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KENYA

Technical report: Development of the pulp and paper industry in Kenya
Part III: Report on the feasibility of producing hard tissues from sisal waste in Kenya*

Prepared for the Government of Kenya

by the United Nations Industrial Development Organization,

acting as executing agency for the United Nations Development Programme

Based on the work of T. Jeyasingam,
consultant on pulp and paper

United Nations Industrial Development Organization

Vienna

* This document has been prepared without formal editing.

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ABBREVIATIONS

ADT	AIR DRY TON
ADTPY	AIR DRY TON PER YEAR
BDT	BONE DRY TON
BL	BLEACHED
CEH	CHLORINE/CAUSTIC EXTRACTION/HYPO
CEHH	CHLORINE/CAUSTIC EXTRACTION/HYPO/HYPO
D.D.	DOUBLE DISC
FTPY	FINISHED TONS PER YEAR
GCV	GROSS CALORIC VALUE
GSM	GRAMS PER SQ.METER
KW	KILOWATT
KSHS.	KENYA SHILLINGS
M^3	CUBIC METER
MPM	METERS PER MINUTE
MM	MILLIMETER
MWH	MEGA WATT HOUR
NCV	NET CALORIC VALUE
OD	OVEN DRY
T	TON
TPD	TONS PER DAY
TPH	TONS PER HOUR
US$	US DOLLAR
WT	WEIGHT

EXPLANATORY NOTES

Value of the local currency - KENYAN SHILLING (K.Shs.) during the period of the mission in terms of United States Dollars:

1 US$ = 15.00 K.Shs.

ABSTRACT

This Report presents the results of a Study using SISAL Waste (SISAL FLUME TOW) to produce high quality hard tissues.

It is concluded about 3,000 TPY of various tissues such as Cigarette, Tea bag onion skin, Airmail, Carbonizing base, Bible paper etc. could be produced either near the GALANA area in the COASTAL PROVINCE or LAKE NAIVASHA in the Rift Valley Province

The total capital investment needed would be KShs.248,455,000 (Exclusive of Working Capital). The Return on Investment is estimated at 28.3%.

It is recommended that serious consideration is given to implement the project. A further study is recommended to compare, evaluate and select the most appropriate site either in the Coastal Province or Rift Valley Province.

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RECOMMENDATIONS

(1) HARD TISSUES is not presently manufactured in the country. The proposal to manufacture this grade initially with sisal waste and subsequently with sisal fibre for future expansions appears to be economically attractive with a gross return of 28.3% on investment and a gross profit of KShs.70,218,000 per year.

(2) It is technically and economically feasible to produce very high quality grades of paper from Sisal fibre. Already such grades of paper are being produced using Sisal pulp in BRAZIL and MEXICO. and Kenya is presently exporting sisal fibre to produce Tea Bag paper in USA.

(3) It is recommended this project is implemented to diversify and support the SISAL industry which is getting seriously affected due to substitution of synthetic fibre in place of sisal fibre. A demand has to be therefore created in the pulp and paper industry to prevent the sagging economy of the Kenyan sisal industry.

(4) In the event an interest is shown in the development of the project as indicated in this study, a more detailed study should be undertaken to closely examine the sites recommended in this Study and to correctly evaluate the market condition for the specific grades of Hard Tissues determined in this report.

1. INTRODUCTION

Kenya currently has 5 paper mills operating with a total installed capacity of 85,600 TPY of paper and paper board. The afore-mentioned 5 mills have plans to expand to 125,400 TPY within the next 2 to 3 years.

The indigenous pulping capacity is only 58,000 tons of chemical pulp and 8,000 tons of mechanical pulp per year at PANAFRICAN PAPER MILLS, WEBUYE. Therefore, the other 4 mills depend mostly on waste paper for their fibre requirements. The supply of raw material for the PANAFRICAN PAPER MILLS is based on PINE AND CYPRESS from "Man-made plantations". There will be a further demand on this source of supply when the proposed MADHU PAPER MILLS at THIKA goes into production. This mill at THIKA will require wood to produce about 20,000 TPY of chemical pulp.

It is feared Kenya is heading towards a shortage of wood and in particular for domestic fuel requirements both in the form of firewood and wood charcoal. It is, therefore felt at this stage further planning of pulp and paper mills based on wood does not look promising with only 20% of the land area available in Kenya both for agriculture as well as forestry. On the other hand Kenya needs more paper. The demand for paper during the last 5 years has been growing at the rate of 5%. It is expected the future growth will be around 6 to 7%, with a high demand for cultural grades of paper on account of the growth in school going population.

