OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

FORM 3

Stadler Hurter ENGINEERS • CONSULTANTS	UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION	REFERENCE NO	INDEX NO	SERIAL NO.
DATE July 20, 1972		R-193A	07	3101

Rev. November 10, 1972

06951

FS 383 B

APPENDIX I

MARKET RESEARCH
AND MATERIALS AVAILABILITY

S/F BAGASSE

9/F ARGENTINE

PRELIMINARY STUDY ON THE INDUSTRIAL UTILIZATION OF BAGASSE IN THE PROVINCE OF TUCUMAN, ARGENTINA

FOR

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

S T A D L E R   H U R T E R   L I M I T E D

Engineers - Designers - Consultants

1501 St. Catherine Street West

Montreal 107, P.Q.

Canada

P R E F A C E

Since market information has been obteined only through much work and effort, results heve been included in the Appendix in considerable detail.

For similar reaeons some aspecte concerning materiels and eervices hzve also been appended.

Technologicel calculations end date which ere necessary for the interpretetion of this prefeasibility study have been presented in thie Appendix.

PRELIMINARY STUDY ON THE
INDUSTRIAL UTILIZATION OF BAGASSE
IN THE
PROVINCE OF TUCUMAN, ARGENTINA

APPENDIX I

- TABLE OF CONTENTS -

APPENDIX I

- TABLE OF CONTENTS -

(Cont'd)

PRELIMINARY STUDY ON THE
INDUSTRIAL UTILIZATION OF BAGASSE
IN THE
PROVINCE OF TUCUMAN, ARGENTINA

APPENDIX I

- TABLE OF CONTENTS -
(Cont'd)

APPENDIX I

- TABLE OF CONTENTS -
(Cont'd)

APPENDIX I

- TABLE OF CONTENTS -
(Cont'd)

AX. MARKET INFORMATION

AX.1 Import and Export Data

(a) General

During the analysis of paper imports from 1958 to 1969, it can be noted that import of the different types of paper, exception made of newsprint, shows a relatively distorted information, especially for 1967 and 1969, where writing paper imports decrease and "Other Papers" increases. This shows the convenience of gathering the different types in order to have a more consistent general idea.

In this way, imports are relatively reduced only in 1968, while in the other periods, restrictions which have taken place in certain moments, have had no major influence on imports and satisfaction of demand.

Eventual existence of market-regulating stocks must be taken into account. This would result in a new balance point of the market through prices.

It is possible to suppose that this process appeared in those cases when there were significant increases in the rate of exchange, which would temporarily affect imports.

(b) Imports

Agreements

For all item NAB 48.00.00.00, 80% of FOB value is calculated at 5. - $/u$s. Remaining 20% of FOB plus freight

and insurance is calculated according to financial market quotation of the date of the operation.

FOB value includes consular fees. In case of payment of interests, they are paid as above (80 and 20%). There is no previous deposit nor previous payment.

Operation can be taken by letter credit, document, etc., but there are restrictions with respect to payment terms. When original payment date is modified, or when payment is delayed for more than 5 days after maturity date, Central Bank must authorize the operation.

Payment conditions are regulated by Telephonic Despatch # 2522 of 22/X/71. The remaining regulations correspond to Circular RC 409, RC 414 and RC 419.

Printing paper with water lines

- 5% on CIF value (Decree # 2524/70)
- without previous deposit
- 10% on CIF value (exception made of LAFTA countries)

Security paper for bank notes

- Free of charge (Decree # 1410/67)
- Without previous deposit

Bible paper with water lines for printing

- 5% on CIF value (Decree # 2524/70)
- without previous deposit
- 10% on CIF value, exception made of LAFTA countries

Illustration paper with water lines for printing

- 5% on CIF value (Decree # 2524/70)
- Without previous deposit
- 10% on CIF value, exception made of LAFTA countries

Other printing papers

- 100% on CIF value (Decree # 2524/70)
- 10% on CIF value, exception made of LAFTA countries

Kraft for sacks

- 100% on CIF value (Decree # 2524/70)
- without previous deposit
- 10% on CIF value exception made of LAFTA countries

Note: Law 19,327/71 created an import duty of 15%, which will be applied to merchandise from any origin, exception made of Uruguay, Paraguay, Bolivia and Ecuador (Decree # 5388).

- Import Freights

Freights for pulps are the following (average):

Scandinavian countries: 30 u$s/T

USA - Canada: east coast: 36 u$s/T; west coast: 40 u$s/T

Chile: between 15 and 18 u$a/T

- Import Insurance

For newsprint, against all risks (average):

8,10% Canada-USA-United Kingdom-France-Sweden-Finland-Norway

10,80% Australia

7,02% Brazil

6,20% Japan

- Import Routes

Transportation must be done in classified ships of

no more than 20 years, according to regulations in force. Insurance company must be Argentine.

Most imports are through Buenos Aires port. Zarate is also used, and there is a Government warehouse used by the companies of that region in order to regulate production/consumption ratio.

With respect to imports from Chile, they also arrive in ships. Land imports are limited and only in specisl circumstances.

Source: Inquiries in different companies.

(c) Exports

Although total exports decreased during 1968 in a 6.8%, mainly due to decreased shipments of meat and corn, Argentina had a good place in the market. Non traditional products exports improved in a 33%, increasing their participation in total exports, from 12% to 18.4%. A little part of this increase corresponds to the first shipments of offset paper.

Paper production installations began only in 1965, using bagasse as raw material. First shipment was made in 1967, and consisted of 10 T exported to Paraguay. In 1968, 1600 T of offset paper were shipped to USA, 315 T to Ecuador, 250 T to Paraguay, 35 T to Peru and a sample of 6 T to Bolivis. But real exports begin only in 1969, with a 5,100 T shipment to USA, representing more than u$s 1,000,000.

According to information from the producers and exporters, although the opening of new export markets demanded great efforts, the increasing domestic demand modified the company's exporting policy, in order to cover local market demand. Efforts made have lost, in consequence, their effectivity, as they have had no continuity.

(d) Agreements

Item NAB 48.00.00.00 is regulated by Decree # 5062/71. 40% of FOB value is calculated at financial rate of exchange; 60% of FOB value at commercial rate of exchange.

Circular RC#363 establishes that terms can be freely agreed by the interested parties; operations need no banking approval.

Items NAB 48.01.00.00 to NAB 48.17.00.00 and NAB 48.18.00.00, and from 48.19.00.00 to 48.21.00.00 are contemplated in Decree # 3255/71 which establishes tax reimbursements for non traditional exports, of 10% on:

- FOB value when export is carried out on foreign transportation and with foreign insurance;
- CI value when insurance is contracted in the country;
- C and F value when transportation media are Argentine;
- CIF value when both transportation and insurance are Argentine.

Source: BCRA 1971 - Exporter's Guide 1971

AX.2 National Economic Data

Following Tables include data of the economy in general, which have been used in the preparation of the report.

TABLE 1-AX

GROSS NATIONAL PRODUCT AT MARKET PRICES
(Million Pesos Ley 18,188)

Year	Current Prices	1960 Constant Prices	% Variation	Population (Million of Inhabitants)	Per Capita	% Variation
1950	684.7	7,487.2		17,070	438.61	
			3.9			1.5
1951	968.3	7,779.0		17,481	444.99	
			- 5.0			- 7.0
1952	1,138.4	7,386.6		17,858	413.62	
			5.4			3.5
1953	1,311.8	7,789.1		18,202	427.92	
			4.0			2.1
1954	1,468.8	8,101.1		18,544	436.85	
			7.2			5.2
1955	1,736.1	8,684.7		18,893	459.67	
			2.8			0.9
1956	2,249.3	8,926.3		19,250	463.70	
			5.1			3.1
1957	2,837.1	9,379.1		19,614	478.18	
			6.3			4.4
1958	4,013.5	9,972.9		19,979	499.16	
			- 6.6			- 8.1
1959	7,671.1	9,318.7		20,325	458.48	
			8.0			6.2
1960	10,063.4	10,063.4		20,669	486.88	
			8.1			5.8
1961	11,997.1	10,777.9		20,923	515.12	
			- 1.7			- 3.0
1962	14,848.7	10,596.8		21,180	500.32	
			- 2.4			- 3.6
1963	18,548.6	10,345.2		21,441	482.49	
			10.4			9.1
1964	25,799.1	11,422.0		21,705	526.23	
			9.2			7.8
1965	36,183.1	12,468.6		21,972	567.47	
			0.7			- 0.5
1966	45,224.1	12,559.2		22,242	564.66	
			2.5			1.2
1967	59,120.1	12,871.1		22,516	571.64	
			4.6			3.4
1968	68,822.8	13,464.9		22,793	590.92	
			7.9			6.6
1969	80,422.0	14,531.6		23,073	629.80	
			4.8			3.5
1970		15,229.0		23,364	651.81	

Annual average increase of total GNP, last 21 years: 3.6 %

Annual average increase of GNP P.C., last 21 years: 2.0 %

Annual average increase of total GNP, last 10 years: 3.9 %

Annual average increase of GNP P.C., last 10 years: 2.7 %

Source: CIDIE on basis of data from BCRA

Stadler Hunter
ENGINEERS . CONSULTANTS

UNIDO

REFERENCE NO.	INDEX NO	SERIAL NO
R-193A	07	3101

DATE: July 20, 1972

PAGE AX/7

TABLE 2-AX

COMPARISON OF INCREASE OF NATIONAL INCOME WITH OTHER COUNTRIES
(At constant prices)

Index 1963 = 100

Country		1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
BRAZIL	Total	68	73	77	85	94	98	100	103	106	111	116	-
	P.C.	80	85	87	93	99	101	100	100	100	102	103	-
CHILE	Total	-	80	82	80	91	95	100	105	110	118	119	121
	P.C.	-	91	91	87	95	97	100	103	104	110	108	107
MEXICO	Total	74	78	80	87	90	94	100	110	116	125	133	-
	P.C.	90	92	92	96	96	97	100	100	108	113	116	-
ARGENTINE(*)	Total	-	96	91	98	105	103	100	108	117	118	120	126
	P.C.	-	105	97	103	108	105	100	107	114	112	113	117
U. S. A.	Total	-	82	87	89	90	96	100	105	112	119	123	129
	P.C.	-	88	92	93	93	98	100	104	109	115	117	121
FRANCE	Total	-	76	79	84	89	95	100	107	112	118	123	128
	P.C.	-	82	83	88	92	96	100	105	109	114	119	123
GREAT BRITAIN	Total	-	85	89	94	95	97	100	106	109	111	112	117
	P.C.	-	88	92	96	97	98	100	105	107	109	109	114

Source: U. N.

(*) Without last corrections of BCRA (In order to obtain valid comparison figures, we have selected three Latin America countries and three high developed countries).

TABLE 3-AX ARGENTINE POPULATION: HISTORICAL INCREASE (Thousands of inhabitants)	
1960	20,669
1961	20,923
1962	21,180
1963	21,441
1964	21,705
1965	21,972
1966	22,242
1967	22,516
1968	22,793
1969	23,073
1970	23,364
Source: INDEC	

TABLE 4-AX ARGENTINE POPULATION: EVOLUTION OF INCREASE ADJUSTED BY FIVE-YEAR PROMEDIOS MOVILES (Thousands of inhabitants)	
1960/64	21,183.6
1961/65	21,444.2
1962/66	21,708.0
1963/67	21,975.2
1964/68	22,245.6
1965/69	22,519.2
1966/70	22,743.6
Source: Own preparation	

TABLE 5-AX

ARGENTINE POPULATION: ANNUAL AVERAGE GROWTH RATES

Year	Rate (%)	Year	Rate (%)
1950	25.8	1960	16.8
1951	23.6	1961	16.2
1952	19.8	1962	16.2
1953	17.5	1963	13.1
1954	18.9	1964	14.9
1955	18.4	1965	13.9
1956	18.9	1966	12.9
1957	18.5	1967	13.7
1958	18.0	1968	13.4
1959	15.2	1969	13.9
		1970	13.7

Source: INDEC

TABLE 6-AX

RATES OF AVERAGE ANNUAL POPULATION INCREASE OF ARGENTINA AND OTHER COUNTRIES 1950 & 1970

Country	Average incr. rate per thousand inh. 1950/60 (a)	1960/70 (b)	(b - a)	Average Density per km^2
U. K.	+ 0.5	+ 0.6	+ 0.1	323
FRANCE	+ 0.9	+ 0.9	0.0	92
U.S.A.	+ 1.7	+ 1.2	- 0.5	22
ARGENTINA	+ 1.7	+ 1.5	- 0.2	8
CHILE	+ 1.8	+ 1.8	0.0	13
BRAZIL	+ 3.4	+ 2.6	- 0.8	11
MEXICO	+ 3.1	+ 3.2	+ 0.1	25

Source: U. N.

TABLE 7-AX

RATES OF ANNUAL AVERAGE INCREASE OF SOME LATIN AMERICA COUNTRIES, NECESSARY TIME TO DOUBLE THEIR POPULATION, AND ESTIMATES FOR THE YEAR 2000

Country	1970 Population (thousands)	Annual Average rate of increase	Time to Double Population (years)	Estimated Population for 2,000 (thousands)
ARGENTINA	23,323	1.5	46	36,517
CHILE	8,885	1.8	39	15,161
BRAZIL	92,238	2.6	27	201,230
MEXICO	48,313	3.2	22	126,179

Source: U. N.

