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Expert Group Meeting
on Pulp and Paper

Vienna, 13 - 17 September 1971

THE UTILIZATION OF WASTE PAPER IN THE PAPER INDUSTRIES OF DEVELOPING COUNTRIES 1/

by
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PREFACE

Paper is the keystone and support of modern civilization. It is the reservoir and pipeline which stores and transmits the driving force that is improving the lot of all mankind, and which will eliminate the deadening, grinding poverty so all too prevalent in the world today.

Man has not advanced mentally, to any appreciable extent, during the past several thousand years. The literatures of Greece and Rome, of China and India, all reveal capacities which may be equalled today, but certainly not greatly surpassed.

Great civilizations of the past were based on some form of slavery or serfdom. Man by his own efforts cannot create sufficient wealth to release him from the relentless toil necessary for bare existence. Some form of slavery is required in order for some to obtain that leisure which is essential to think, inquire, to acquire knowledge and to create a civilization.

Man now has a new slave, more powerful than Aladdin's Genie, the machine.

If man possessed the same mental attributes ten thousand years ago, then why did he take so long to discover the machine and to liberate himself from the frightful drudgery necessary to eke out a primitive existence ? The answer lies in the mysterious workings of the human brain, which can only remember a little, and this in time becomes

hazy and inaccurate. In order to be permanent, knowledge must be inscribed, for old brains die and new ones must be taught. Machines are enormously compicated affairs, and their design and operation must be recorded to be remembered and used.

The invention of writing lies in the misty pages of prehistoric times. This much is certain, however, the knowledge of writing was not wide spread, and never has been until recently.

Many materials have been used to record knowledge, stone and clay tablets; bronze, copper and lead; boards; skins of animals; bark and papyrus; and finally paper.

The use of parchment and vellum was a real advance because of their relatively light weight and volume, and their good printing and writing surfaces. Because of their origin, however, they could not have widespread use. For example, a single copy of the Gutenberg bible required the slaughter of three hundred sheep.

While the art of papermaking originated in China in the year A. D. 105, about a thousand years elapsed before it reached Europe, via the Great Silk Road. The Moors had a mill in Toledo in 1085, but it took another 400 years before it spread to England. The first mill in the United States was built in 1690.

Prior to the invention of printing by Gutenberg about 1450,

all books had to be laboriously hand scribed, and, as a consequence, the price was such that only the wealthy could afford them.

It was natural that the combination of printing and paper would increase learning and knowledge and that this would become an accelerating process which would culminate in better methods of production.

Robert, financed by the Fourdriniers, developed a machine to produce paper continuously about 1798. Until then, paper had to be made by hand in small sheets and air dried, a tedious and expensive process, although the product often was excellent.

Widespread dissemination of knowledge was not possible until there was an abundance of paper at a reasonable price. The utilization of wood pulp; groundwood in 1844; soda in 1855; sulphite in 1866 and kraft in 1884; together with the modern high speed paper machine have put paper and recorded knowledge within the reach of everyone.

Waste paper has been used for many hundreds of years, but only to a limited extent until this century, due to the small amounts available. By far the greater proportion of waste paper now used is in board. While some deinking was done in the 1800's, it is only in this century that it has been widely practiced.

Waste paper has tremendous potential, particularly for

developing countries that lack fiber resources.

The machine has given man more power than any number of human slaves and was developed by the storing and dissemination of knowledge on paper. Old civilizations have been swept away. Our present culture is more firmly rooted as all knowledge discovered has been recorded and is universally possessed - and new mechanical slaves are being developed daily.

Modern technology has developed scores of types of paper and board which are used in hundreds of ways in thousands of products to make life richer and more enjoyable.

Because of its small intrinsic value, more durable than platinum, gold or silver for records, paper is the magic carpet to lift man's thoughts from the mire to the clouds and beyond. By recording each step of the way, it has enabled him to create more wealth and has opened the door to freedom for all mankind.

