site fabrication of appropriate pieces of equipment.

#### 5.12 Freight and Insurance

5.12.1 Clarification is needed as to what this provision covers, namely whether it includes both marine and internal freight and insurance from North European port to the site. It also should be clarified as to what equipment and materials for the civil works are proposed to be imported.

5.12.2 The basis of costing should also be stated and the Conference rate checked and applied to a more precise estimate of weight and measurement tons. Moreover, it should be clarified whether attempts have been made to obtain a "project" rate from

the Conference.

5.13 Increase due to Revised Terms of Payment

- 5.13.1 The basic cost of the project, in addition to the 19.32% increase between March and October 1977, has been subjected to an escalation of D.Kr. 6,355,000 equivalent on account of the revision of the terms of payment of the contract price. Presumably this is intended to compensate the Contractor for financial costs to be borne by them due to the reduction of the 30% down-payment (and 60% progress payments) originally envisaged, to the present 15% and 25% down-payments on the Danish/Belgian and local portions of the contract supply, respectively.
- 5.13.2 It would be somewhat academic to argue for or against justification for the proposed overprice, since the fundamental issue of the reasonableness of the overall contract price needs to be established as the starting point for any reasoned assessment. Furthermore, one would have to have some fairly precise information as to the Contractor's schedule of expenditure and the discount that would have to be absorbed by the Contractor when negotiating the promissory notes and the extent to which such discounting costs have been included in the financial charges.
- 5.13.3 A question that arises is the extent to which the inclusion of interest during construction in the all-inclusive lump sum price eliminates any financing costs that the Contractor might have to bear. No doubt, the justifications obtained from the Contractor will clarify it.
- 5.13.4 In any event, the negotiations should aim at arriving at an acceptable price based on cash payment terms. This price would then be adjusted to take into account the interest during construction and financial charges that would accrue based on a detailed schedule of expenditures and the specified responsibilities of the Contractor.

#### 5.14 Interest during construction

- 5.14.1 Provision has been made in the project costs for an amount of D.Kr. 49,575,000 to cover interest during construction based on estimated expenditures of roughly equal amounts of about D.Kr. 190 million in each of the three construction years.
- 5.14.2 Without a detailed work program and schedule of sources and uses of funds, it is impossible to assess the accuracy of this provision. Nonetheless, the substantial figure appears to reflect both the down-payments, the 3-year duration for completion of the project and the somewhat unusual assumptions for work progress.
- 5.14.3 Subject to some minor modifications, it has been the writer's experience that expenditures during the first year are relatively low and in a three-year project, expenditures rise sharply beginning in the second year, peaking at about the 18th to the 26th month and subsequently decline gradually until commencement of production. As a general rule, project expenditures could roughly be divided into 20%, 50% and 30% in the first, second and third year, respectively. A detail schedule should be provided by the Contractor.

#### 5.15 Other Financial Charges

- 5.15.1 The total provision for financial charges amounts to D.Kr. 24,180,000 equivalent, of which D.Kr. 13,783,000 on the Belgian supplier credit financing is payable on the effective date of the contract.
- 5.15.2 In the absence of any details other than those specifically mentioned in relation to Belgian credits, one can only presume that this component amounting to slightly more than 5% of the proposed borrowings, will cover credit insurance premiums, bank charges and commitment fees.

5.16 General Conclusion

In view of the difficulties discussed above, direct contacts should be established with the financing institutions at the earliest opportunity to explore the possibility of converting the supplier credits to buyer credits.