TABLE 8-AX

ARGENTINE POPULATION: INTER-CENSUS RATES OF ANNUAL AVERAGE INCREASE

Territory	1970/60 rate %	1960/47 rate %	1947/14 rate %
Total of the Country	15.4	17.2	20.4
Federal Capital (Bs.As. City)	2.0	- 0.4	18.7
Buenos Aires			
Great Buenos Aires	35.1	55.3	35.4
Rest of the province	12.6	12.5	13.5
Catamarca	2.4	10.0	11.4
Córdoba	16.1	11.8	20.7
Corrientes	5.6	1.1	12.4
Chaco	4.2	17.4	48.8
Chubut	28.6	31.9	36.4
Entre Ríos	0.8	1.7	18.1
Formosa	26.9	33.3	43.0
Jujuy	22.4	27.5	22.1
La Pampa	8.0	- 4.9	15.2
La Rioja	6.1	11.2	9.9
Mendoza	16.6	25.1	21.7
Misiones	20.3	28.4	39.0
Neuquén	33.8	17.6	30.4
Río Negro	30.4	27.0	31.6
Salta	21.0	26.0	20.8
San Juan	8.7	22.3	22.6
San Luis	5.1	3.9	10.6
Santa Cruz	45.9	15.7	37.8
Santa Fe	12.5	7.6	18.7
Santiago del Estero	3.9	- 0.5	17.8
Tucumán	- 1.0	19.8	17.0
Tierra del Fuego, Antártida e Islas del Atlántico Sur	33.1	56.9	20.4

Source: INDEC

TABLE 9-AX

GENERAL COMPARATIVE DATA OF LAFTA COUNTRIES

	Area Thousands of km^2	1970 Population thousands of inhabitants	Urban Population % 1965	Population rate of increase 1960/69 %	Per Capita (US$) constant value 1969
Argentina	2,795.7	23,250	76.4	1.5	1,292
Bolivia	1,098.6	4,938	32.5	2.6	320
Brazil	8,500.0	93,272	44.0	3.2	480
Colombia	1,138.9	20,944	52.8	3.2	485
Chile	741.0	9,780	67.4	2.3	833
Ecuador	455.4	6,050	41.0	3.4	419
Mexico	1,969.3	50,719	58.3	3.5	783
Paraguay	406.7	2,360	32.7	3.1	356
Peru	1,285.2	13,500	44.1	3.1	526
Uruguay	186.9	2,880	77.6	1.3	964
Venezuela	912.0	10,400	67.4	3.5	1,105

Source: OECEI - CEPAL

AX.3 Production and Consumption of Papers and Boards

TABLE 10-AX

USE OF INSTALLED CAPACITY

Types of Papers	Installed Capacity	Production	Use %
Newsprint	20,000	1,826	9.13
Printing & writing	188,000	108,633	57.78
Sack & Wrapper - kraft	204,500	159,828	78.16
Corrugating	122,000	94,115	77.14
Tissue	32,000	31,317	97.87
Pasteboard-Bristolboard and other papers	213,000	186,170	87.40
T o t a l	779,500	581,889	74.65

Source: DNEI on data BIRA 1969

FORM 4

Stadler Hurter ENGINEERS • CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO.	SERIAL NO.
DATE July 20, 1972		R-193A	07	3101

PAGE AX/14

TABLE 11-AX

NATIONAL PRODUCTION OF PAPER AND PASTEBOARD (TONS)

Year	Newsprint	Printing and Writing	Kraft, Sack and Wrapper	Corrugating	Tissue	Pasteboard and Bristol-Board	Other	Total
1958	-	57,800	93,200	9,800	-	128,400	69,300	358,500
1959	-	54,700	84,400	39,600	-	111,700	55,800	346,200
1960	9,324	60,617	72,595	32,588	8,774	89,278	17,776	290,952
1961	9,281	75,208	95,753	41,515	12,399	116,400	21,460	372,016
1962	12,500	74,698	87,855	40,131	17,995	113,401	18,477	365,057
1963	21,718	69,761	99,690	51,817	14,316	99,758	14,889	371,949
1964	12,009	79,896	122,206	59,830	19,477	135,789	14,515	443,722
1965	4,409	101,361	137,972	76,673	23,068	163,265	16,686	523,434
1966	2,602	111,217	151,161	74,559	18,798	150,478	17,177	525,992
1967	3,230	90,474	128,133	68,402	22,185	143,202	16,025	471,660
1968	4,052	104,510	148,040	79,675	24,551	153,512	16,732	531,072
1969	1,826	108,633	159,828	94,115	31,317	168,170	18,000	581,889

Source: INDEC

FORM 6

Stadler Hunter ENGINEERS • CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO	SERIAL NO
DATE July 20, 1972		R-193A	07	3101
		PAGE	AX/15	

TABLE 12-AX

INSTALLED CAPACITY AND NUMBER OF PLANTS BY TYPE OF PAPER

(TONS)

Item	Newsprint	Printing and Writing	Kraft and Wrapper	Tissue	Corrugating Medium	Other Papers
Maximum capacity (tons/year)	20,000	188,000	204,500	32,000	122,000	213,000
Number of plants	1	10	21	6	28	47
Main plant (tons/year)	20,000	70,000	100,000	13,000	12,000	15,000
Average by plant (tons/year)	20,000	18,800	9,738	5,333	4,357	4,532

Source: BIRA and DNEI

Form 4

Stadler Hunter ENGINEERS . CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO	SERIAL NO
DATE July 20, 1972		R-193A	07	3101

PAGE AX/16

TABLE 13-AX

ANALYSIS OF INSTALLED CAPACITY FOR VARIOUS TYPES OF PULPS

(METRIC TONS PER YEAR)

Item	Mechanical	Long-Fibre Chemical	Short-Fibre Chemical and Semichemical	Total
Maximum capacity (tons/year)	36,500	30,000	186,000	252,500
Number of plants	4	1	21	26
Main plant (tons/year)	30,000	30,000	30,000	30,000
Average per plant (tons/year)	9,125	30,000	8,857	9,712

Source: BIRA - DENEI, 1969

TABLE 14-AX

PER CAPITA CONSUMPTION (PAPER AND PASTEBOARD)
FOR DIFFERENT COUNTRIES (kg)

Country	Consumption per year 1968	1969	1970
U.S.A.	242	272	252
Sweden	168	186	191
Canada	167	178	181
Switzerland	133	144	154
Denmark	123	143	148
United Kingdom	122	128	129
Netherlands	118	136	138
West Germany	110	123	125
Australia	107	118	119
Japan	93	110	122
France	81	93	95
Italy	58	65	65
ARGENTINA	34	37	39
Spain	31	37	39
Russia	23	26	27
Mexico	20	22	24
Chile	18	20	33
Uruguay	15	19	21
Peru	13	13	15
Brazil	12	12	14
WORLD TOTAL	32	-	-
Idem without U.S.A.	21	-	-

Source: Pulp and Paper International - 1969, 1970, 1971

FORM 4

Stadler Hunter ENGINEERS . CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO.	SERIAL NO.
DATE July 20, 1972		R-193A	07	3101
		PAGE	AX/18	

TABLE 15-AX

PAPER AND PASTEBOARD IMPORTS

(METRIC TONS)

Year	Newsprint	Printing	Kraft	Corrugating	Tissue	Paste- and Bristolboard	Other Papers	Total
1958	160,827	7,470	3,890	-	31	1,755	1,841	175,814
1959	127,291	6,062	3,127	-	-	1,216	970	138,666
1960	161,732	5,027	1,498	-	83	1,454	1,358	171,152
1961	213,706	17,853	1,530	-	2,036	4,478	3,566	243,169
1962	135,172	10,171	300	-	216	2,453	3,404	151,716
1963	126,862	8,769	739	-	-	1,521	3,773	151,664
1964	165,151	9,568	190	-	2	3,475	3,533	181,919
1965	220,064	9,564	116	-	2	2,174	4,547	236,467
1966	236,992	14,131	-	-	-	3,100	5,370	259,593
1967	205,607	5,091	-	-	-	3,258	12,100	226,056
1968	244,915	11,723	-	-	-	751	1,001	258,390
1969	299,711	3,082	3,580	-	-	117	24,002	330,492

Source: INDEC

FORM 4

Stadler Hunter ENGINEERS . CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO	SERIAL NO
DATE July 20, 1972		R-193A	07	3101

PAGE AX/19

TABLE 16-AX

PAPER AND PASTEBOARD EXPORTS

(METRIC TONS)

Year	Newsprint	Printing	Kraft	Currugating	Tissue	Paste- and Bristolboard	Other Papers	Total
1958	368	1	-	-	-	-	2	371
1959	-	11	-	-	-	2	7	20
1960	-	55	-	-	-	14	8	77
1961	107	2	-	-	-	6	33	148
1962	62	3	-	-	-	8	27	100
1963	379	15	-	-	-	19	59	472
1964	160	10	-	-	-	35	124	329
1965	5	12	-	-	-	19	93	129
1966	-	9	-	-	-	2	19	30
1967	171	15	-	-	-	4	227	417
1968	165	2,590	-	-	-	10	224	2,989
1969	358	7,870	1,401	-	-	46	1,473	11,148

Source: INDEC

88.- Installed Capacity and Expansion of Installed Capacity

A very important observation must be taken into account which considering installed capacity tables, in order to avoid mistakes. This refers to following chapters, too:

CONADE says that, "... the great versatility of equipment complicates determination of installed capacity by type of paper. There are plants which normally produce a wide range of types and qualities with the same equipment. Due to this fact, any division of installed capacity by type of paper would be arbitrary, and could give a distorted impression of local paper industry situation in some of its aspects". (CONADE - "Diagnosis and Projections of Paper and Cellulosic Pulps used in its Production" - Industry and Mining Sector - 1965).

With reference to unused capacity, the equipment is in general in condition to be started-up without great technical problems.

The situation of closed plants is different. In many cases, it is not probable that they could be started-up again. These have not been considered in the corresponding tables, unless the probability of opening them is good. This is the case of Celulosa Bell-Ville, in Córdoba.

Ledesma S.A. intends to expand their production capacity. Their plant is located in Jujuy. Expansion is foreseen for 1972 in 5,000 T/yr of different papers, especially printing.

In 1965 Ledesma started a paper mill based on bagasse, which

had been used as fuel up to that time .

Ledesma produces presently 30,000 T/yr and their expansior program includes a minor improvement in 1972 - on the baais of the main equipment of the plant - which will increase thei- capacity to 35,000 T/yr. In 1976 a second continuous machine will be installed, having the same capacity as that presently in operation (this will double capacity of production for bagasse bleached cellulose, recuperation of reactives, etc), which will increase annual produ tion to 70,000 T; with reference to projected market for printing and writing, in 1975 Ledesma will cover 30% of the same, especially in "Papel Obra" item.

Source: Present and Future Situation of Paper and Cellulose Industry in Jujuy - Provincial Government - September 1970

Celulosa Argentina S.A. estimate that in about seven years they would have invested 100/120 million dollars in their plants. In 1969 this company submitted important projects amounting to 65 million dollars, for expansion of capacities for their plants in Cap. Bermúdez (Sta. Fe), and Puerto Piray (Misiones), and installation of a new plant for cellulose production, in Puerto Piray also, and for increases in capacity of production of paper in Bernal and Zárate (Buenos Aires) plants.

FORM 9

Stadler Hurter
ENGINEERS & CONSULTANTS

DATE [illegible] 30, 1972

UNIDO

TABLE 17-AX

PARTICIPATION OF THE COMPANIES IN THE MARKET

REFERENCE NO: [illegible]-19-A | INDEX NO: 02 | SERIAL NO: 0101 | PAGE: AX/22

Type of Paper and Total Capacity in Tons/Year	Company	Installed Capacity Tons/Year
Newsprint		
20,000 tons	Celulosa Argentina	20,000
Printing and Writing		
188,000 tons	Celulosa Argentina	108,500
	Ledesma S.A.	30,000
	Witcel S.A.	16,000
	5 Companies	27,500
Kraft and Wrapper		
204,500 tons	Celulosa Argentina	100,000
	Massuh Hnos S.A.	16,000
	Papelera Del Norte	10,000
	Papelera Hispano Arg. S.A.	12,000
	Papelera Raffaele S.A.	12,000
	15 Companies	54,500
Corrugating		
122,000 tons	Zucamor	12,000
	Schcolnik S.A.	10,000
	Rodriguez Canedo	9,000
	Suarez Asin	8,000
	Celcar	7,000
	23 Companies	76,000
Tissue		
32,000	Papelera Del Plata	13,000
	Celulosa Jujuy (S.Pedro)	4,500
	Papelera Baradero	4,000
	Papelera Mar Del Plata	4,500
	Papelera Mosconi	4,500
	Celulosa Jujuy (Ciudadela)	1,500
Pasteboard, Bristol-board and other		
213,000 tons	Adamas	15,000
	Copaca	15,000
	Papelera Pedotti	12,000
	Papelera Teitelman	10,000
	Ind. Arg. Del Papel	9,000
	19 Companies	152,000

Source: DNEI and BIRA

TABLE 18-AX

PLANTS MANUFACTURING PAPER AND/OR BOARD USING BAGASSE (TONS)

Plant and Location	1969	1970
Companía del Norte de Santa Fe Villa Ocampo - Santa Fe	6,572	-
Cía Azucarera del Norte S.A. Tucamán	1,884	2,746
Las Palmas del Chaco Austral S.A. Las Palmas - Chaco	12,000	-
Celulosa Argentina S.A. Tucumán	-	1,482
Ledesma S.A. Jujuy	-	27,000

Source: BIRA

TABLE 19-AX

COMPARISON OF NATIONAL AND INTERNATIONAL PRICES (US$)

Paper	National Price	International Price	Ratio
Newsprint	223	130	1.71
Printing	371	176.5	2.10
Kraft	371	160	2.31
Pasteboard	148.5	105	1.41
Tissue	514	237	2.16

Source: D.N.E.I.