The Department of Industry in the Ministry of Commerce and Industry, sensing this problem, initiated the need for a study to look into the

aspect of using non wood materials for pulp and paper manufacture. To conduct this study a pulp and paper expert was requested from UNIDO. He arrived on 9 November 1984 for a three-month assignment in Kenya.

The following report is Part III of the investigations and studies related to the use of non-woody raw materials for the production of pulp and paper, made up into five parts:

PART I - Development of the Pulp and Paper Industry in Kenya

PART II - A Report on the Feasibility of Producing Fine Paper from Bagasse

PART III - A Report on the Feasibility of Producing Hard Tissues From Sisal Waste

PART IV - A Report on the Feasibility of Producing Corrugating Medium From Straw

PART V - A Report on the Feasibility of Producing Hand Made Paper from Cotton Waste.

2.0 BASIS OF STUDY

This Study relates to the use of SISAL WASTE for the production of "HARD TISSUES".

Kenya produces 50,000 Tons of Sisal per year. About 10 to 15% of this production goes as waste in the form of SISAL FLUME TOW. This amounts to about 5,000 to 7,500 tons/year of SISAL Waste. It is proposed to use this waste material to produce speciality grades of paper which are currently not produced in KENYA and are imported into the country. A part of the Sisal flume tow was used in previous years by E.A. Bag and Cordage Co. to produce bags to pack sugar. This demand is now lost due to stiff competition from Synthetic Fibre and sugar is now packed in polypropylene bags.

2.1 TYPES OF PAPER

On account of the special properties of Sisal fibre possessing exceptionally high tearing strength and other desirable properties such as porosity, absorbency and folding endurance it is possible to make certain hard tissues such as the following:

- Teabag Paper
- Cigarette Tissue
- Carbonizing Tissue
- Filter Paper
- Special Wrapping Tissue
- Hard Tissues for writing such as Airmail and onion skin
- Hard Tissue for printing such as Bible paper, Manifold etc.

2.2 MARKET CONSIDERATIONS

Kenyan market presently imports these grades of paper. The existing paper mills cannot manufacture such light weight tissues. The raw materials presently used by these mills such as PINES AND CYPRESS are also not ideally suited for the above grades of paper.

Kenya is also in a strong position to export such grades of paper because of their special characteristics to its neighbouring countries both in AFRICA as well as the MIDDLE EAST REGION.

2.3 SELECTION OF CAPACITY

The selection of capacity in this particular case is both limited on account of the size of the market as well as the availability of the raw material in the form of sisal waste.

The present demand for such grade of paper is expected to be around 2,000 tons/year. To make a full market study, it is recommended to carry out a further study at a future date. However at this stage it is presumed 3,000 tons of hard tissues of the above types could be made with about 2,000 tons/year for domestic consumption and 1,000 tons/year for the export market. The capacity is therefore presently fixed at 3,000 tons/year. Provisions are also made in the planning of the Mills so that with the increase in market capacity, an ultimate production of 6,000 tons/year could be reached by installing a second paper machine.

The selected capacity is viable for such small scale of production on account of the specialized nature of the products.

2.4 LOCATION

The maximum production of sisal is from the COASTAL PROVINCE averaging about 15,000 TPY, closely followed by RIFT VALLEY PROVINCE averaging another 14,700 TPY. The rest of the production comes from other provinces of KENYA. The main problem in selecting a site close to the availability of raw material is the difficulty of getting a dependable source of water supply to the paper mill.

The proposed mill requires 5,500 m^3/day initially and about 7,000 m^3/day eventually allowing for future expansion of the mills.

Dependable source of water supply is only available from GALANA in close proximity to the sisal estates of the Coastal Province. In the case of RIFT Valley Province the required amount of water could only come from Lake Naivasha.

In choosing a location for the paper mill it is more desirable to locate the mills close to GALANA River but far away from the MARINE RESERVE of MALINDI. In the case of the Rift Valley the choice would be a location close to Lake Naivasha.

Further study is recommended to make a comparative evaluation of these two possible sites.

2.5 FIBROUS MATERIAL SUPPLY

For the production of 3,000 TPY of Hard Tissues, about 4,000 tons of sisal waste would be required supplemented by 600 TPY of wood pulp.