## VI. CONTRACTUAL TERMS AND CONDITIONS

### 6.1 Introduction

- 6.1.1 In conjunction with their March 1977 proposal, the Contractor submitted a skeleton draft contract delineating the obligations of the buyer and seller and setting forth the machinery equipment and technical services to be supplied by the Contractor for a lump sum price of D.Kr. 204,903,500. The object and scope of the contract is so drafted as to indicate that the construction of the factory was intended to be carried out as a partial turnkey operation under which the Contractor was to supply all of the equipment and technical services necessary to fulfil the performance guarantees stipulated in the contract.
- 6.1.2 The terms of payment set out in the said draft contract called for a down-payment of 30% on the effective date of the contract, 60% against shipping documents and monthly invoices for engineering and supervisory services and 10% upon fulfilment of the performance guarantees and acceptance of the plant, but not later than 24 months after final payment of the 60% portion.
- 6.1.3 The revised October 1977 proposal appears to imply that the factory would be constructed as a complete turnkey operation, the Contractor being fully responsible for all aspects of the project, as generally specified in the revised proposal.
- 6.1.4 The comments offered below are based solely on the terms and conditions of the revised October 1977 proposal. For purposes of comparison occasional references are made to the March partial turnkey proposal.
- 6.1.5 An outline of some of the more important general provisions of the construction contract that will, to a great or lesser degree, have significant implications on the risks and costs of the project are discussed below.



## 6.2 Object and Scope of the Contract

- 6.2.1 The selection and clear definition of the object and scope of the construction contract needs the most careful consideration. It is central to the delineation of the mutual obligations of the parties and thus, apart from directly affecting most of the provisions of the contract, the type of contract selected will have significant repercussions on the risks and benefits.
- 6.2.2 It is fundamentally assumed that the plant will be constructed in some form of a turnkey operation, a concept in which many variations are possible. Each of these variations needs to be considered in the light of the capabilities of the Company to undertake some of the buyer's obligations relative to the project, the limitations that may be imposed by the lenders and the financing plan as a whole, the conditions of the joint-venture arrangements and finally, the risks, costs and benefits of one or the other approach.
- 6.2.3 The issue rests primarily on the extent of control that the Company can, and finds it desirable, to exercise over the project expenditures without disturbing the overall turnkey responsibility of the prime Contractor.
- 6.2.4 The revised October 1977 proposal seems to imply that the factory will be constructed as a comprehensive turnkey operation, the Contractor being fully responsible for all costs, including financial charges and interest during construction, until commissioning and acceptance of an operating plant. Payment is to be made in a lump-sum price, subject to adjustment for inflation in accordance with specified escalation formulas.
- 6.2.5 Such an approach has the advantage of limiting the Company's risks solely to any variations in the inflationary pressures prevailing in the sources of supply. On the other hand, it excludes the Company from participating in any benefits that might accrue as a result of a more efficient utilization of the available resources, completion of the plant before the

contractually agreed date and, unless very detailed lists of equipment and services are annexed to the contract, from any variations in the supply or modifications in the design of the industrial complex.

- 6.2.6 On the basis of this preliminary assessment of the project costs, it would seem more advantageous to devise a partial turnkey contract, under which the Contractor would be paid a lump-sum price for specified machinery, equipment and services and undertake the balance of the costs on a cost-reimbursable basis under an appropriate management contract. Final determination must await the results of the various phases of negotiation and the necessary clarifications.

### 6.3 Contract Machinery and Equipment

- 6.3.1 A detailed list of the machinery and equipment together with any additional parts, components, machinery, plant and equipment required for the proper operation of the different departments should be prepared with a more detailed breakdown of individual prices for major equipment, and annexed to the Contract.
- 6.3.2 Such a detailed list of machinery and equipment should be drawn up in consultation with the Contractor after the Government's consulting engineers have completed their comprehensive review of the process design, flow diagram and general specifications. The primary objective of this review would be to achieve modifications which are found to be technically desirable, which would be a technically satisfactory alternative at a reduced capital cost or which would result in lower operating costs.
- 6.3.3 Provision should be made in the Contract for the purchase of spare parts after review and negotiation of a detailed list with individual firm prices to be submitted by the Contractor within 10 to 12 months from the effective date of the contract.

- 6.3.4 The total net weight of the contract machinery should be specified and a tolerance figure agreed upon. In the event of any weight shortfall below the agreed tolerance, the contract price should be decreased by an agreed percentage of the average price per kilogram calculated on all the specified machinery and equipment.
- 6.3.5 A delivery schedule for the contract machinery should be carefully drawn up so that it conforms to the general work plan and dovetails with the schedules of civil constructions and erection.
- 6.3.6 Special consideration should be given to the speeding up of the delivery of machinery and equipment. The impact of earlier completion on administrative and overhead costs and especially on interest during the construction period can be very significant.
- 6.3.7 The Contractor should be held liable for any delays in the delivery of contract machinery, except for delays caused by major modifications that may be requested by the Company and force majeure.
- 6.3.8 Detailed packing and shipping instructions should be prepared and incorporated in the final contract.