TABLE 20-AX

PRICE DISTORTION STRUCTURE

Cause	Newsprint	%	Kraft	%	Printing	%
Insufficient dimension	0.17	24	0.85	65	0.30	27
Non-integrated plants			0.13	10	0.20	18
Higher costs of raw materials	0.54	76	0.33	25	0.60	54
TOTAL DISTORTION	0.71	100	1.31	100	1.10	100

Source: DNEI

FORM 4

Stadler Hunter ENGINEERS . CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO	SERIAL NO
DATE July 20, 1972		R-193A	07	3101
		PAGE	AX/25	

TABLE 21-AX

WHOLESALE PRICES INDEX WITHOUT DEFLATION - BASIS 1956 = 100

Product	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Paper and pasteboard	153.3	281.8	323.0	397.7	518.5	615.1	737.6	991.4	1,183.2	1,446.1	1,520.1	1,637.0
Boxes and other packings	139.1	235.2	258.2	374.0	553.2	600.6	712.2	1,013.6	1,270.6	1,530.9	1,636.2	1,879.9
Cellulose and wood pulps	152.2	250,3	338.8	272.2	320.4	394.4	470.3	588.6	660.4	817.5	890.0	890.0
Paper, paste- and bristol-board	157.1	299.1	342.8	438.7	559.7	672.7	812.6	1,080.2	1,287.9	1,597.6	1,657.1	1,766.8
Paper sacks and envelopes	166.2	322.2	345.4	371.9	443.6	582.0	688.5	909.1	1,010.9	1,164.0	1,243.6	1,252.0

Source: INEC

Stadler Hunter
ENGINEERS • CONSULTANTS

UNIDO

REFERENCE NO.	INDEX NO	SERIAL NO
R-193A	07	3101

DATE: July 20, 1972

PAGE AX/.6

TABLE 22-AX

DEFLATED CONSTANT PRICES INDEX - BASIS 1960 = 100

Year	Paper and Paperboard Total	Boxes and Other Bristol-Board Packings	Cellulose and Other Wood Pulps	Paperboard and Bristol-Board	Paper Sacks and Envelopes
1958	0.61	0.70	0.58	0.59	0.62
1959	0.96	1.00	0.81	0.96	1.03
1960	1	1	1	1	1
1961	1.12	1.32	0.73	1.16	0.98
1962	1.124	1.53	0.67	1.16	0.91
1963	1.07	1.31	0.66	1.11	0.90
1964	1.02	1.23	0.62	1.06	0.89
1965	1.05	1.35	0.60	1.08	0.90
1966	1.06	1.41	0.56	1.08	0.84
1967	1.03	1.37	0.56	1.07	0.78
1968	0.99	1.33	0.55	1.02	0.76
1969	1.02	1.46	0.53	1.03	0.73

Source: DNEI on the basis of INEC data

AX. [illegible]

(i) [illegible] and Writing

TABLE 23-AX APPARENT CONSUMPTION (METRIC TONS)	
Year	Tons
1960	66,607
1961	95,029
1962	86,359
1963	78,125
1964	93,072
1965	110,899
1966	125,385
1967	98,960
1968	105,387
1969	104,238
1970	123,806

Source: INDEC

TABLE 24-AX APPARENT CONSUMPTION ADJUSTED BY PROMEDIOS MOVILES (METRIC TONS)	
Years	Tons
1960/64	83,840
1961/65	92,790
1962/66	98,770
1963/67	101,290
1964/68	106,740
1965/69	108,980
1966/70	111,550

Source: Own preparation on data from INDEC

TABLE 25-AX

PER CAPITA ANNUAL CONSUMPTION - KG (*)

Years	Consumption
1960/64	3.96
1961/65	4.32
1962/66	4.54
1963/67	4.62
1964/68	4.79
1965/69	4.83
1966/70	4.90

Source: Own preparation

(*) Relation apparent consumption and population promedios móviles.

There are no detailed statistics to give exact figures of consumption distribution, but according to per capita consumption and taking into account the main urban centers, we could establish the following relation:

- Federal Capital and Great Buenos Aires
- Córdoba
- Rosario
- Santa Fe
- Bahía Blanca - Mendoza - Mar del Plata
- Resistencia - Corrientes - Tucumán

TABLE 26-AX

ARGENTINE PRODUCTION (*) (Thousands of Tons)

Year	Printing	Writing	Total
1964	71.42	13.04	84.46
1965	79.81	25.47	105.28
1966	94.18	16.93	111.11
1967	58.17	33.85	92.03
1968			102.60
1969	50.03	74.13	114.16

Source: BIRA 1964/69

(*) Above figures agree approx. with those of APPARENT CONSUMPTION table. They appear here discriminated.

FORM 8

Stadler Hunter
ENGINEERS • CONSULTANTS

R-19-A/27/4101 - Page AX/1

TABLE 27-AX

PRODUCTION

Year	Tons
1960	61,635
1961	77,178
1962	76,190
1963	69,371
1964	83,513
1965	101,376
1966	111,327
1967	93,887
1968	104,511
1969	108,633
1970	122,628

Source: INDEC

Stadler Hurter
ENGINEERS • CONSULTANTS

DATE July 20, 1972

UNIDO

REFERENCE NO R-19[illegible]A | INDEX NO 07 | SERIAL NO [illegible]101

PAGE AX/31

TABLE 28-AX

INSTALLED CAPACITY OF PRODUCTION (1970) (Tons)

Firm	Installed Capacity	Writing	Printing	Parchment Type	Vegetable Parchment	Total
Celulosa Argentina S.A.						
Planta Andino - Sta. Fe.	10,000	411	971	1,223	-	2,605
Planta Zárate - Bs.As.	62,300	-	36,016	-	-	36,016
Planta C. Bermúdez-- Sta. Fe	49,500	4,346	38,753	-	-	43,099
Papelera San Isidro S.A.						
Planta Beccar - Bs.As.	3,250	15	15	-	-	30
Papelera San Justo S.A.						
San Justo - Bs.As.	4,500	6	854	415	-	1,[illegible]75
Papelera Mitre S.A.I.C.						
San Martín - Bs.As.	5,000	-	3,639	-	-	3,639
Denti S.A. - Capital	14,000	3,167	1,434	-	-	4,601
Industrias Argentinas						
Del Papel S.A.						
Planta - Córdoba	13,800	-	1,488	-	-	1,[illegible]88
Ledesma S.A.						
Planta - Jujuy	30,000	-	30,000	-	-	30,000
Papelera Pedotti S.A.						
Campana - Bs.As.	13,560	-	45	168	17	[illegible]30
Beccar - Bs.As.	15,120	30	764	1,388	-	2,182
Witcel - S.A.I.C.						
Zárate - Bs.As.	17,000	2,035	5,454	-	1,573	9,062
Total	236,030	10,010	119,433	3,194	1,59[illegible]	134,[illegible]

Source: Own preparation

Prices for printing and writing papers [illegible] are as follows:

Cap. Bermúdez Plant

- "Papel Obra" 27 g/cm^2 $a 2.60 kg
- "Papel Obra" 72.82 g/cm^2 $a 2.40 kg

Zárate Plant

- "Papel Obra" 57 g/cm^2 $a 2.52 kg
- "Papel Obra" 72.82 and 94 g/cm^2 $a 2.29 kg

Coloured Commercial Paper

- 57.70 g/cm^2 $a 2.66 kg

TABLE 29-AX

COMPARISON OF NATIONAL AND INTERNATIONAL MARKET PRICES
(US$/TON - 1970)

Paper	National Price	International Price	Ratio
Printing (more than 70 g/cm^2)	371	176.5	2.10

Source: SEICI

TABLE 30-AX

TOTAL IMPORTS

Year	Type of Paper	Tons	US$
1966	Printing with water lines	6,416	1,909,297
1967		3,255	1,076,990
1968		3,020	942,526
1969		2,713	918,491
1970		3,572	1,193,815
1966	Security paper for bank notes	204	449,778
1967		223	443,229
1968		256	560,454
1969		211	435,865
1970		312	645,169
1966	Illustration paper with water	7,411	2,326,900
1967	lines for printing	1,232	400,941
1968		29	18,582
1969		33	19,415
1970		207	61,870
1966	Bible paper with water lines	21	11,067
1967	for printing	47	26,010
1968		27	15,853
1969		7	6,772
1970		34	21,823
1966	Other papers	14	10,232
1967		31	12,884
1968		43	21,704
1969		8	3,728
1970		72	24,707

FORM 4

Stadler Hunter ENGINEERS & CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO.	SERIAL NO.
DATE July 20, 1972		R-193A	07	3101

TABLE 31-AX

PRINTING AND WRITING EXPORTS (TONS & US$)

Year		Bolivia		Colombia		Chile		Ecusdor		U.S.A.		Paraguay		Peru		Uruguay		Venezuela		Totals	
		T	US$	T	US$	T	US$	T	US$	T	US$	T	US$	T	US$	T	US$	T	US$	T	US$
1966	I																				
	E															9	6156			9	6156
1967	I											10	2854							10	2854
	E											1	823			4	2904			5	3727
1968	I					44	14232	66	14510	367	45866	114	28402	27	5200	6	2051			624	110261
	E	2	963			430	154971	555	125732	661	98808	201	48928	7	1585	12	6111	5	2638	1873	439736
1969	I	220	40062					505	106231			51	12429			14	4839			790	163562
	E			73	14908			933	204991	5085	695851	466	120174	1	418	5	2752	20	11013	6583	1050107
1970	I	450	90413			149	30766					341	94704							940	215883
	E	6	2950			1643	337350					355	93636	10	4882	75	35239	17	8492	2106	482549

Source: DNEI on the basis of INDEC information

FORM 9

Stadler Hurter
ENGINEERS • CONSULTANTS

DATE
July 20, 1[illegible]

[illegible]

[illegible]-AX

REFERENCE NO R-[illegible]A | INDEX NO [illegible] | SERIAL NO [illegible]

PAGE AN/[illegible]

[illegible] WITH ARGENTINA
([illegible]S)

Country		1960	1961	1962	1963	1964	1965	1966
Bolivia	P	(*)	-	-	-	-	-	(*)
	I	(*)	3,059	1,691	1,495	2,762	1,047	(*)
	E	(*)	-	-	-	-	-	(*)
	CA	(*)	3,059	1,691	1,495	2,762	1,047	(*)
Brazil	P	101,485	106,770	135,871	145,498	150,791	150,791	169,618
	I	20,013	13,605	8,468	9,736	7,948	7,948	7,702
	E	-	-	10	10	-	-	95
	CA	121,498	120,375	144,329	155,224	158,739	158,739	177,225
Colombia	P	-	4,000	16,351	22,441	19,870	(*)	(*)
	I	26,301	26,110	7,559	3,741	2,757	(*)	(*)
	E		-	-	-	-	(*)	(*)
	CA	26,301	30,110	23,910	26,182	22,627	(*)	(*)
Chile	P	10,700	10,430	13,100	12,670	15,230	28,300	38,460
	I	366	472	313	992	952	1,158	2,162
	E	-	-	-	-	-	-	-
	CA	11,066	10,902	13,413	13,662	16,182	29,458	40,622
Ecuador	P	(*)	(*)	(*)	(*)	(*)	(*)	(*)
	I	(*)	(*)	(*)	(*)	(*)	(*)	(*)
	E	(*)	(*)	(*)	(*)	(*)	(*)	(*)
	CA	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Mexico	P	67,007	75,355	78,303	80,837	92,160	105,791	108,840
	I	7,439	750	136	301	1,062	7,689	2,128
	E	-	-	-	-	-	-	-
	CA	74,446	76,105	78,439	81,138	93,222	113,480	110,968
Paraguay	P	-	-	-	-	-	-	(*)
	I	276	394	364	427	431	638	(*)
	E	-	-	-	-	-	-	(*)
	CA	276	394	364	427	431	638	(*)
Peru	P	4,621	2,958	3,854	6,894	6,143	(no figura)	(*)
	I	-	-	-	-	-	4,052	(*)
	E	-	-	-	-	-	-	(*)
	CA	4,621	2,958	3,854	6,894	6,143	4,052	(*)
Uruguay	P	9,299	5,243	3,598	5,148	7,335	8,729	7,169
	I	-	112	541	372	33	53	-
	E	-	-	-	-	-	-	-
	CA	9,299	5,355	4,139	5,520	7,368	8,782	7,169
Venezuela	P	147	377	973	939	2,381	2,508	16,121
	I	-	25,080	19,600	14,203	13,848	15,602	-
	E	-	-	-	-	-	-	-
	CA	147	25,457	20,573	15,142	16,229	18,110	16,121

Source: PAPER AND CELLULOSE INDUSTRY IN LAFTA - June 1969

(*) No information available

(b) Existing

TABLE 33-AX

APPARENT CONSUMPTION (TONS)

Year	Consumption
1960	8,774
1961	14,435
1962	18,211
1963	13,778
1964	17,329
1965	23,070
1966	18,798
1967	22,185
1968	24,551
1969	31,317
1970	33,083

Source: INDEC

TABLE 34-AX

APPARENT CONSUMPTION ADJUSTED BY PROMEDIOS MOVILES

Years	Tons
1960/64	14510
1961/65	17360
1962/66	18240
1963/67	19030
1964/68	21190
1965/69	23980
1966/70	25990

Source: Own preparation

The main consumption centers are Buenos Aires, Cordoba Rosario, Mendoza, and Bahia Blanca.

TABLE [illegible]-AX

P R O D U C T I O N (TONS)

Year	Tons
1960	8,774
1961	12,399
1962	17,995
1963	13,778
1964	17,327
1965	23,068
1966	18,798
1967	22,185
1968	24,551
1969	31,317
1970	33,083

Source: INDEC

TABLE 36-AX

PRODUCTION ACCORDING TO PRODUCERS' DATA

Year	Tons
1964	19,816
1965	23,629
1966	19,723
1967	27,664
1968	25,500
1969	35,128

Source: BIRA

The following observations have been made concerning the above production figures:

(i) Installed capacities include other products, as shown in tables corresponding to these products.

(ii) PAPELERA RIO CORONDA SRL increased their installed capacity, from 1969 to 1970, from 650 to 850 T.