It is expected the entire 4,000 TPY of Sisal waste could be collected as SISAL FLUME TOW without any difficulty. As pointed out earlier, the sisal waste at one time was used in the manufacture of bags. This has been replaced with polypropylene bags. In fact the entire sisal industry is threatened with the encroachment of synthetic fibre. Itis therefore strongly recommended a diversification in the utilization of sisal fibre should be adopted at this stage. Countries like BRAZIL and MEXICO have already done this by getting into paper manufacture where sisal fibre is directly used for pulp, that is exported. Kenya should also follow this example and launch into this project as early as possible, so that further development of the paper industry could be based on SISAL FIBRE. Since a large number of workers depend for their livelihood on this industry, it must not suffer a set back due to the threat of synthetic fibre.

2.6 PRICE FOR SISAL FIBRE

The sisal waste was purchased by the bag manufacturers at K.Shs.1,600/Ton, when there was a demand for it. Presently there is no demand for it and the material is used as a land fill in most of the estates.

However, for the purpose of this study a price of KShs.2,625/Ton including transport had been used in place of K.Shs.1,600/ton. It was also noted besides large estates there are a number of small farmers who are in a position to supply sisal fibre directly at competitive prices.

2.7 WATER SUPPLY

For the production of 3,000 TPY of hard tissue about 3,500 m^3/day of process water is required. In planning a project of this type allowances have to be made for future expansions as well. Taking the overall requirements of the mill both to meet the present and the future requirements, the mill should be assured of a supply of 7,000 m^3/day.

It is recommended a further study is made to properly evaluate the sites chosen tentatively namely the GALANA river area and Lake NAIVASHA area.

Other possible locations are also open at this stage in close proximity to the supply of raw materials if adequate water supply could be secured.

2.8 ELECTRIC POWER SUPPLY

The average load will be around 500 to 700 KW with a peak load upto 1,000 KW. For the future expansion, allowances have to be made for delivering power upto 2,000 KW. The entire supply will have to be purchased from the National GRID.

2.9 STEAM SUPPLY

The steam requirements would be met by the use of oil fired package boilers. The capacity of the boiler would be about 5 to 6 TPH and the average load would be around 3 TPH.

2.10 TRANSPORT

During the time the detail study is conducted for the project it is preferable to select a site served both by road as well as rail. In the case of the GALANA river area, the possibility of using barges up the river to the possible mill site, should be examined.

3.0 MILL PPOCESS

The mill would be designed for the production of 3,000 TPY of hard tissue using a single Paper machine. Allowances would be made in the design to permit further expansion of the mills to 6,000 TPY by adding a second machine. The equipment and processing system chosen would be simple to facilitate easy operation and maintenance.

Pulping would be based on the Soda process employing batch digesters. The washing of the pulp would be achieved by using ROTARY VACUUM WASHERS. The washed pulp would be centrifrugally screened. The accepted stock would pass through a 3 stage battery of centrifugal cleaners prior to bleaching.

The bleaching would be a 3 stage system employing the CEH Sequence. Inter stage vacuum washers would be provided.

The stock would be prepared using D.D. refiners and the blending ratio for most of the grades would be 15% wood pulp as Bleached KRAFT mixed with 85% Bleached sisal Pulp.

A fourdrinier type of paper machine would be used. This machine would be capable of producing light weight tissues between 20 to 35 GSM. The trim width of the machine would be 2,590 mm.

The finishing department would be equipped with sheeters, Trimmers, winders, rewinders and narrow slitters. A warehouse would be provided for storage of finished product.

4.0 COST ESTIMATES

4.1 MANUFACTURING COST ESTIMATES

The Manufacturing cost estimates are given in detail under APPENDIX 2 and a summary of it is produced below:

ANNUAL MANUFACTURING COSTS		KSHS.
ITEM		COST/YEAR
SISAL WASTE	-	11,629,000
IMPORTED PULP	-	5,400,000
CHEMICALS	-	4,080,000
FUEL OIL	-	3,293,000
OTHER MATERIALS	-	1,500,000
PURCHASED ELECTRIC ENERGY	-	2,160,000
LABOUR	-	2,158,000
ADMINISTRATION AND OVERHEAD	-	2,952,000
CONTINGENCIES	-	460,000
TOTAL		33 632,000

The cost data of the materials used for processing and the quantities are shown in detail under APPENDIX 1.

The staff and Labour requirements and the cost by way of salaries and wages are given under the respective estimates in APPENDIX 2. The overhead expenses are also shown under APPENDIX 2.