#### 6.4 Engineering and Technical Services

- 6.4.1 The technical data, general layout drawings, flow sheets, arrangement drawings indicating foundation loads, complete specifications of heavy pieces of machinery, drawings and documents for control panels, operating and maintenance instructions, system drawings for refractory lining, data for insulation material and grinding balls, guide drawings, list of greases and lubricants, etc. should be provided for.
- 6.4.2 The timing and procedure for the supply of technical data should be agreed upon and specified in the contract.

- 6.4.3 Supervisory services for the construction, erection, start-up and commissioning of the plant should be spelled out in detail.

6.5 Financial Arrangements

- 6.5.1 A firm contract price for the machinery and services should be established.
- 6.5.2 Provision should be made for the modification of the firm contract price in the event that the Contractor's supply obligations are modified by mutual agreement or if there is a short fall in the total net weight of the contract machinery.
- 6.5.3 The payment terms for the lump sum price and any cost reimbursable expenditures should be clearly stated including the timing and conditions for the release of promissory notes. In general trigger-points for the release of the notes should be negotiated and agreed upon to ensure that the project proceeds smoothly and that neither the Company nor the Contractor incur additional costs with respect to their mutual obligations.
- 6.5.4 The provision for escalation has not yet been analysed since so much depends on the final shape of the contract. In general, attempts should be made to achieve a fixed price contract, failing which, the formula and the base price to which it would be applied, should be analysed and the cost estimated. The suggested application of the formula to the total project cost including interest during construction, financial charges, management and a few of the other costs is complicated and somewhat unorthodox.

6.6 Guarantees

- 6.6.1 Guarantees of delivery time for the equipment and completion of erection and start-up should be sought.

- 6.6.2 Penalties should be provided for in the event that the Contractor excludes certain machinery and equipment from its supply or if there is any short fall in the total net weight of the contract machinery.
- 6.6.3 Warranties of design, materials and workmanship on the contract machinery should be provided for.
- 6.6.4 Provision should be made against the discovery of defects in the construction of machinery within the warranty period, obligating the Contractor to repair or replace the defective equipment by the fastest means and at no cost to the Company.
- 6.6.5 The performance guarantees should be strengthened and penalties provided for. The performance guarantees should generally cover consumption of power and fuel, and output factors. More specifically, guarantees should be provided departmentally as to units of output at the main production cost centers. The main departments are the raw material grinding plant, the raw meal blending plant, the kiln plant, the electrostatic precipitator, the grinding plant, the bypass system and the packing plant.
- 6.6.6 The conditions for the performance tests should be spelled out in detail, both as to the duration of individual tests and the continuity of the time during which the performance guarantees are fulfilled. In other words, there should be a minimum number of consecutive days (possibly three days) in which the guarantees applicable to a particular department are met. The duration of performance tests for major process equipment should be specified as for instance, 24 hours each for the raw material grinding plant, the kiln plant and the electrostatic dedusting plant (the latter possibly in six or more measurements), and six hours

for the raw meal blending plant with a minimum of 20 samples.

6.6.7 Indemnification for non-performance within a specified period for each of the departments as to output, power and heat consumption, as well as clean dust content and the like should be provided for.

6.6.8 A performance bond should be posted by the Contractor.

6.6.9 The amount of liquidated damages for non-performance, now proposed at a maximum of 5% of the total FOB value of mechanical equipment should be reconsidered as it seems somewhat inadequate relative to the magnitude of the project.

#### 6.7 Conclusions

6.7.1 The object and scope of the contractual arrangements as well as some of their specific provisions discussed above would have to be tailored to fit the understandings reached in the course of negotiations. At the appropriate time, the final understandings would have to be translated into contractual form for which purpose a legal adviser to the Government would need to be retained.