(iii) In CELULOSA JUJUY S.A. production, 1970, both Ciudadela plant and San Pedro plant are included (Total 7,878 T).

(iv) CELULOSA ARGENTINA Production for 1969 is 2,264 T.

Projected expansion programes for the various plants producing tissue are as follows:

(i) PAPELERA MOSCON

Location of plant: General Pacheco - B.A.

Production to be faced: 3,000 T/yr

Note: In advanced study

(ii) PAPELERA MORON

Location of Plant: Moron - B.A.

Production to be added: 2,600 T/yr

Note: In production

Thus, for tissue, unused capacity is approximately 2,000 tons and expansion projects amount to approx. 5,500 T.

Marketing specifications for various tissues are as follows:

- Toilet paper

It is furnished in different types of packings, in parcels or boxes from 2 to 96 units. Specifications per unit: Width: 108 mm.; Weight: 22/27 g/cm^2; Length: 34, 48 and 74 mt.

- Paper napkin and towelling

There are no official specifications, size and presentation vary according to manufacturers.

Prices for various tissues vary as follows:

- <u>Toilet paper</u>: Mill price unit 74 mt. $0.275/1.15 each

- [illegible]

- [illegible]: Mill price $ 0,2080

(.) [illegible]

TABLE 37-AX	
APPARENT CONSUMPTION EVOLUTION	
Year	Tons
1960	159,521
1961	230,374
1962	198,450
1963	196,737
1964	256,490
1965	320,871
1966	310,344
1967	232,639
1968	282,688
1969	413,883
1970	415,805

Source: INDEC

TABLE 38-AX

APPARENT CONSUMPTION BY TYPE OF FIBRE

Type of Fibre	1966	1967	1968	1969	1970
Mechanical Pulp	20,195	20,749	20,100	23,354	28,005
Short Fibre Chemical & Semi-Chemical Pulp	146,357	94,484	111,008	170,038	201,656
Subtotal Short Fibre	166,552	115,233	131,108	193,392	229,661
Long Fibre Chemical Pulp	143,793	117,406	151,580	220,491	186,144
Total	310,344	232,639	282,688	413,883	415,805

Source: INDEC

TABLE [illegible]-AX

CONSUMPTION BY TYPE OF PULP (TONS)

Type of Pulp	1966	1967	1968	1969
Mechanical Pulp	48,562	28,318	42,177	42,775
Chemical Cellulose Pulp	193,131	118,924	78,334	208,740
Semichemical Cellulose Pulp	28,291	23,148	34,977	36,142
Bagasse Pulp	29,261	24,728	30,729	40,354
Cellulose Pulp from Residues	21,023	17,730	38,234	6,423
Cellulose Pulp from Paper Trimmings	210,077	227,741	235,797	402,723
Total	530,345	440,589	460,248	737,157

Source: BIRA

TABLE 40-AX

BAGASSE PULPS CONSUMPTION (TONS)

Year	Bleached	Unbleached
1965	8,300	10,099
1966	20,358	8,903
1967	16,641	8,087
1968	23,338	7,391
1969	30,879	9,655

Source: BIRA

TABLE 41-AX

MECHANICAL PULP CONSUMPTION (TONS)

Year	Short Fibre	Long Fibre
1965	21,566	13,097
1966	32,461	16,101
1967	20,943	7,375
1968	21,685	20,492
1969	25,731	17,044

Source: BIRA

TABLE 42-AX

CELLULOSE CHEMICAL PULP CONSUMPTION (TONS)

Year	Short Fibre Bleached	Long Fibre Bleached	Short Fibre Unbleached	Long Fibre Unbleached
1965	39,400	50,853	6,956	38,358
1966	36,261	53,287	2,704	100,879
1967	22,010	35,025	6,400	75,489
1968	8,083	47,529	2,750	19,972
1969	37,277	123,539	3,840	44,084

Source: BIRA

TABLE 43-AX

CELLULOSE SEMICHEMICAL PULP CONSUMPTION (TONS)

Year	Bleached	Unbleached
1965	819	23,663
1966	7,270	21,021
1967	6,577	16,571
1968	26,941	8,036
1969 (no discrimination given)		

Source: BIRA

[illegible] ... [illegible] market. Remaining 10% consists of some special [illegible], which are imported. In view of the projection of the [illegible], the unused installed capacity and existing projects according to SIRA estimations, we do not feel there is any possibility of considering this production for the new mill, unless the production costs are much lower than those of pulps from other raw materials.

TABLE 44-AX

EVOLUTION OF PRODUCTION

Year	Tons	Year	Tons
1960	73,300	1965	158,694
1961	82,200	1966	154,694
1962	87,442	1967	115,332
1963	99,289	1968	125,000
1964	107,369	1969	256,324
		1970	327,500

Source: INDEC

TABLE 45-AX

PRODUCTION BY TYPE OF FIBRE

Type	1966	1967	1968	1969	1970
Mechanical Pulp	19,976	20,587	20,000	23,334	27,946
Short Fibre Chemical & Semi-chemical Pulp	118,893	73,805	85,000	141,298	177,835
Subtotal Short Fibre	138,869	94,392	105,000	164,632	205,781
Long Fibre Chemical Pulp	15,400	20,940	20,000	91,692	121,719
Total	154,269	115,332	125,000	256,324	327,500

Source: INDEC

TABLE 46-AX PULP IMPORTS	
Year	**Tons**
1960	86,221
1961	141,174
1962	103,848
1963	97,448
1964	149,121
1965	170,177
1966	156,055
1967	117,307
1968	157,688
1969	157,599
1970	88,305
Source: INDEC	

TABLE 47-AX

IMPORTS FROM LAFTA COUNTRIES (TONS)

Type of Pulp	1966	1967	1968	1969	1970
Short fibre unbleached pulp from wood	-	-	-	-	-
Long fibre unbleached pulp from wood	5,891	2,167	4,378	6	7,993
Short fibre bleached pulp from wood	94	-	100	-	-
Long fibre bleached pulp from wood	1,066	358	100	-	575
Bleached chemical pulp from other fibres	-	-	-	38	288
Unbleached chemical pulp from other fibres	-	-	-	-	59
Sulphate cellulose	60,525	41,087	71,153	67,958	80,716
Sulphite cellulose	8,859	4,229	3,123	7,472	7,256
Unbleached semi-chemical from wood	-	-	-	-	70
Bleached semi-chemical from wood	-	-	-	-	-
Paper and cardboard trimmings	-	-	398	56	36
T o t a l	76,435	47,841	79,252	75,530	96,993

Source: A. F. P.

FORM 3

Stadler Hurter
ENGINEERS • CONSULTANTS

DATE

UNIDO

REFERENCE NO | INDEX NO | SERIAL NO

PAGE

TABLE 48-AX

IMPORTS FROM COUNTRIES OUTSIDE LAFTA ZONE (TONS)

Type of Pulp	1966	1967	1968	1969	1970
Short fibre unbleached pulp from wood	125	161	-	-	-
Long fibre unbleached pulp from wood	8,693	5,556	2,588	770	498
Long fibre bleached pulp from wood	887	460	381	199	103
Short fibre bleached pulp from wood	-	-	-	-	-
Bleached chemical pulp from other fibres	-	-	-	-	180
Unbleached chemical pulp from other fibres	-	-	-	-	-
Sulphate cellulose	55,931	47,548	54,731	26,397	51,228
Sulphite cellulose	19,555	12,272	15,309	21,412	17,284
Unbleached semi-chemical from wood	-	-	-	25	-
Bleached semi-chemical from wood	-	51	359	99	-
Paper and cardboard trimmings	448	1,634	167	-	143
Total	85,639	67,682	73,535	48,902	69,436

Source: A. F. P.

TABLE 49-AX			
APPARENT CONSUMPTION (TONS)			
Year	Wrapper	Other uses incl. Sacks	T o t a l
1960	22,745	30,399	53,114
1961	25,418	54,441	79,859
1962	25,518	42,051	67,569
1963	22,399	43,222	65,621
1964	23,342	55,888	79,230
1965	26,207	79,833	106,040
1966	31,718	83,961	115,679
1967	25,110	75,564	100,674
1968	25,208	91,337	116,545
1969	24,692	105,935	130,627
1970	26,470	113,967	140,437

Source: INDEC

TABLE 50-AX	
APPARENT CONSUMPTION ADJUSTED BY PROMEDIOS MOVILES	
Years	Tons
1960/64	68880
1961/65	79460
1962/66	86830
1963/67	93440
1964/68	103420
1965/69	113690
1966/70	120570

Source: Own preparation on data from INDEC

TABLE 51-AX

PER CAPITA ANNUAL CONSUMPTION

Years	Consumption (kg)
1960/64	3.25
1961/65	3.71
1962/66	3.99
1963/67	4.26
1964/68	4.64
1965/69	5.06
1966/70	5.30

Source: Own preparation

It is natural to suppose that the main consumption centers are the principal cities such as Buenos Aires, Córdoba, Mendoza, Santa Fe, Rosario, Tucumán, Bahía Blanca, Mar del Plata, valle del Río Negro - Neuquén.

TABLE 52-AX

KRAFT PRODUCTION (TONS)

Year	Wrapper	Kraft Incl. Sacks	Total
1964	82,446	1,166	83,612
1965	59,490	52,752	112,242
1966	61,364	51,063	112,427
1967	51,808	41,206	93,014
1968	29,730	57,500	87,230
1969	52,242	62,770	115,012

Source: B.N.D.

TABLE 53-AX

PRODUCTION OF SACK AND WRAPPER (TONS)

Year.	Wrapper	Paper for other uses including Sacks	Total
1960	21,247	30,399	51,646
1961	23,890	54,441	78,331
1962	25,228	42,051	67,279
1963	21,651	43,222	64,873
1964	23,167	55,888	79,055
1965	26,093	79,833	105,926
1966	31,719	83,801	115,520
1967	25,115	75,397	100,512
1968	25,209	90,989	116,198
1969	24,693	103,013	127,706
1970	26,472	110,873	137,343

Source: INDEC

TABLE 54-AX	
INSTALLED CAPACITY EXPANSION	
Company	Projected Expansion
SEIN S.A. Bs. Aires	10,000 T/yr (*)
PAPELERA BERAZATEGUI	10,000 T/yr (**)
CELULOSA MOLDEADA S.A.	6,000 T/yr (***)
PAPELERA MISIONES S.A.	35,000 T/yr (****)

Source: BIRA BND 1970/71

(*) Paper for wrapping. In operation since '70
(**) Wrapper. In operation
(***) Wrapper. Being installed
(****) Kraft papers. This project is delayed, but feasible to be carried out. It is estimated that it will start in 1973 and that 50% of production will be for kraft

All but insignificant amounts of the sacks produced are used in the sugar industry. The types used including sizes and weights are as follows:

- **Paper**	3,393,540	units	of	1	kg(s)
	624,420	units	of	5	kg(s)
	70,522	units	of	10	kg(s)
	86,709	units	of	20	kg(s)
	76,811	units	of	24	kg(s)
	50,000	units	of	25	kg(s)
	289,013	units	of	30	kg(s)
	1,850	units	of	40	kg(s)
	15,619,949	units	of	50	kg(s)
- **Jute**	2,210	units	of	60	kg(s)
	30,282	units	of	65	kg(s)
	7,121	units	of	68	kg(s)
	1,431,070	units	of	70	kg(s)
- **Cotton**	42,000	units	of	50	kg(s)
- **Polyester**	30,539	units	of	70	kg(s)

Source: Argentine Sugar Center 1970

50-kg Sacks

Net weight per unit	450 gr	common sugar
	540 gr	sugar for refinery
	470 gr	granular sugar

Paper sack weight varies according to the type of sugar, and it is due to the type of paper used.

- Domestic Trade: All sugar is commercialized in paper sacks, that of 450 gr. being the most common
- Foreign Trade: Jute sacks are used, as required by importers. They can be first or second hand, or have several uses. There is a trend to replace jute sacks by paper, dut to the following reasons:

(1) Jute sack requires return, (2) thus, it represents higher costs, (3) paper sacks have a lower manufacturing cost.

Price for 50-kg Sugar Sack

Price was between 0.940 and 1.276 in 1971.

Price for 50-kg Jute Sugar Sack

During 1971 price was $2.70, varying with dollar quotations. Only Cruz Alta (Córdoba) sugarmill use this type of sack. (C.A.A.)

Selling prices for sack and wrapper in the various forms in which it is used are as follows:

Kraft for cement type sack - 500 units	2.66 to 2.95 $/kg
Kraft for cement type sack - per roll	2.60
Kraft for wrapper	1.60
Bleached kraft for wrapper	2.10
Extra kraft for wrapper	1.95
Wrapper in rolls	2.10
Semipure kraft for sacks	2.20

Source: Own investigation Nov. 1971

TABLE 55-AX

IMPORTS (TONS)

Year	Wrapper	Other Uses	T o t a l
1960	1,498	-	1,498
1961	1,530	-	1,530
1962	300	-	300
1963	749	-	749
1964	190	-	190
1965	116	-	116
1966	-	160	160
1967	-	167	167
1968	-	348	348
1969	-	2,936	2,936
1970	-	3,095	3,095

Source: INDEC

FORM 8

There is no information on exports for kraft sacks or paper so therefore no information is included in this appendix.