PAPER [illegible] AN INDEX OF PROSPERITY

A recent newspaper article (1) tells that United Nations experts have drawn up a list of countries for possible designation as the least developed in the world. A copy is on the next page.

Chart A lists these countries, populations, per capita gross national product, the pounds per capita consumption of paper and board, and waste paper, the tons of paper produced per year , and the number of paper mills. (2)

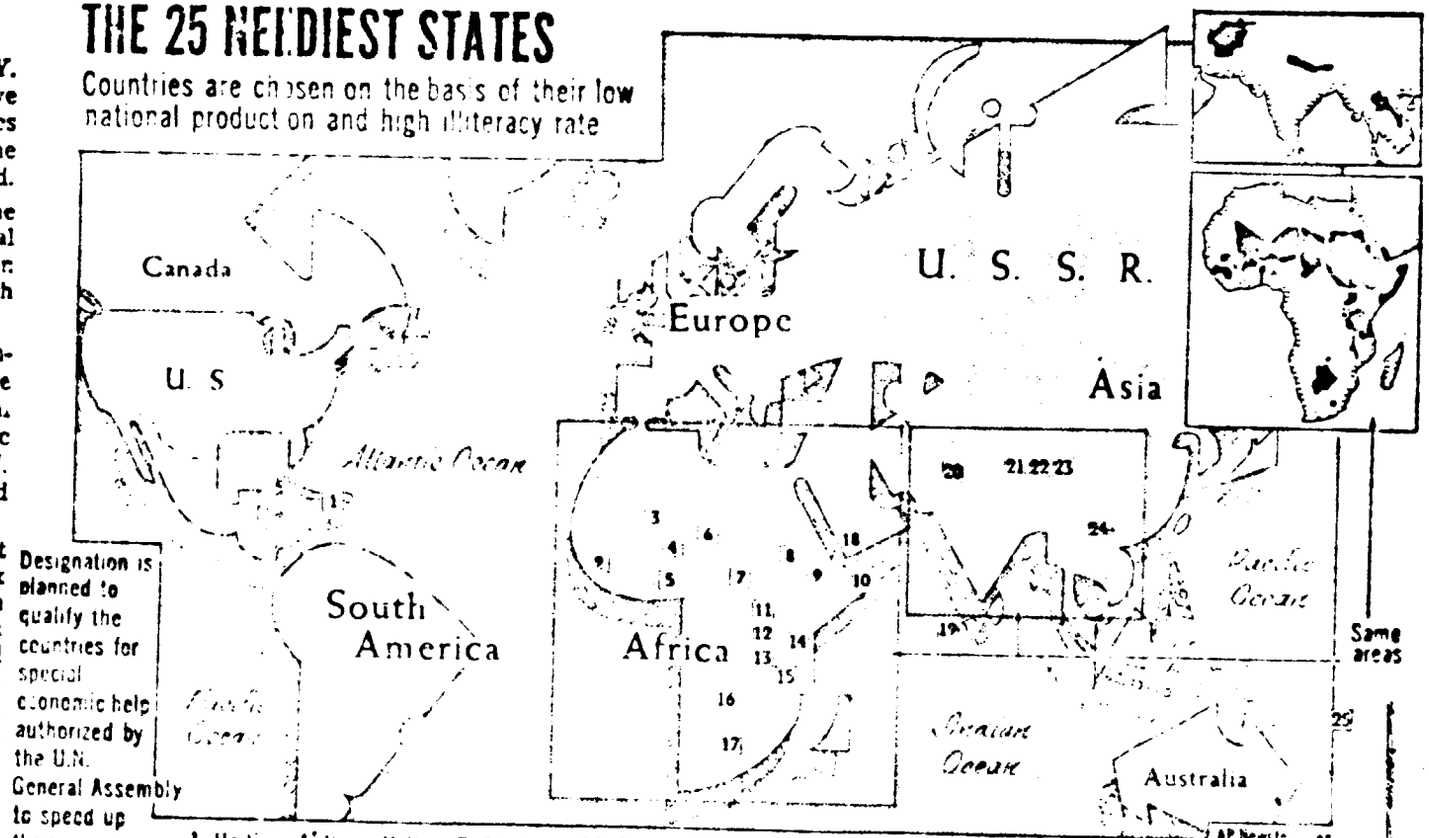
It will be noted that the per capita GNP (3) in most cases is below 100 or not known, the consumption of paper and board is almost negligible except in Samoa, and this is probably due to the military. Sudan is the only country listed as using waste paper. Only four have paper mills. Nepal reports 200 mills, all for hand made paper, with a total production of only 558 tons per year.