6.7.2 In general, it is felt that the object and scope of the contract should be so designed as to give the Company maximum flexibility in the utilization of the available resources and to derive the benefit of any cost savings resulting therefrom. To achieve this objective, consideration might be given to arranging for the construction of the plant on a partial turnkey basis involving a lump sum payment for certain equipment, engineering and technical supervisory services and training, with the other project costs being undertaken by the Contractor on a cost reimbursable basis for and on behalf of the Company under an appropriate management contract.

- 6.7.3 Every effort should be made to speed up the delivery of equipment and the timetable for the erection and commissioning of the plant. While some costs can be expected to expand to achieve this goal, they can be expected to be more than offset by reduced debt service and overhead costs and earlier income generation.
- 6.7.4 The escalation formulas should be carefully examined both intrinsically and in regard to the basic costs to which they would be applied. As presently constituted, the estimated 8% provision seems at once inadequate and overstated. As a percentage of inflation over a probable two-year period, 8% is probably insufficient. However, its application to the total project cost, including some predictable and relatively fixed charges tends to inflate the provision. In any event, attempts should be made to obtain a firm price for the lump-sum portion of the Contractor's supply.
- 6.7.5 The present terms of payment seem unfavorable to the Company and it would be unusual for the lending agencies to agree to the 15% down-payment called for on the Danish and Belgian supply packages and 25% of the local costs. Terms of a 5% down-payment and 10% against shipping documents might be sought as an opening negotiating position, ultimately settling for a more currently standard 10% down-payment and 5% at the median point of shipping.
- 6.7.6 A justification for the overprice relative to the revised payment terms should be obtained. In principle, such an additional charge may be considered as compensating the supplier for the pre-financing costs of his obligations which are usually already reflected in the lump sum quotation. In the present instance of relatively favorable payment terms and the proposed equipment delivery schedule starting some nine months after the effective date of the

contract, the overprice calls for justification. In any event, it should be taken into account in connection with establishing the reasonableness of the base price quotation of each major component of the project costs.

- 6.7.7 The management services should be contracted for under a separate agreement reflecting the overall plan for the construction of the factory. If a lump-sum and cost reimbursable contract is entered into, then a nucleus of management under a General Manager may need to be established soon after the contract date, for the discharge of the Company's responsibilities. These services should be paid for out of an appropriate provision for overheads during construction and the training costs included in the lump-sum supply of the equipment and services. The management services rendered during the operating period should in no event be capitalized as it tends not only to distort the total project cost but also to magnify the cost component and the volume of borrowings.



## VII FINANCIAL STRUCTURE OF THE PROJECT

### 7.1 General Comments

- 7.1.1 As pointed out in Section IV of this report, the analysis of the project's cash flow raises some serious questions as to whether the project is capable of realisation on the basis of the criteria and assumptions set forth in the Contractor's proposal. It is also a reflection of the high ratio of debt to equity which in part contributes to the high cost of the capital assets particularly in the area of interest during construction and other financial costs.
- 7.1.2 The questions arise in two contexts. Firstly, as to whether it is realistic to structure the project on the basis of full capacity production and sales at the indicated ex-mill price which, upon adding the transportation and selling expenses, may be higher than the import parity level in Nigeria. Secondly, as to whether it is possible to satisfy the investors and the sources of financing that a project so structured is worthy of support.
- 7.1.3 Consequently, another look will need to be taken at the project to determine whether a different structure can be worked out which would make the project more realistic and the elements which would be required, in financial terms, for this purpose.
- 7.1.4 Any new financial structure will automatically be influenced by the magnitude of the reductions in the capital costs of the project that are achieved through the negotiating process, or which may result from any modifications in the implementation plan. At the same time, the nature and extent of the benefits derived from such modifications will to an important degree be an outgrowth of the flexibility that such a financial structure provides.
- 7.1.5 Any specific suggestions as to a revised financial structure

would at this stage be somewhat premature. These should more readily be expected to evolve in the course of the next phase of the negotiations with the Contractor on the various elements of the capital costs discussed throughout this report. In the interim, some general guidelines that arise from the present analysis are discussed below.