TABLE 56-AX

WRAPPER EXPORTS (TONS)

	1967		1968		1969		1970	
	Ton	US$	Ton	US$	Ton	US$	Ton	US$
Bolivia	0.120	28	0.364	146	0.288	149	0.180	77
Paraguay	5.166	980	0.460	289	0.795	393	2.037	1,471
Italy	-	-	-	-	0.312	62	-	-
	5.286	1.008	0.824	435	1.395	604	2.217	1,548

TABLE 57-AX

TOTAL EXPORTS (TONS)

Year	Wrapper	Other Uses	Total
1960	2	-	2
1961	10	-	10
1962	1	-	1
1963	15	-	15
1964	2	-	2
1965	1	-	1
1966	5	-	5
1967	1	-	1
1968	1	-	1
1969	2	14	16
1970	-	1	1

Source: INDEC

TABLE 58-AX

LAFTA APPARENT CONSUMPTION (TONS)

Country	1962	1963	1964	1965	1966
Bolivia	311	276	428	321	-
Brazil	189,568	241,790	246,565	233,783	271,509
Colombia	32,689	35,039	30,450	-	-
Chile	25,708	27,608	29,095	26,880	29,214
Ecuador	7,194	26,194	73,141	121,076	-
Mexico	95,201	106,582	116,659	177,983	152,452
Paraguay	879	755	882	1,104	-
Peru	25,874	25,542	28,700	-	-
Uruguay	6,415	7,094	9,525	8,744	11,190
Venezuela	23,428	23,787	27,476	28,782	49,627

Source: Paper and Cellulose Industry in LAFTA

TABLE 59-AX

LAFTA PRODUCTION (TONS)

Country	1962	1963	1964	1965	1966
Brazil	188,765	241,004	246,208	232,932	271,000
Colombia	30,741	32,503	29,812	-	-
Chile	25,688	27,534	29,069	26,800	29,120
Mexico	95,205	106,559	116,572	141,635	152,261
Peru	24,590	24,374	26,931	-	-
Uruguay	6,413	7,093	9,524	9,641	11,188
Venezuela	22,378	23,112	26,492	28,214	49,627

Source: Paper and Cellulose Industry in LAFTA

TABLE 60-AX

LAFTA IMPORTS (TONS)

Country	1962	1963	1964	1965	1966
Bolivia	311	27	428	325	-
Brazil	412	804	425	858	521
Colombia	1,942	2,559	678	-	-
Chile	110	74	86	119,710	94
Ecuador	7,194	26,194	73,141	1,603	-
Mexico	-	25	92	7,689	260
Paraguay	879	755	882	1,104	-
Peru	1,284	1,168	1,769	532	-
Uruguay	2	1	1	3	2
Venezuela	1,050	675	984	568	-

Source: Paper and Cellulose Industry in LAFTA

TABLE 61-AX

LAFTA EXPORTS (TONS)

Country	1962	1963	1964	1965	1966
Brazil	26	18	68	7	12
Colombia	-	50	40	-	-
Mexico	4	2	5	-	69

Source: Paper and Cellulose Industry in LAFTA

(c) [illegible]

TABLE 62-AX HISTORICAL APPARENT CONSUMPTION (TONS)	
Year	**Tons**
1963	-
1964	71,141
1965	55,520
1966	84,440
1967	107,480
1968	129,210
1969	141,600
1970	134,340

Source: INDEC

TABLE 63-AX APPARENT CONSUMPTION ADJUSTED BY PROMEDIOS MOVILES (TONS)	
Years	**Tons**
1964/68	89,610
1965/69	103,650
1966/70	119,410

Source: Own preparation on data from INDEC

TABLE 64-AX PER CAPITA ANNUAL APPARENT CONSUMPTION (*)	
Years	**Consumption (kg)**
1964/68	4.03
1965/69	4.60
1966/70	5.25

Source: Own preparation

(*) Relation approximate consumption and population promedios móviles - kg.

TABLE 65-AX

LINERBOARD PRODUCTION (TONS)

Year	I Class	II Class	Total
1964	19,787	20,800	40,587
1965	5,986	21,550	27,536
1966	18,576	22,066	40,642
1967	16,590	34,929	51,519
1968	11,211	47,445	58,656
1969	14,184	40,481	54,665
1970	33,098	36,237	69,335

Source: BIRA

TABLE 66-AX

CORRUGATING MEDIUM PRODUCTION (TONS)

Year	I Class	II Class	Total
1964	2,770	28,053	30,823
1965	2,645	25,337	27,982
1966	15,995	27,801	43,096
1967	29,095	30,867	59,962
1968	15,412	55,142	70,554
1969	22,084	64,854	86,938
1970	45,016	20,000 *	65,000 *

Source: BIRA

(*) Estimated

TABLE 67-AX

PRODUCTION OF LINERBOARD AND CORRUGATING MEDIUM (TONS)

Year	Linerboard	Corrugating Medium	Total
1964	30,823	40,587	71,410
1965	27,982	27,536	55,518
1966	43,796	40,642	84,438
1967	59,962	51,519	111,481
1968	70,554	58,656	129,210
1969	86,938	54,665	135,603
1970*	65,000	69,335	134,335

Source: BIRA

(*) Estimated

The Provincial Government in Jujuy stated that expansion projects in their area included that of Celulosa Jujuy S.A. who plan to increase production by 6,000 tons per year in 1970, 15,000 tons per year in 1971, 30,000 tons per year in 1972 with 45,000 tons per year in 1975.

According to BIRA, Schcolnik S.A. project a corrugating medium production of 30,000 T/yr. The project is presently being studied by the authorities. Zucamor S.A. is implementing an expansion of 12,000 T/yr, and Celulosa Bell Ville is planning opening their inactive plant, with a 6,000 T/yr. production. According to the same source, Papelera Misiones S.A. are planning a 35,000 T/yr kraft corrugating medium production, which is estimated to start-up in 1973.

The following companies produce corrugating medium using

bagasse as raw material:

- CELULOSA ARGENTINA S.A. 9Tucumán); they use:
  - 32 T bagasse pulp from bleached cane
  - 1,449 T bagasse pulp from unbleached cane

  These pulps are prepared in the plant, using 5,481,441 kg of bagasse (1970 data)
- CIA. AZUCARERA DEL NORTE S.A. (Leales Sugarmill); they use:
  - 1,884 tons of bagasse pulp from unbleached cane (1969) and 2,746 T of bagasse pulp from unbleached cane (1970)

  This pulp is prepared in their plant, using 10,812,000 kg of bagasse in 1969 and 13,731,200 kg in 1970 (50% moisture)
- CIA. PAPELERA DEL NORTE DE SANTA FE; they use:
  - 6,572 tons of bagasse pulp from unbleached cane, 1969 and 3,017 T in 1970

  They prepare this pulp in their plant, using 8,116,000 kg of bagasse (1969) and 3,453,109 kg in 1970.

Linerboard and corrugating medium production is used almost completely for corrugated boxes manufacture. Consumption reached about 250,000,000 units in 1968 (approx. 22,000,000 boxes per month).

In 1969 production increased to 24,760,000 boxes approximately, and in 1970 about 26,400,000 boxes. Main manufacturers are those who also produce linerboard and corrugating medium (Schcolnik, Zucamor, Celulosa Argentina,

etc.). There are no imports. High import duties prevent use of imported boxes, and no change is foreseen in this policy.

The average weight per box is 450/500 grams. Wood box price is $a3.70 and corrugated boxes for export are about $a3.60.

It is practically impossible to obtain prices since most packing manufacturers produce linerboard and corrugating medium and are not willing to furnish data.

With respect to those selling their products, they vary technical characteristics according to purchase orders. Marketing policies fix prices (sometimes they are lower than costs, due to industrial or management policies).

As guiding information, the following were average selling prices during the last months of 1971:

- Corrugating Medium	Grey paper	$a 0.87 to 0.93	/kg
	from bagasse	$ 0.90	/kg
	from corn	$ 0.965	/kg
- Linerboard	Third class	$ 0.95	/kg
	Second class	$ 1.55	/kg
	First class	$ 2.00	/kg

There are practically no exports and imports to or from LAFTA countries. Figures mentioned under linerboard divided by 2 - give approximate total exports of Peru. The same could be said of installed capacity, unused capacity and projects. In all cases, half of the given amounts give an approximate idea of the

corrugating medium situation. Thus, production figures are equivalent to consumption for both products.

With respect to corrugating medium, imports in 1970 were 7.5 tons from Venezuela and 60.7 tons from Mexico.

Peru exported 49 tons in 1960, 18 tons in 1961, 166 tons in 1963, amounting to 20,000 dollars. There are no more exports up to 1966 (last data available).

In all LAFTA countries there are unused capacities of production. Chile which increased their production threefold in 5 years to 14,000 tons in 1967 had an installed capacity of 16,000 tons at that time. There are no expansion projects (up to 1970).

In 1967, Brazil - second producer - had an unused capacity of about 20,000 tons. But there are new plans under study and/or implementation to increase installed capacity to about 160,000 T/yr in 1975.

In 1966, Mexico - first producer - had an unused capacity of about 67,000 T. But there are projects to increase total installed capacity to 211,000 tons in 1970.

Paraguay, where no linerboard is produced, has an installed capacity of 1,700 tons. In Peru there was an unused capacity of about 13,000 tons in 1964, the year latest figures were available. And up to 1970 foreseen growth is about 800 T. In 1966 Uruguay had an unused capacity of 1,300 T. There are no expansion plans - up to 1970. Venezuela had in 1966, an unused

capacity of 12,000 T. Increase for 1970, however, does not reach 1,000 T.

Source: LAFTA

TABLE 68-AX

PRODUCTION IN LAFTA COUNTRIES (TONS)

Country	1962	1963	1964	1965	1966
Brazil	60,252	46,282	60,230	48,058	64,199
Colombia	17,733	13,933	21,936	s/d	s/d
Chile	6,922	8,190	9,728	10,500	12,134
Mexico	85,962	94,012	101,048	110,565	124,163
Peru	10,600	12,533	14,366	s/d	s/d
Uruguay	1,331	1,099	1,724	2,107	1,748
Venezuela	12,724	10,274	14,574	16,565	17,448

Source: LAFTA

(f) Particle Board

According to evolution of consumption and expansion projects already approved, there seems to be no possibility to replace wood particle boards, unless manufacturing costs are much lower.

With respect to use of particle boards for framings - according to information from Argentine Construction Board - replacing white South American pine imported from Brazil was not considered feasible by any of the studies carried out, due to technical and pricing reasons.

TABLE 69-AX APPARENT CONSUMPTION (m^3)	
Year	Consumption
1967	64,723
1968	92,924
1969	108,072
1970	115,294
Source: S. N. P.	

TABLE 70-AX PRODUCTION (m^3)	
Year	Production
1960	6,000
1961	7,400
1962	12,700
1963	25,365
1964	38,700
1965	45,800
1966	55,450
1967	63,800
1968	90,926
1969	105,422
1970	113,200

TABLE 71-AX PROJECTION OF APPARENT CONSUMPTION (m^3)	
Year	Consumption
1972	117,000
1973	130,000
1974	147,400
1975	175,000
Source: S.H.F.	

TABLE 72-AX	
ESTIMATION OF PERCENTAGES OF PROJECTED DEMAND	
Type	%
Particle Board	70
Hardboard	17
Plywood	13
Source: S.N.P.	

Prices for Particle Board have been determined on information received from BIRA and companies as follows:

December 1966	$ 10.60 /m^2
December 1967	$ 8.72
December 1968	$ 9,72
November 1970	$ 16.40

Import and export item (48.09.00.00.00) includes also construction sheets, paper pulps, defibred wood, etc.

Origin is uniform. First importer is Brazil, and then the United States and Finland.

TABLE 73-AX		
IMPORTS		
Year	Quantity (m^3)	Value US$
1967	1,290	155,446
1968	2,015	270,444
1969	2,658	395,854
1970	2,181	-
Source: INDEC - Univ.Nac.Tucumán		

Exports have been to Bolivia, Brazil and Paraguay.

TABLE 74-AX

EXPORTS

Year	Cu. Meters	US$
1967	36.7	3,998
1968	17.0	4,189
1969	8.0	2,382
1970	87.0	

Source: INDEC - Univ.Nac.Tucumán

(g) Hardboard

There is only one mill in the country, which manufsctures this product (FIPLASTO SACI), locsted st Ramallo, B.A., in 1949. They used, as raw material, "caña de Castilla", but due to the continuous increasses in costs, they decided to use eucslyptus wood from the Delts of the Paraná River.

According to the SNF, in reference to the hardboard market, s slow evolution of this mill is observed, with a significant recess in 1964. Up to 1965, the production was absorbed by the domestic market. Since 1965, there has been difficulties to plsce the product in the country, due to the strong competition of particle-board. This fact provokes exports.

And, on the other hand, there is an intent of diversifying the uses of hardboard opening new possibilities: drilled boards; use of phenolic resins to increase

impermeability and facilitate their use outdoors; different finishing of surfaces, leather imitation, etc.

The low consumption of insulating boards, and the fact that imported products are strongly placed in the market, and at the beginning of a very important competition of plastic products, show that, on one side, the development of a national industry has been impossible and, on the other hand, it is not economically feasible to install another mill for these products.

No substantial increase of hardboard consumption is foreseen, according to the historical projection of consumption and a still greater reduction in the next years due to other factors (increase of particle board, introduction of new products in the market). If we add to all this, the expansion of FIPLASTO plant, it is clear that the installation of a new hardboard mill is impossible.

There are no imports.

During a long time, there were only sporadic exports, having no importance, to Bolivia, Peru and Paraguay. After FIPLASTO expansion, and after some previous market studies, it is expected to export to USA and ports of the Atlantic Ocean.