4.2 CAPITAL COST ESTIMATES

The estimates for structures, equipment needed for the establishment of the mill are given under APPENDIX 3. The summary of the Capital Cost is given below:

ITEM		COST (KSHS.)
STRUCTURES	-	43,180,000
EQUIPMENT	-	115,260,000
CONSTRUCTION EXPENSE	-	31,620,000
ENGINEERING & CONTINGENCIES	-	29,580,000
TOTAL PLANT CAPITAL	-	219,640,000
WORKING CAPITAL	-	11,803,000
DUTY	-	28,815,000
TOTAL INVESTMENT		260,258,000

The above Capital Cost estimates are based on a simple design. The prices are also based on purchase of equipment from countries where the Labour Cost and overheads are not expensive like TAIWAN, INDIA, GDR or POLAND. The technology adopted in these countries; will also be appropriate to the conditions in Kenya. The cost of erection, commission and follow-up of technical services too will be cheaper for Kenya where the input, particularly for cost of labour, is very high.

4.3 MANUFACTURING PROFIT AND EARNINGS

Product sales prices are recorded in APPENDIX 2. From the total gross earnings and the estimated manufacturing costs as per details given in APPENDIX 2, the gross annual profit has been determined. A summary of these details is produced below:

MANUFACTURING PROFIT AND EARNINGS

ITEM	AMOUNT (KSHS.)
- ANNUAL MILL NET SALES	103,850,000
- ANNUAL DIRECT MANUFACTURING COST	33,632,000
- GROSS PROFIT BEFORE DEPRECIATION AND INTEREST	70,218,000
- CAPITAL INVESTMENT EXCLUDING WORKING CAPITAL	248,455,000
- GROSS RETURN ON INVESTMENT BEFORE INTEREST AND DEPRECIATION	28.3%

The gross return has been calculated on the investment excluding working Capital that would be obtained as a short-term bank loan to be paid out of initial earnings.

The earnings estimate indicates a gross return of 28.3% on investment.

ANNEX 1

COST DATA

ITEM	UNIT	AMOUNT
-. SISAL WASTE	Sh/ADT	2,625
- WOOD PULP Bl. Kraft	Sh/ADT	9,000
- CAUSTIC SODA	Sh/T	4,800
- CHLORINE	Sh/T	2,900
- HYDRATED LIME	Sh/T	300
- ALUM	Sh/T	3,600
- SIZE	Sh/T	10,700
- FUEL OIL	Sh/T	2,400
- ELECTRIC ENERGY	Sh/MWH	600

ANNEX 2

MANUFACTURING ESTIMATES

3000 FTPY HARD TISSUES

SUMMARY

STATISTICS

ITEM		UNIT	AMOUNT
- SALES HARD TISSUES	-	FTPY	3,000
- SISAL WASTE	-	ADTPY	4,430
- WOOD PULP (Bl KRAFT)	-	ADTPY	600
CHEMICALS			
- CAUSTIC SODA	-	TPY	490
- CHLORINE	-	TPY	144
- HYDRATED LIME	-	TPY	215
- ALUM	-	TPY	150
- SIZE	-	TPY	60
- ADDITIVES AND DYES	-	TPY	7
- FUEL OIL	-	TPY	1,372
- ELECTRIC ENERGY (TOTAL)	-	MWH	3,600
- WATER		M^3 x 1000	1,050
- LABOUR			
= DAILY PAID		MEN	230
= SALARIED		MEN	41
= TOTAL		MEN	271
- ANNUAL OPERATING DAYS		DAYS	300

MANUFACTURING COST ESTIMATES

ITEM	RATE K.SHS.	COST/YEAR K.SHS.
SISAL WASTE	2,625/ADT	11,629,000
BL. KRAFT	9,000/ADT	5,400,000
CHEMICALS		
- CAUSTIC SODA	4,800/T	2,352,000
- CHLORINE	2,900/T	418,000
- HYDRATED LIME	300/T	65,000
- ALUM	3,600/T	540,000
- SIZE	10,700/T	642,000
- ADDITIVES & DYES	9,000/T	63,000
- OTHER MATERIALS	--	1,500,000
- FUEL OIL	2,400/T	3,293,000
- ELECTRIC POWER	600/MWH	2,160,000
- LABOUR		2,159.000
- ADMINISTRATION AND OVERHEAD		2,952,000
- CONTINGENCIES		460,000
		33,632,000

ANNEX 2,cont.