## 7.2 The Equity Base

- 7.2.1 The total initial capitalization of the project is on the order of D.Kr. 602 million equivalent, inclusive of a share capital of D.Kr. 120 million or slightly less than 20% of total capital. If one includes the D.Kr. 30 million proposed to be borrowed at the end of the first year of operation, the equity input will represent only about 19% of the invested capital.
- 7.2.2 In either case, the rather heavy debt burden is one of the major contributory factors to the accumulation of the cash deficits and the weakness of the Company's earnings potentialities.
- 7.2.3 Consequently, serious consideration needs to be given to widening the equity base to approximately one third of the total investment capital ultimately arrived at, exclusive of working capital. Such an increase, which hopefully may not have to exceed D. Kr. 50 million equivalent, might be contributed by the joint-venture partners pari passu with their present undertakings, either in the form of additional subscriptions to the common stock or alternatively by the issue of redeemable, cumulative preference shares.

## 7.3 The Supplier Credits

- 7.3.1 Based upon a cursory investigation of prevailing conditions in the European money market, the terms of the proposed supplier credits appear favorable.

7.3.2 Nonetheless, it is suggested that contacts be promptly established with the lending agencies with a view to exploring possibilities of converting these loans into buyer credits and obtaining confirmation of their agreement in principle to the funding of the project. Simultaneously the following elements should be clarified:

- (a) the possibility of extending either the Grace Period or the principal repayment period, or both;
- (b) definition of the extent to which the credits can be utilized to finance some of the local costs and, upon technical and economic justification satisfactory to the lenders, for the procurement of equipment and services outside Denmark and Belgium;
- (c) the break-down of the cost of insurance premiums, commitment fees and other banking charges;
- (d) the detailed justification of cost estimates and sales revenues that the lenders would require as conditions precedent to the formal granting of the loans, and
- (e) the contractual terms and conditions that would be acceptable to the lenders.

Needless to say, other issues requiring clarification will emerge in due course. The elements outlined above are some that immediately come to mind in the light of the conclusions reached and are aimed at a preliminary assessment of the flexibility that could be expected within the framework of the present financial plan.