BX. MATERIAL INFORMATION

BX.1 Bagasse

TABLE 1-BX

PERCENTAGE COMPOSITION OF BAGASSE *

Sugar Mills	% Moisture	% Solid Solubles	% Fibre
Concepcion	52.2	4.6	43.1
Cruz Alta	49.2	5.7	45.1
La Florida	49.8	5.5	47.7
San Juan	51.2	4.1	44.6
Dpto. Cruz Alta	51.6	4.8	43.8
La Corona	49.5	3.8	47.1
La Trinidad	50.1	4.6	45.3
Dpto. Chicligasta	49.7	4.0	46.5
Bella Vista	51.0	5.6	43.4
La Fronterita	51.0	4.5	44.5
San Pablo	50.2	4.6	45.4
Dpto. Famaillá	50.7	4.8	44.6
Leales	50.7	4.3	44.9
La Providencia	50.5	4.2	45.3
Ñuñorco	49.1	4.9	46.0
Santa Rosa	48.7	3.8	47.6
Dpto. de Monteros	49.6	4.3	46.0
Aguilares	49.2	5.2	43.9
Marapa	48.8	6.0	43.6
Sta. Barbara	50.5	4.7	44.8
Dpto. Rio Chico	50.6	5.1	44.2

(*) Average of 1966/70 for Tucumán

Source: Direccion Nacional de Azúcar

Stadler Hunter ENGINEERS • CONSULTANTS	UNIDO	REFERENCE NO.	INDEX NO.	SERIAL NO.
DATE July 20, 1972		R-193A	07	3101

TABLE 2-BX

SUBSTITUTION OF BAGASSE (*)

Sugar Mills	Bagasse (**)	Megacalories Produced	Equivalent in M^3 of Natural Gas
Concepcion	248.3	454,637,300	47,856,557
Cruz Alta	53.4	97,226,100	10,234,326
La Florida	56.5	103,451,500	10,889,631
San Juan	70.5	129,085,500	13,587,947
Dpt. Cruz Alta	428.8	785,132,800	82,645,557
La Corona	119.5	218,804,500	23,032,052
La Trinidad	76.1	139,339,100	14,667,273
Dpt. Chicligasta	195.6	358,143,600	37,699,326
Bella Vista	102.4	187,494,400	19,736,252
La Fronterita	117.0	214,227,000	22,550,210
San Pablo	129,9	237,846,900	25,036,515
Dpt. Famailla	349.3	639,568,300	67,322,978
Leales	68.7	125,789,700	13,241,021
La Providencia	105.1	192,438,100	20,256,642
Ñuñorco	71.1	130,184,100	13,703,589
Santa Rosa	65.8	120,479,800	12,682,084
Dpt. Monteros	242.0	443,102,000	46,642,315
Aguilares	56.4	103,268,400	10,870,357
Marapa	44.1	80,747,100	8,499,695
Sta. Barbara	77.3	141,536,300	14,898,557
Dpt. Rio Chico	177.8	325,551,800	34,268,610
Tucuman	1,462.0	2,676,922,000	281,781,260

(*) Equivalent in gas of burnt bagasse and megacalories generated.

(**) Thousands of tons - Bagasse considered is the average consumption 1961/70 for operating sugar mills

1 Ton Bagasse = 1,831 MCal.

AX.2 Chemicals

SALT (Sodium Chloride) (Tons)

Year	Production	Exports
1968	736,815	47,915
1969	470,361	62,369
1970	911,769	84,143

Availability in the country: abundant

Price: In bags from Buenos Aires on wagon, origin 37.50 ^{a}/Ton
La Pampa " " " 52.- "
Córdoba " " " 55.- "

Bulk Buenos Aires " " " 20.- "
La Pampa " " " 32.- "
Córdoba " " " 30.- "

Suppliers: Atanor S.A. - Cia Industrial Progreso

ALUMINUM SULPHATE (Tons)

Year	Production	Consumption
1968	77,034	77,034
1969	85,500	85,500
1970	91,140	91,140

Price: Solid 16/17% Al_2O_3 555 ^{a}/Ton (origin)
" 15% 450 " "

Producers: Alum S.R.L. - Duperial S.A. - La Fortaleza S.A. - La Metaloquimica S.A. - Meranol S.A. - Quimica Lanus SRL O.S.N.

Grade: Technical

Delivery: 40/50 kg bags (granulated or fine dust)
40/60 " " (flagstone)
Bulk: tank-trucks (liquid)

[illegible]ATE

Capacity of Production: 12,760 T/yr

Year	Production	Consumption
1968	6,366	6,366
1969	8,944	8,944
1970	9,335	9,335

Price: 400 $^{a}/Ton (anhidrous) at storehouse in B.A.

Producers: Cia Industrial Progreso S.A. - Rhodia Argentina S.A. - Ossur S.A. - Sulfargentina S.A.

Grade: Technical

Delivery: 50 kg bags - 0.250/ 1. - kg. bottles

CHLORINE

Capacity of Production: 88,000 T/yr

Year	Production	Exports	Consumption (*)
1968	56,900	500	43,000
1969	77,000	1,735	53,265
1970	83,300	1,811	62,289

(*) Difference between production and consumption corresponds to chlorine which is not used.

Price: 720 $^{a}/ton (origin)

Grade: Technical

Producers: Atanor S.A. - Celulosa Arg. S.A. - Cia Quimica S.A. - Dow Quimica S.A. - Ledesma S.A. - Papelera Pedotti S.A. - Viplastic S.A.

Delivery: 50, 90 and 150 kg tubes
800/870 kg cylinders (*)

(*) There are no tank-trucks available for bulk delivery, especially because volumes purchased do not justify them. Trucks can carry up to 5 tubes of 870 kg and freight is 120 $^{a}/tube.

SULPHUR

Year	Production	Imports	Consumption
1968	33,637	22,313	55,950
1969	34,579	44,414	78,993
1970	37,500	51,725	89,225

Price: 99% purity, free of selenium, organic material less than 0.10%

350 $a/Ton (destination) from Salta
315 " " from Mendoza

Suppliers: Fabricaciones Militares Basso y Tonnelier S.A.

KAOLIN

Year	Production	Imports	Exports	Consumption
1968	73,706	13,818	2	87,522
1969	80,905	15,579	2	96,482
1970	74,555	13,180	2	87,733

Kaolin beds: Playa Dorignac (Chubut) Don Carlos (Chubut) Maruja (Chubut) Adelita - Fortuna (R. Negro) Cerro Segundo (B.A.)

Price: Natural green (R. Negro) 54 $a/Ton on wagon, origin.

GRAPHITE - In sheets and bolts

Year	Imports
1968	8.9
1969	10.2
1970	10.7

Price: 6.50 $a/kg

Delivery: sheets and bolts

[illegible] ACID

Capacity of Production: 276,000 T/yr.

Year	Production	Consumption
1968	161,000	161,000
1969	188,800	188,800
1970	195,500	195,500

Price: 240 ^{a}/Ton (origin)

Producers: Cia Quimica SA - Duperial S.A. - Energia Atomica F.M. - O.S.N. - Petrosur - Sulfacid S.A.

SODIUM SULPHIDE

Year	Production	Imports	Consumption
1968	3,900	871.7	4,771.7
1969	6,552	1029	7,581
1970	7,930	477	8,407

Price: 1,100 ^{a}/Ton solid 60% - origin

Producers: Industria Progreso S.A. - Ossur S.A. - Quimica Industrial ME Bomar S.A.

Grade: Technical

Delivery: 200/250 kg drums (solid in pieces)
bulk in tank - trucks or wagons (solution)

MERCURY

Origin: for studied uses, it is imported

Price: 64 ^{a}/kg

HYDROCHLORIC ACID

Year	Production	Consumption (*)
1968	32,345	22,132
1969	32,827	25,000
1970	43,631	29,000

(*) Difference is acid which is neutralized.

Price: 300 ^{a}/Ton

Delivery: 23/28 kg bottles
bulk in tank-trucks or wagons

FORM 8

Stadler Hunter
ENGINEERS • CONSULTANTS

R-1[illegible]A/07/3101 - Type AX/72

(a) Model I (Corrugating Medium)

137.8 ODMTD Slush pulp x 575 kwh/MT = [illegible] kwh

165 ADMTD Corrugating Medium x 500 kwh/MT = [illegible] kwh

Total = 162,235 kwh/day

= $\frac{162,235}{24}$

= 6,760 kwh

at 90% efficiency contracted power = 7,510 kwh

Annual billing for power consumed using tariffs in effect in May 1972 becomes

6,760 x 24 x 340 x 0.029 = ^{a} 1,600,000

Power contract using same power contract becomes

7,510 x 16.46 x 12 = ^{a} 1,483,400

(b) Model II (Linerboard)

204.6 ODMTD Slush pulp x 550 kwh/MT = 112,500 kwh

330 ADMTD Linerboard x 550 kwh/MT = 181,500 kwh

Total = 294,000 kwh/day

= $\frac{294,000}{24}$

= 12,250 kw

at 90% efficiency contracted power = 13,600 kw

Annual billing for power consumed using tariffs in effect in May 1972 becomes

12,250 x 24 x 340 x 0.029 = ^{a} 2,898,800

P[illegible] power contract becomes

[illegible] x 16.[illegible] x 12 = $[a] 2,686,300

(c) [illegible] (Combined)

Power cost for this model is the sum of Models I and II.

Power Consumed

Corrugating Medium		1,600,000
Linerboard		2,898,800
Total	$[a]	4,498,800

Power Contract

Corrugating Medium		1,483,400
Linerboard		2,686,300
Total	$[a]	4,169,700

BX.4 Bagasse Requirements and Costs

(a) General

Cost of bagasse includes the following:

1. Fuel replacement value: Calculated according to the generally accepted ratio of 1 ton of oil = 3 tons of O.D. bagasse.

   Actual calorific value of bagasse at 50% H_2O = 1,825 Cal./Kg. with variation of 45 Cal./Kg./1% moisture.

Calorific value of oil	10,300 Cal./Kg.
Natural gas	9,300 Cal./m^3
Bagasse replacement equivalent	3,434 Cal /Kg. O.D. (at 50% H_2O)

2. Labour costs for bagasse handling and preparation to include loading on trucks or conveyors.

3. Power cost for depithing, conveying, etc.

4. Maintenance for depithers, conveyors, etc.

5. Transportation to the pulp mill (assuming trucking to be by contract)

6. All cost figures in pesos Lev 18,188 except as noted.

Note: Capital costs of equipment are not included.

(b) Model I Corrugating Medium - 166 MTD A.D. for 340 Days/Yr.

Total moist depithed bagasse to pulp mill = 83,960 ODMT/Year

This amount includes washing losses, storage losses of approximately 10% of bagasse stored plus the required amount of depithed and washed bagasse to the digesters.

No. Days of Bagasse Deliveries

Crushing season - 82 days/year at 6 days/week

Rate of daily deliveries at 21 hours per day — 1023.9 ODMTD / 48.8 ODMT/H

Washing rate at 7 days/week at 95 days/year — 883.79 ODMT/D

Fuel Replacement Value

3 ODMT bagasse = 1 MT oil = 1,107.5 m^3 natural gas

Tons of oil required to replace 83,960 BDMT bagasse = 27,987

= m^3 of natural gas — 30,995,603 m^3/year

*Average monthly flow required (12 months) = 2,582,967 m^3/month

Assuming that all bagasse will be taken from one sugar mill only:

First	900,000 m^3/month	73,451.4 Pes.
Next	1,682,967 m^3/month	128,073.8 Pes.
		201,525.5 Pes./mo.

2,418,302 pesos/year = 28.80 pesos/ODMT

Replacement fuel value - Pesos 28.80/O.D. ton

*Note: Total gas will be required during ingenio operating period only but for conservative cost figure, average flow over 12 months has been used.

Labour Cost

Daily rate at 82 days/year = 83.960 MT/.82 = 1023.9 ODMT of accepted bagasse.

No. of moist depithers	3 large
Labour required	1 operator
	1 helper

Daily rates Operator $20.72/day + 60% = $33.152/day

Helper $18.40/day + 60% = $29.44/day

No. net operating days in Concepcion sugar mill 82 days/year

No. gross operating days in Concepcion sugar mill 90 days/year

90 x 33.152 = $2,983.68

90 x 29.44 = $2,649.60

Total cost/shift for 90 days = $5,633.28

To allow for shift differential and overtime, assume

3.5 men per shift job at 3.5 shifts per day =

3.5 x 5633.28 = 19,716.48

Overhead (20% +) 3,940.52

Total cost for season ^{a} 23,657.00

Total O.D. tons of bagasse processed: 83,960 Tons

Labour cost - bagasse processing at the sugar mill per ton O.D. bagasse = $0.2818

Power Cost for Moist Depithing

Connected Load :	Intake belt conveyor	20 HP
	Transfer conveyor	10 HP
	Distribution conveyor	20 HP
	Feeders	15 HP
	Depithers	750 HP
	Overflow Ret. (2)	20 HP
	Accepted conveyor	15 HP
	Pith conveyor (2)	20 HP
		870 HP = 650 KW

Power consumed: (0.8 load factor)

650 x 24 x 0.8 = 12,480 kwh/day

Assuming 100 days operation:

KWH per 26 day month	324,480
KWH for extra 10 days	124,800

Rates:

Fixed charge $4.06/KW connected

1 - 100 kwh/month	$0.103/kwh =	$ 10.30/month
101 - 200 kwh/month	$0.092/kwh =	$ 9.20/month
201 - 400 kwh/month	$0.069/kwh =	$ 13.80/month

Cost/month of 1st 400 kwh = $ 33.30

Total cost of power per season:

33.30 x 4 mos.	$ 133.20
(324,480 - 400) x 0.043 x 3 mos.	$41,806.50
(124,800 - 400) x 0.043	$ 5,349.00
	$47,288.70
Fixed charge 4.06 x 650	$31,668.00
	$78,956.70
Lighting allowance (estimated)	$ 1,198.30
	$[a] 80,156.00

Cost per O.D. ton primary depithed bagasse

$$\frac{80,156}{83,960} = \$0.9547$$

Cost of Transportation (Ingenio to Paper Mill)

Assume all moist depithed bagasse transported by belt conveyor - 60 HP motor

60 HP = 44.8 KW

At 0.8 load factor = 44.8 x 0.8 x 24 = 860 kwh/day

For 100 day season:

KWH/26 day month = 860 x 26 = 22,350 kwh

For extra 10 days = 860 x 10 = 8,600 kwh

Cost of power for season:

1st 400 KWH 33.30 x 4 mos.	133.20
(22,350-400) x 0.043 x 3 mos.	2,831.60
(8,600-400) x 0.043	352.40
	3,317.20

Fixed cost/KW connected =

$4.06 x 44.8 x 12 mos.	2,180.00
	5,497.20
Cost of lighting (est.)	200.00
Total $s	5,697.20

Cost/O.D. ton moist depithed bagasse

$$\frac{5697.20}{83960.} = \$0.0679$$

Maintenance Cost - Depithing Installation and Conveyor to Pulp Mill

	L	M	Total
Unique equipment	14,000	154,000	168,000
Conveyors	28,500	136,000	164,500
Electrical	12,000	23,000	35,000
	54,500	313,000	367,500 U.S.