ESTIMATE 1

PAPER MACHINE

	ITEM	UNIT	AMOUNT
-	SPEED RANGE	MPM	100 - 300
-	BASIS WT. RANGE	GSM	20 - 35
-	TRIM AT WINDER	MM	2,500
-	FINISHED PRODUCTION	TPY	3,000
-	FINISHING LOSSES	%	7
-	AUERAGE MACHINE PRODUCTION	TPD	10 - 12
-	MOISTURE CONTENT	%	6
-	FIBRE LOSS	%	3
-	ANNUAL OPERATING DAYS	DAYS	300

ANNEX 2, cont.

ESTIMATE NO.2

LABOUR

DEPARTMENT	NO. OF MEN	COST/YEAR
- RAW MATERIAL SUPPLY	16	
- RAW MATERIAL PREPARATION	12	
- CHEMICAL PREPARATION	12	
- DISGESTER	12	
- WASHING, SCREENING AND BLEACHING	8	
- STOCK PREPARATION	12	
- PAPER MACHINE	24	
- FINISHING	30	
- DESPATCH AND WAREHOUSE	12	
- QUALITY CONTROL AND LABORATORY	8	
- WATER SUPPLY	8	
- STEAM GENERATION AND SUPPLY	8	
- POWER SUPPLY	4	
- ENGINEERING AND MAINTENANCE	30	
- MILL STORES	5	
- TRANSPORT AND YARD	21	
- SECURITY	-	
- OFFICE	4	
- HOUSING AND WELFARE	4	
TOTAL	230	KSH.2,153,000

ANNEX 2, cont.

ESTIMATE NO.3

ADMINISTRATION AND OVERHEAD

SUMMARY

ITEM	NO. OF EMPLOYEES	KSHS. COST/YEAR
SALARIES		
- MILL PERSONNEL	36	1,860,000
- HEAD OFFICE PERSONNEL	5	350,000
TOTAL	41	2,210,000
GENERAL OVERHEAD EXPENSES		742,000
		2,952,000

SALARIED MILL PERSONNEL

POSITION ADMINISTRATION DIVISION	NO. OF EMPLOYEES
- MILLS MANAGER	1
- MILLS ACCOUNTANT	1
- STORE KEEPER	1
- TRANSPORT FOREMAN	1
- OFFICE SECRETARIES	2
- CLERKS	4
- TELEPHONE OPERATOR/RECEPTIONIST	1
- FIRST AID NURSE	1
	12

ANNEX 2, cont.
ESTIMATE 3

PRODUCTION DIVISION

POSITION	NO. OF EMPLOYEES
- PRODUCTION MANAGER	1
- FOREMAN	9
	10
- QUALITY CONTROL & LAB.	
- CHEMIST	1
- LABORATORY TESTERS	8
	9
- ENGINEERING DIVISION	
- MILLS ENGINEER	1
- FOREMEN	4
TOTAL	5

SALARIED HEAD OFFICE PERSONNEL

- POSITION	NO. OF EMPLOYEES
- GENERAL MANAGER	1
- SUPPLIES & SALES MANAGER	1
- OFFICE SECRETARIES	2
- TELEPHONE OPERATOR + RECEPTIONIST	1
TOTAL	5

ANNEX 2, cont.

SALES ANALYSIS

	KSHS. PRICE/TON	QTY	KSHS. SALES
- TEA BAG PAPER	55,000	100	5,500,000
- CARBONIZING TISSUE	40,000	50	2,000,000
- SPECIAL WRAPPING TISSUE (GIFT WRAP)	30,500	100	3,050,000
- HARD TISSUE FOR WRITING	35,000	1,100	38,500,000
- HARD TISSUE FOR PRINTING	32,000	1,400	44,800,000
- CIGARETTE TISSUE	40,000	250	10,000,000
		KSHS.	103,850,000