VIII. SUGGESTED IMMEDIATE WORK PROGRAM

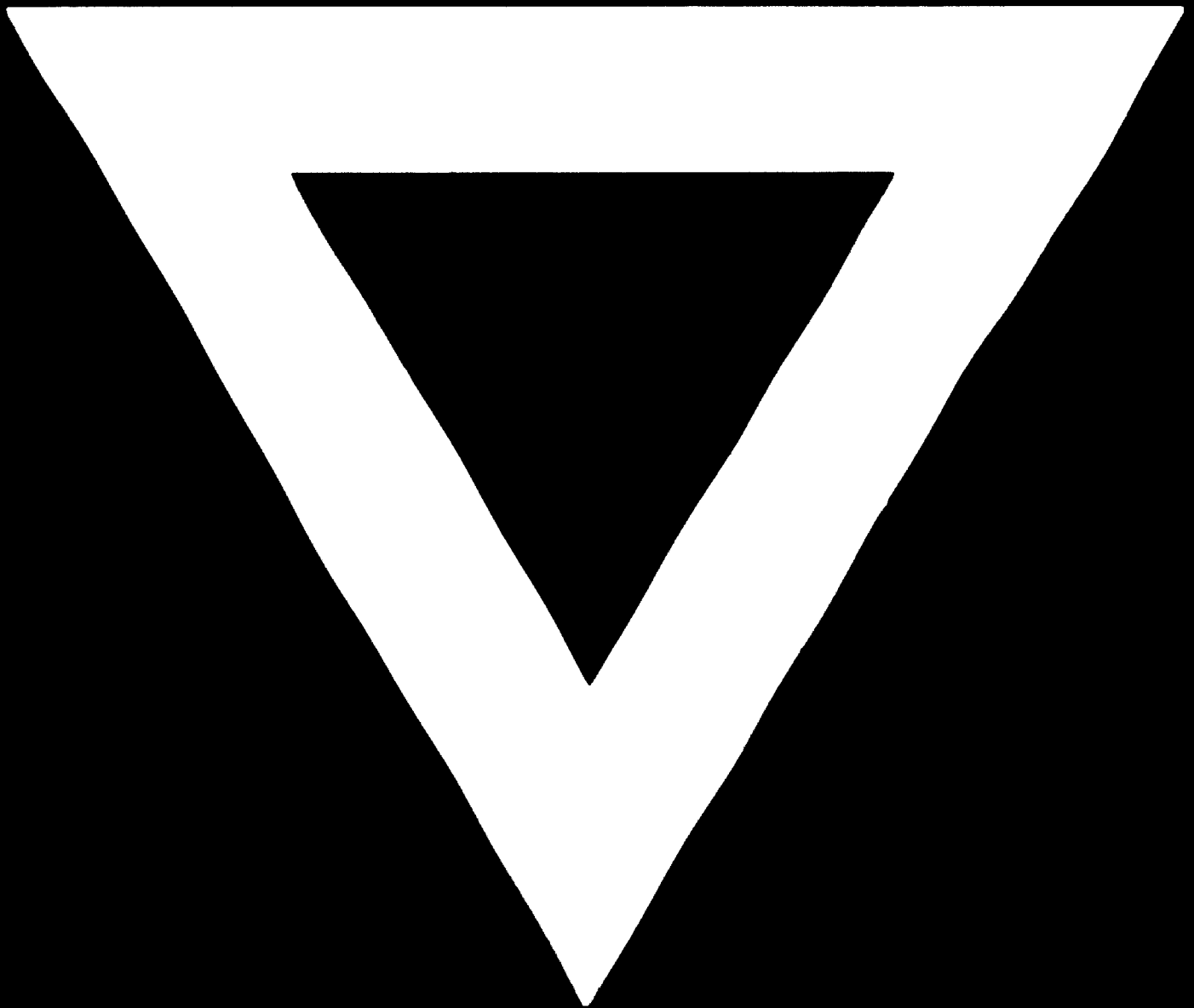
- 8.0 In order to resolve some of the problems discussed in this report, several matters will require prompt attention. These cover commercial, financial and technical aspects.
- 8.1 A comprehensive market study will need to be undertaken to establish and support a forecast of sales revenues and determine the most advantageous distribution system.
- 8.2 Discussion should be initiated with the Government of Nigeria to verify their agreement in principle to grant preferential treatment of the Company's exports to Nigeria.
- 8.3 The prices of the various production materials should be confirmed and a cost-benefit analysis made on the viability of local manufacture of cement bags.
- 8.4 The Government's technical consultants should be instructed to complete a detailed review of the process design and layouts towards revealing technically satisfactory alternatives that could result in lower capital or production costs.
- 8.5 Sources of additional working capital and the possibilities of increasing the equity contributions of the joint-venture partners should be investigated and confirmed.
- 8.6 Direct contacts should be entered into with the lending agencies to determine the limitations on the use of the loans for local and other external purchases of materials and services, the possibility of extending the grace period and/or the repayment period, and the potentiality of converting the proposed loans into buyer credits.
- 8.7 The Nigerian and Benin institutions that will guarantee the loans should be identified and the form and substance of the guarantees acceptable to the lenders clarified. Simultaneously,

the feasibility of splitting the guarantees into appropriate denominations to permit more flexible procurement should be examined.

- 8.8 The Government's consulting engineers should be requested to obtain comparative prices on the contract machinery with a view to evaluating the reasonableness of the prices quoted.
- 8.9 Consultations should be held with the Contractor to obtain clarification and justification of the prices of various heads of capital expenditures and particularly, the civil works including the housing colony, the erection of machinery and equipment, the 7<sup>th</sup> administrative charges, the calculation of interest during construction and the financial charges.
- 8.10 Simultaneously, the feasibility of accelerating the schedule of deliveries and completion of construction and erection should be examined and a detailed schedule of sources and uses of funds prepared.

The above are but a few of the matters that should be attended to without delay. Others will undoubtedly evolve as these are being resolved.

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