Maintenance cost $\pm$ 5% = $18,375 U.S./year

= $91,875 pesos

at 83,960 tons/year = $ 1.094 peso/ton O.D.

Cost of bagasse from one sugar mill to an adjacent pulp mill

	Total/Year	Per O.D. Ton
Fuel replacement value	$a 2,418,302	$[a] 28.800
Labour at sugar mill	23,657	0.282
Power cost - moist depithing	80,156	0.955
Power cost - conversion to pulp mill (belt)	5,697	0.068
Maintenance cost depithing and transportation	91,875	1.094
	$[a] 2,619,687	$[a] 31.199

(c) Model II - 330 TPD Linerboard Mill at Ing, Concepcion

Total moist depithed bagasse to pulp mill = 157.280 ODMT/year

This amount includes washing and wet depithing losses of approximately 18%, storage losses of approximately 10% of bagasse stored plus the required amount of depithed and washed bagasse to the digesters.

Rates of Bagasse Deliveries

Crushing season 82 days/year at 6 days/week	1,918 ODMT/D
at 21 hours/day	91.3 ODMT/hr.
Washing and wet depithing at 7 days/week	1,655.6 ODMT/hr.
= 95 days/year	
at 21 hours/day	78.8 ODMT/hr.

Bagasse from Ing, Concepcion

Bagasse available in 1970	124,000 ODMT/year
Planned increase till 1979 (30%)	37,400 ODMT/year
Anticipated bagasse available 1979	161,400 ODMT/year
Moist depithing loss (30%)	48,400 ODMT/year
Primary depithed available	113,000 ODMT/year

Note: 157,280 - 113,000 = 44,280 to be secured from other sugar mills.

Bagasse from Ing. Concepcion

113,000 ODMT/year

Fuel Value equivalent = $\frac{113,000 \times 1,000 \times 3,434}{9,300}$

= 41,724,900 m^3 of natural gas

Based on 12 month flow rate = 3,477,079 m^3/mo.

Cost of natural gas 1st - 3,000,000 m^3/mo. = 233,261.4

Cost of remaining 477,079 m^3 at 0.0742 = $\frac{35,399.3}{\$268,660.7/month}$

=$3,223,928.4/year

Fuel replacement per ton OD =$ 28.53

Labour

Personnel same as for corrugating mill but 10% more time allowed.

$ 23,657
+ 10% 2,366

$ 26,023

Labour cost/ton OD moist depithed bagasse $\frac{26,023}{113,000}$ = $ 0.231

Power Cost

Connected load 1125 HP = 840 KW

Power consumed = 840 x 24 x 0.8 = 16,128 KWH/day

Assuming 110 days operation:

KWH per month (26 days)	419,328
KWH for extra 20 days	322,156

Total cost of power per season:

(Same rates as Model I)

33.30 x 4 mos.	133.20
(419,328 - 400) x 0.043 x 3	54,042
(322,156 - 400) x 0.043	13,852
	68,027
Fixed charge $4.06 x 840 x 12	40,920
	108,947
Allowance for lighting	1,200
Total	$ 110,147

Power cost per OD ton of moist depithed bagasse $\frac{110,147}{113,000}$ = $0.975

Maintenance Cost

Moist depithing installation with 4 large Peadco depithers will cost about U.S. $420,000 installed including conv. to pulp mill:

Maintenance cost at 5% = $ 21,000 U.S. = 105,000 pesos

$= \frac{105,000}{113,000}$ = $0.9292/ton

Power for Transportation

Model I + 10% = $ 5,697 + 570 = $ 6,267/year

$\frac{6,267}{113,000}$ = $0.0555 per OD ton

Cost of moist depithed bagasse from Ingenio Concepcion

Stadler Hunter
ENGINEERS • CONSULTANTS

	Total/Year	Per O.D. Ton
Fuel replacement value	$[a] 3,223,928	$[a] 28,530
Labour at sugar mill	26,023	0.231
Power cost - moist depithing	110,147	0.975
Maintenance cost	105,000	0.929
Power - Transport	6,267	0.056
	$[a] 3,471,365	$[a] 30,721

Cost of Bagasse from San Juan Sugar Mill

All bagasse produced will be required.

Bagasse produced in 1979	45,800 ODMT/year
Moist depithing loss 30%	13,700 ODMT/year
Available	32,100 ODMT/year

Note: 44,280 - 32,100 leaves 12,180 to be obtained elsewhere.

It is estimated that by 1979 this mill will operate 100 days/year, including 92 days actual operation plus 8 days maintenance and setting up.

Therefore, 1 large depither installation should be sufficient.

Average production of O.D. moist depithed bagasse per day = 321 tons.

Installed cost of depithing system	$ 180,000 (U.S.)
Installed power	420 H.P.
Labour required	2 men/shift

Fuel Replacement Cost of Bagasse

$$\frac{32,100 \text{ MT O.D.} \times 1,000 \times 3,434 \text{ Cal./Kg.}}{9,300 \text{ Cal./m}^3} = 11,852,838 \text{ m}^3 \text{ natural gas}$$

Average flow per month 987,736 m^3

Rate for 1st 900,000 m^3/mo. $ 73,451.4

Next 87,736 m^3/mo. 6,676.7

80,128.1/mo. x 12 = $ 961,537/year

= $ 29,954/ton O.D. moist depithed bagasse

Labour

2 men/shift: Operator $ 33.152/day/shift at 100 days/year

= 3,315.2 man/shift/day

Helper $29.44/day/shift at 100 days/year
$62.592/day/shift

= 2,944.0 man/shift/day
6,259.2 man/shift/day

We assume 3.5 shifts/day = $ 21,910/100 days

Overhead (20% ±) $ 4,382

$ 26,292

Total bagasse accepted 32,100 ODMT/year = $0.819/ton O.D. moist depithed bagasse

Power Cost

Connected load = 420 HP = 315 KW

Power consumed = 315 x 24 x 0.8 = 6,048 KWH/day

Assuming 100 days operation:

KWH/month (26 days)	=	157,248
KWH for extra 10 days	=	60,480

Total cost of power per season:

33.30 x 4 mos.		133
(157,248 - 400) x 0.043 x 3		20,234
(60,480 - 400) x 0.043		2,583
		22,950
Fixed charge $4.06 x 315 x 12		15,347
		38,297
Allowance for lighting		1,200
	Total	$ 39,497

Power cost per O.D. ton of moist depithed bagasse $\frac{39,497}{32,100}$ = $1.230

Maintenance Cost

$ 7,500 U.S. = 37,500 pesos at 32,100 MT O.D./year = $1.168/ton

Transportation

By contractor, fixed costs per truck with 3 drivers = $23,000 U.S.

Net payload - 8 MT O.D.

No. of trips = $\frac{32,100}{8}$ = 4,012.5 trips/year

Distance 12.01 km one way, 24.02 return

Total km/year = 24.02 x 4,012.5 = 96,380 km/year

No. of trips/day 43.614. Therefore, two trucks are required.

Fixed costs	$ 46,000 U.S.
Operating costs at $144/1,000 km - $96.38 x 144	$ 13,878 U.S.
	$ 59,878 U.S.
	= 299,390 pesos

Cost per ton $ 9.326 pesos/MT O.D.

Cost of moist depithed bagasse from San Juan

	Total/Year	Per O.D. Ton
Fuel replacement value	$[a] 961,537	$[a] 29,954
Labour at sugar mill	26,292	0,819
Power cost - moist depithing	39,497	1,230
Maintenance cost	37,500	1,168
Transportation by Contractor	299,390	9,326
	$[a] 1,364,216	$[a] 42,497

Average cost per MT O.D. = $ 42,497

Cost of Bagasse from Ingenio Cruz Alta (12,180 MT/year O.D.)

Installad cost of 1 large depithar systam $ 180,000 U.S.

Connactad power 420 HP = 313 KW

Minimum No. Operating Days $\frac{12,180 \text{ MT/year}}{300 \text{ MT/day}}$ = 40.6 days/yaar

Fuel Replacement Value

$\frac{12,180 \text{ MT O.D.} \times 1,000 \text{ Kg.} \times 3,434 \text{ Cal./Kg.}}{9,300 \text{ Cal./m}^3}$ = 4,497,432 m^3/year natural gas

Avarage monthly consumption 374,786 m^3

Rate for tha 1st 150,000 m^3 13,451.4

Rate for the next 224,786 at 0.0800 - $\frac{17,982,9}{31,434.3/\text{month}}$

= $ 377,212/year

= $ 30.970/ton O.D. bagasse

Labour Cost

2 man/shift for 41 days/year

1 operator at $20.72/day + 60% = 20.72 + 12.43 =

$33.15/day x 41 days = $ 1,359.2

1 helper at $29.44/day/shift x 41 days = $1,207.0

= 2,566.2

Cost per shift = $ 2,566.2

We assume 3.5 shifts/day = $ 8,981.70/year

Overhead (20% +) $ 1,796.34

$10,778.04/year

Maintenance Cost

$ 7,500 U.S. = 37,500 pesos

Cost of Transport - 12,180 MT/year O.D.

Distance - 20 km one way, 40 km return trip

Assuming each truck load carried 8 MT

No. of trips required 1,522.5/year = 1,523 or

37.15 trips/day

Thus, two trucks are required

Distance trsvelled per year = 60,920 km/year

Fixed cost equipment 12 months/year = $46,000 U.S.

Equipment operating costs at $144/1000 km.
$60.92 x 144 $ 8,772 U.S.

$54,772 U.S.

= 273,860 pesos

Power Cost

Connected load 420 HP = 313 KW

Power consumed = 313 x 24 x 0.8 = 6,010 KW/day

Assuming 41 days continuous operation:

6010 x 41 = 246,410

Total cost of power per season:

1st 400 KWH for 1-1/2 mos.		49
(246,410 - 400) x 0.043 x 1-1/2 mos.		15,868
		15,917
Fixed charge $4.06 x 313 x 12		15,249
		31,166
Allowance for lighting		1,170
	Total	$ 32,336

Power cost per O.D. ton of moist depithed bagasse $\frac{32,336}{12,180}$ = $2.655

Cost of Bagasse from Cruz Alta - 12,180 MT O.D./year

Fuel replacement value	$ 377,212
Power cost	32,336
Labour cost	10,778
Maintenance	37,500
Transportation	273,860
	$[a]731,686

= $ 60.08/MT O.D.

Average Cost of Bagasse from all Ingenios

Bagasse from -

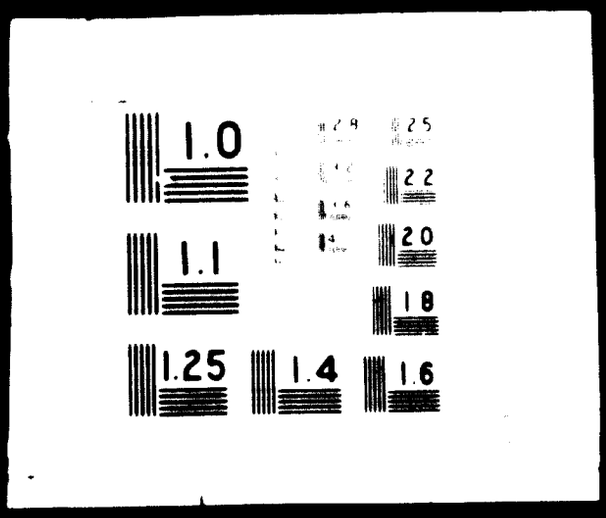
Ing. Concepcion	113,000 MT O.D./year	$[a] 3,471,365
Ing. San Juan	32,100 MT O.D./year	1,364,216
Ing. Cruz Alta	12,180 MT O.D./year	731,686
	157,280 MT O.D./year	$[a] 5,567,267

Average cost = $ 35.397/MT O.D.

76. 05. 19

2 OF 2

06951



(d) Model III - Combined Liner and Corrugating Board Mill - 498 tons/day

Total moist depithed bagasse requirements:

Liner board mill	157,280 MT/year O.D.
Corrugating board mill	83,960 MT/year O.D.
	241,240 MT/year O.D.

The above amounts include washing and wet depithing losses of approximately 18%, storage losses of approximately 10% of bagasse stored plus the required amount of depithed and washed bagasse to the digesters.

Bagasse will be supplied from the following ingenios:

	Moist depithed 1979
Concepcion	113,000 MT/year O.D.
San Juan	32,100 MT/year O.D.
San Pablo	59,100 MT/year O.D.
Cruz Alta	24,300 MT/year O.D.
Total available from the 4 ingenios	228,500 MT/year O.D.
Total required	241,240
Required from the 5th ingenio - La Florida	12,740 MT/year O.D.

Cost of Bagasse from San Juan

32,100 T. O.D. moist depithed bagasse

90 days crushing season = 356.6 TPD O.D.

Use only 1 large depither and same costs for power and maintenance as in Model II calculations.

Fuel Replacement Value

(Same as in Model II calculations)

Labour

(Same as in Model II calculations)

Transportation

(Same as in Model II calculations)

Total cost of moist depithed bagasse from San Juan

	Total/Year
Fuel replacement value	$[a] 961,537
Labour cost	26,292
Power cost	39,497
Maintenance	37,500
Transportation	299,390
	$[a] 1,364,216

Average cost = $42.497 per MT O.D.