Chart B shows the 1968 per capita gross national product and the 1968 pounds per capita consumption of paper and board. Figure 1 shows a graph of these statistics. If a point is far from the average line, there usually will be a reason for it such as the discovery of oil in a developing country and the wealth from this remains in the hands of a few.

While it is true that a more prosperous nation will tend to use more paper per capita than one less favored because they can afford it, the real truth is that they are more

THE 25 NEEDIEST STATES

Countries are chosen on the basis of their low national product on and high illiteracy rate



Designation is planned to qualify the countries for special economic help authorized by the U.N. General Assembly to speed up their development

1 Haiti, 2 Guinea, 3 Mali, 4 Upper Volta, 5 Dahomey, 6 Niger, 7 Chad, 8 Sudan, 9 Ethiopia, 10 Somalia, 11 Uganda, 12 Burundi, 13 Rwanda, 14 Tanzania, 15 Malawi, 16 Botswana, 17 Lesotho, 18 Yemen, 19 Maldives Is., 20 Afghanistan, 21 Nepal, 23 Bhutan, 24 Laos, 25 Western Samoa

BY MAX HARRELSON
Associated Press Writer

UNITED NATIONS, N.Y. (AP) — U.N. experts have drawn up a list of 25 countries for possible designation as the least developed in the world.

The 25 were selected on the basis of their low national production, especially in manufacturing, and their high illiteracy rate.

The designation is not intended to embarrass the countries, but to make them eligible for special economic help authorized by the U.N. General Assembly to speed their development.

The countries on the list include 16 from Africa and six from Asia. Others are Haiti in the Caribbean, Western Samoa in the Pacific and Yemen in the Middle East. The remainder are Botswana, Burundi, Chad, Dahomey, Ethiopia, Guinea, Lesotho, Mali, Malawi, Niger, Rwanda, Somalia, Sudan, Uganda, Tanzania, Upper Volta, Afghanistan, Bhutan, Laos, Maldives, Nepal and Sikkim.

Together the 25 have a population of nearly 139 million, or about 8 per cent of the total population of all developing market economies of Africa, Asia and Latin America.

All the 25 selected have per capita annual gross domestic product of $100 or less, with not more than 10 per cent of this in manufacturing in most cases.

Most of them have a literacy rate of 20 per cent or less.

Four of the nations chosen economically that no statistics on these subjects were available, but the U.N. report said the absence of adequate data precluded their inclusion in the category of least developed.

Those selected on this basis were the Maldive Islands, Bhutan, Sikkim and Western Samoa.

The report suggested that the list should be updated from time to time to drop countries which advance to already reached by their neighbors.

"Of course," it said, "a too frequent scrutiny will be unjustified; the results of the complex development process emerge only after a reasonable duration of time."

It said the first re-appraisal of the list might take place at the midpoint of the U.N. Second Development Decade in 1975, and that another scrutiny could be made toward the end of the decade.