ANNEX 3

CAPITAL COST ESTIMATES

SUMMARY

PART I - STRUCTURES

DESCRIPTION	KSHS. LABOUR	KSHS. MATERIAL	KSHS. TOTAL
SITE	340,000	1,700,000	2,040,000
TRANSPORTATION	170,000	510,000	680,000
SEWERS AND EFFLUENT DISPOSAL	INCLUDED UNDER EQUIPMENT		
FIRE PROTECTION	34,000	34,000	68,000
TOWN SITE	1,462,000	5,338,000	6,800,000
OFFICE AND LABORATORY	680,000	1,360,000	2,040,000
MILL STORES	INCLUDED WITH OFFICE AND LABORATORY		
WORKSHOP	476,000	986,000	1,462,000
FUEL OIL STORAGE AND HANDLING	34,000	136,000	170,000
WATER SUPPLY & DISTRIBUTION	INCLUDED UNDER EQUIPMENT		
STEAM " "	510,000	1,530,000	2,040,000
POWER " "	102,000	306,000	408,000
SISAL HANDLING AND STORAGE	INCLUDED UNDER EQUIPMENT		
SISAL PREPARATION	136,000	544,000	680,000
DIGESTER HOUSE	646,000	1,666,000	2,312,000
WASHING AND SCREENING	1,530,000	4,250,000	5,780,000
BLEACH PLANT	INCLUDED UNDER WASHING AND SCREENING		
CHEMICAL PREPARATION	INCLUDED UNDER DIGESTER HOUSE		
STOCK PREPARATION	INCLUDED UNDER PAPER MACHINE		
PAPER MACHINE	2,720,000	9,180,000	11,900,000
FINISHING HOUSE	1,700,000	5,100,000	6,800,000
WARE HOUSE	INCLUDED UNDER FINISHING HOUSE		
TOTAL	10,540,000	32,640,000	43,180,000

ANNEX 3, cont.

PART II EQUIPMENT

DESCRIPTION	KSHS. LABOUR	KSHS. MATERIAL	KSHS. TOTAL
SITE	-	-	-
TRANSPORTATION	34,000	476,000	510,000
SEWERS AND EFFLUENT	306,000	1,632,000	1,938,000
FIRE PROTECTION	748,000	2,278,000	3,026,000
TOWNSITE	INCLUDED	IN STRUCTURE	
OFFICE AND LABORATORY	34,000	1,190,000	1,224,000
MILL STORES	-	6,460,000	6,460,000
WORKSHOP	102,000	6,698,000	6,800,000
FUEL OIL STORAGE & HANDLING	68,000	1,156,000	1,224,000
WATER SUPPLY & DISTRIBUTION	442,000	2,958,000	3,400,000
STEAM " " "	510,000	5,440,000	5,950,000
POWER " " "	238,000	2,244,000	2,482,000
SISAL STORAGE & HANDLING	-	578,000	578,000
SISAL PREPARATION	238,000	1,462,000	1,700,000
DIGESTER PLANT	442,000	3,298,000	3,740,000
WASHING AND SCREENING	510,000	4,420,000	4,930,000
BLEACHING	1,224,000	8,534,000	9,758,000
CHEMICAL PREPARATION	204,000	1,496,000	1,700,000
STOCK PREPARATION	2,278,000	11,118,000	13,396,000
PAPER MACHINE	2,210,000	38,590,000	40,800,000
FINISHING ROOM	238,000	4,692,000	4,930,000
WARE HOUSE	34,000	680,000	714,000
TOTAL	9,860,000	105,400,000	115,260,000

PART III CONSTRUCTION EXPENSES

CONSTRUCTION OVERHEAD	31,620,000
ENGINEERING AND CONTINGENCIES	29,580,000
	61,200,000
TOTAL CAPITAL ESTIMATES ON MILL (EQUIPMENT & BUILDINGS) EXCLUDING DUTY	219,640,000

ANNEX 4

WORKING CAPITAL AND OPENING-UP EXPENSES

ITEM		K.SHS.AMOUNT
INVENTORIES		
SISAL WASTE	3 months	2,907,000
IMPORTED PULP	3 months	1,350,000
CAUSTIC SODA	1 month	194,000
CHLORINE	1 month	35,000
HYDRATED LIME	1 month	5,000
ALUM	3 months	135,000
SIZE	3 months	161,000
ADDITIVES AND DYES	3 months	16,000
FUEL OIL	1/2 month	137,000
OTHER MATERIALS	3 months	375,000
FINISHED PRODUCTS	1/2 month	4,327,000
	TOTAL	9,642,000
INSURANCE PREMIUMS AND SUNDRY ADVANCES		510,000
OPENING-UP EXPENSES		
- ADMINISTRATIVE SALARIES	6 months	1,105,000
- OVERHEAD	3 months	186,000
- LABOUR	2 months	360,000
	TOTAL	11,803,000

ANNEX 5

EARNINGS ESTIMATE

ITEM	UNIT	AMOUNT
PAPER PRODUCTION	FTPA	3,000
MILL NET SALES	KSHS./YR.	103,850,000
DIRECT MANUFACTURING COST	KSHS./YR.	33,632,000
GROSS MANUFACTURING PROFIT	KSHS./YR.	70,218,000
CAPITAL INVESTMENT EXCLUDING WORKING CAPITAL	KSHS./YR.	248,455,000
GROSS RATIO BEFORE DEPRECIATION AND INTEREST	%	28.3