Bagasse from San Pablo

59,100 T O.D./year available - all required

Fuel Replacement Value

$$\frac{59,100 \times 1,000 \times 3,434 \text{ Cal./Kg.}}{9,300 \text{ Cal./m}^3} = 21,822,516 \text{ m}^3\text{/year}$$

Monthly flow(12 months/year) = 1,818,543 m^3/month

1st 900,000 m^3/month	= $ 73,451.4
Next 918,543 m^3/month	= $ 69,901.1
	$ 143.352.5 month
= $1,720,230/year	= $29.107/ton O.D.

Labour Cost

2 men/shift: Operator $33.152 at 100 days/year =

$ 3,315.2 man/shift/day

Helper $29.44/day/shift at 100 days/year =

$ 2,944.0 man/shift/day

= $ 6,259.2

Assume 3.5 shifts per day = $ 21.910

Overhead 20% = $ 4,382

$ 26,292

Power Cost

Connected load 600 HP = 450 KW

Power consumed = 450 x 24 x 0.8 = 8,640 kwh/day

Assuming 110 days operation:

KWH/month (26 days)	= 224,240
For extra 20 days	= 172,800

Total cost of power per season:

33.3 x 4 months	133
(224,240 - 400) x 0.043 x 3	28,926
(172,800 - 400) x 0.043	7,430
	36,489
Fixed charge $4.06 x 450 x 12	21,924
	58,413
Lighting allowance	1,300
	59,713

Maintenance Cost

$ 8,000 U.S. = 40,000 pesos

Transportation Cost - 59,100 tons/year O.D.

By contractor:

No. of working days	120/year
TPD O.D.	492.5 = 23.45 TPH O.D.
	= 3 trucks/hour

Distance to paper mill 24 km.

Total trips/year $\frac{59,100}{8}$ = 7,387.5

= 354,600 km/year -

Use 5 trucks

Fixed cost - 5 units	$ 115,000 U.S.
Operating at $144/1,000 km	51,062 U.S.
	$ 166,062 U.S. = 830.310 pesos

Cost of bagasse from San Pablo

	Total/Year
Fuel replacement value	$[a] 1,720,230
Labour cost	26,292
Power cost	59,713
Maintenance cost	40,000
Transportation cost	830.310
	$[a] 2,676,545

Average cost = $45.288/T O.D.

Bagasse from Cruz Alta - 24,300 MT/year O.D.

Fuel replacement value $\frac{24,300 \times 1,000 \text{ kg.} \times 3,434 \text{ Cal./kg.}}{9,300}$

= $\frac{8,972,710}{12}$ = 747,726 m^3/month

Rate for 1st 150,000 m^3/month	\$ 13,451.4
Rate for next 597,726	47,818.1
	\$ 61,269.5/month

= 61,269.5 x 12 = \$ 735,234/year

Average cost = \$ 30,257/ton O.D.

Labour Cost

(See tabulation for Ingenio San Pablo Model III)

2 men/shift - \$26,292/year

Power Cost

Connected load = 420 HP = 315 KW

Power consumed = 315 x 24 x 0.8 = 6,048 kwh/day

Assuming 100 days operation:

KWH/month (26 days)	= 157,248
KWH for extra 10 days	= 60,480

Total cost of power per season:

33.30 x 4 mos.	133
(157,248 - 400) x 0.043 x 3	20,234
(60,480 - 400) x 0.043	2,583
	22,950
Fixed charge \$4.06 x 315 x 12	15,347
	38,297
Allowance for lighting	1,200
Total	\$39,497

Power cost per O.D. ton of moist depithed bagasse $\frac{39,497}{24,300}$ = \$1.625

Maintenance

\$ 7,500 U.S. = 37,500 pesos at 24,300 MT O.D./year = \$1.543

Transportation

24,300 MT/year O.D.

No. of trips at 8 T/trip 3,037.5/year

One way distance 20 km., return 40 km.

Total km. per year 121,500 km/year

Required 2 trucks

Fixed costs	$ 46,000 U.S./year
Operating at $144/1,000 km	17,496
	$ 63,496 U.S./year
=	$317,480 pesos/year
=	$[a] 13,065/ton O.D.

Annual Cost of Bagasse from Cruz Alta

	Total/Year
Fuel replacement value	$[a] 735,234
Labour cost	26,292
Power cost	39,497
Maintenance	37,500
Transportation	317,480
	$[a] 1,156,003

Average cost = $47.572/ton O.D.

Cost of Bagasse from La Florida Sugar Mill

12,740 MT/year O.D.

Minimum number of operating days = $\frac{12,740}{300}$ = 42.5

Installed cost of 1 large depithing system $ 180,000 U.S.

Connected Power 420 HP = 313 KW

Fuel replacement value:

$\frac{12,740 \times 1,000 \times 3,434}{9,300} = 7,456 \times 369.25 = 4,704,211\ m^3$/year

Average flow per month 392,018 m^3

Rate for 1st 150,000 m^3/month $ 13,451.4
Rate for next 242,018 m^3/month
at 0.08 $ 19,361.4

$ 32,812.8/month
or $393,754 /year

Labour Cost

2 men/shift for 43 days per year

1 Operator at $33.15/day = $1,359.2/year

1 Helper at $29.44/day = $1,207.0/year

$2,566.2/year

Cost per shift = $2,566.2

Assume 3.5 shifts/day

Cost per year = 2,566.2 x 3.5 = $ 8,981.70

Overhead 20% $ 1,796.34

Total $10,778.04

Maintenance Cost

$ 7,500 U.S. = 37,500 pesos

Power Cost

Connected load 420 HP = 313 KW

Power consumed = 313 x 24 x 0.8 = 6,010 kw/day

Assuming 43 days continuous operation = 6,010 x 43 = 258,430

Total cost of power per season:

1st 400 KWH for 2 mos.	66
(258,430 - 400) x 0.043 x 2	16,643
	16,709
Fixed charge $4.06 x 313 x 12	15,249
Total	31,958

Power cost per O.D. ton moist depithed bagasse $\frac{31,958}{12,740}$ = $2.508

Cost of Transport

Distance 20 km. one way, 40 km. return

No. of trips/year $\frac{12,740}{8}$ = 1,592.5

Total km/year 63,700

No. trips/day 37 - Use 2 trucks

Fixed costs equipment 12 months/year $ 46,000 U.S.

Operating at $144/1,000 km $ 9,173 U.S.

= $ 55,173 U.S.

= 275,865 pesos/year

Average cost of bagasse from Ingenio Florida

		Total/year
Fuel replacement value	$	393,754
Labour cost		10,778
Power cost		31,958
Maintenance cost		37,500
Transportation cost		275,865
Total	$	749,855 = $58,858/M Ton O.D.

Average Cost of Bagasse from all Ingenios

Bagasse from:

Ing. Concepcion	113,000 MT O.D./year	3,471,365
Ing. San Juan	32,100 MT O.D./year	1,364,216
Ing. San Pablo	59,100 MT O.D./year	2,676,545
Ing. Cruz Alta	24,300 MT O.D./year	1,156,003
Ing. La Florida	12,740 MT O.D./year	749,855
	241,240 MT O.D./year	9,417,984

Average cost = 39.040/MT O.D.

AX.5 Fuel Cost

(a) Model I (Corrugating Medium)

In order to produce the required amount of product the following quantities of steam will be required:

137.8 ODMTD Slush pulp x 1.3 MT/T	=	179.14 MT
166 ADMTD Corrugating Medium x 4.0 MT/T	=	664.00 MT
Total steam/day		843.1 MT
Total steam/year		286.668 MT

Steam contains 610,000 Kg.Cal./Ton

Therefore, total kg.cal./year = 174.8×10^9

If boiler efficiency is 85% and natural gas has 9,300 Kg./Cal/m^3 annual usage of natural gas becomes -

$$\frac{174.8 \times 10^9}{9{,}300 \times .85} = 22{,}112{,}500\ m^3$$

Average monthly consumption becomes $\frac{22{,}112{,}500}{12} = 1{,}842{,}708\ m^3$

Using tariffs in effect in May 1972 the average monthly gas

billing becomes:

For first 900,000 m^3 cost	^{a}	73,451.4
For remaining 942,708 m^3 at 0.0761 cost		71,740.0
Cost per month	^{a}	145,191.4
Cost per year	^{a}	1,742,300

(b) Model II (Linerboard)

In order to produce the required amount of finished product the following quantities of steam will be required:

204.6 ODMTD Slush pulp x 1.5 MT/T	=	306 MT
330 ADMTD Linerboard x 4.0 MT/T	=	1,320 MT
Total steam/day	=	1,626 MT
Total steam/year	=	552.840 MT

Since steam contains 610 kg.cal/ton, 85% boiler efficiency and natural gas contains 9,300 kg.cal./m^3, the amount of natural gas to be used by the plant will become

$$\frac{610{,}000 \times 552{,}840}{9{,}300 \times 0.85} = 42{,}660{,}600 \text{ } m^3/\text{year}$$

$$= 3{,}555{,}050 \text{ } m^3/\text{month}$$

Using tariffs in effect in May 1972 the average monthly gas billing becomes:

For first 3,000,000 m^3 cost	^{a}	233,261.4
For remaining 555,050 at 0.0742 cost		41,184.7
Cost per month	^{a}	274,446.1
Cost per year	^{a}	3,293,400.0

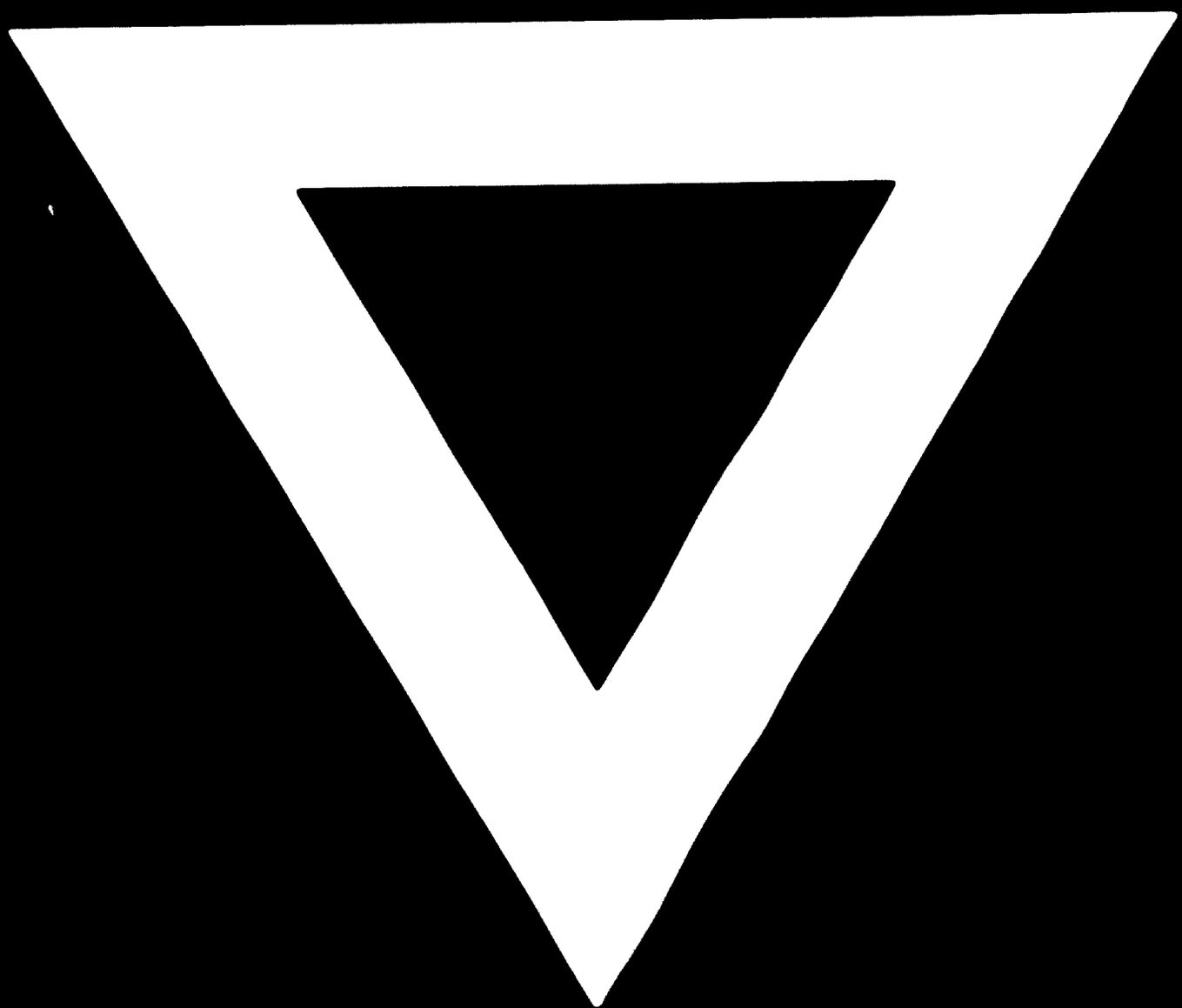
( ) [illegible]

The amount of natural gas required for this pulp and paper mill will become the total requirements of Models I and II.

	m^3/month	m^3/month
Corrugating Medium	1,842,708	22,112,500
Linerboard	3,555,050	42,660,600
Total	5,397,758	64,773,100

Using tariffs in effect May 1972, the cost per month for using natural gas becomes:

For first 3,000,000 m^3 cost		\$[a] 233,261.4
For remaining 2,397,758 at 0.0721 cost		172,878.4
	Cost per month	\$[a] 406,139.8
	Cost per year	\$[a]4,873,700.0



76. 05. 19