CHART A

POPULATION, GNP AND PAPER STATISTICS OF 25 NEEDIEST STATES

Country	Population	GNP	Lbs/Capita Use Paper	Lbs/Capita Use Board	Mills	Tons/Year
1. Haiti	4,675,000	91	1.3	-	-	-
2. Guinea	4,000,000	99	2.3	-	-	-
3. Mali	4,850,000	83	0.5	-	-	-
4. Upper Volta	5,200,000	-	0.3	-	-	-
5. Dahomey	2,700,000	-	3.5	-	-	-
6. Niger	3,650,000	88	0.6	-	-	-
7. Chad	3,500,000	66	0.4	-	-	-
8. Sudan	14,700,000	109	2.4	0.4	2	4,000
9. Ethiopia	23,400,000	63	0.7	-	2	650
10. Somalia	2,650,000	-	1.8	-	-	-
11. Uganda	9,500,000	96	2.8	-	1	?
12. Burundi	3,400,000	-	2.2	-	-	-
13. Rwanda	3,600,000	-	1.0	-	-	-
14. Tanzania	12,900,000	74	2.9	-	-	-
15. Malawi	4,450,000	58	1.9	-	-	-
16. Botswana	620,000	-	1.3	-	-	-
17. Lesotho	900,000	-	1.9	-	-	-
18. Yemen	5,000,000	-	2.0	-	-	-
19. Maldive Is.	-	-	-	-	-	-
20. Afghanistan	16,113,000	-	0.2	-	-	-
21. Nepal	11,365,110	75	2.4	-	200	588
22. Sikkim	-	-	-	-	-	-
23. Bhutan	800,000	-	3.0	-	-	-
24. Laos	2,800,000	-	1.8	-	-	-
25. W. Samoa	137,000	-	15.3	-	-	-

1968 PER CAPITA

PAPER AND BOARD CONSUMPTION AND GROSS NATIONAL PRODUCT

Country	$ GNP	Pounds	Country	$ GNP	Pounds
United States	4,379	551	France	2,537	179
Algeria	248*	16.8	Germany, W.	2,206	244
Argentina	672#	74	Ghana	238	6
Australia	2,479	240	Greece	813	50
Austria	1,544	146	Guatemala	315	13.2
Belgium	2,154	206	Guinea	99*	2.3
Bolivia	170	4.6	Haiti	91	1.3
Brazil	329#	26	Honduras	260	77
Burma	78	2.7	India	80#	3.3
Cambodia	146*	4	Indonesia	96	1.1
Cameroon	774#	7	Iran	295	10
Canada	2,997	368	Iraq	257	10
Ceylon	150	6.8	Ireland	1,024	147.5
Chad	66!	0.4	Israel	1,459	121
Chile	569	40.5	Italy	1,418	128
China, Taiwan	312	54	Ivory Coast	304	15.4
Columbia	319#	26.4	Japan	1,404	213
Congo	79	2	Jordan	282#	9.3
Costa Rica	457	98	Kenya	125	9.5
Denmark	2,545	272	Korea, South	194	20.4
Dominican Rep.	290	16.4	Libya	1,073#	16
Ecuador	229	66	Malagasy	116#	3.5
El Salvador	279	25	Malawi	58	1.9
Ethiopia	63#	0.7	Malaysia	314@	24.8
Finland	1,708	214	Mali	83!	0.5

Country	$ GNP	Pounds
Mauritania	121 !	0.4
Mexico	566	45
Morocco	208	12
Nepal	75	2.4
Netherlands	1,980	265
New Zealand	2,007 #	228
Nicaragua	380	16
Niger	88 @	0.6
Nigeria	76 @	1.6
Norway	2,362	238
Pakistan	140	2.4
Panama	615	127
Paraguay	229	6.7
Peru	291	31
Philippines	301	15
Portugal	529	48
Rhodesia, S.	197	22
Sierra Leone	153 #	4.4
South Africa	647	80
Spain	773	69
Sudan	109 #	2.4
Sweden	3,315	370
Switzerland	2,754	294
Syria	248	7.7
Thailand	166	10
Togo	124 @	1.5
Tunisia	225	15
Turkey	380	16

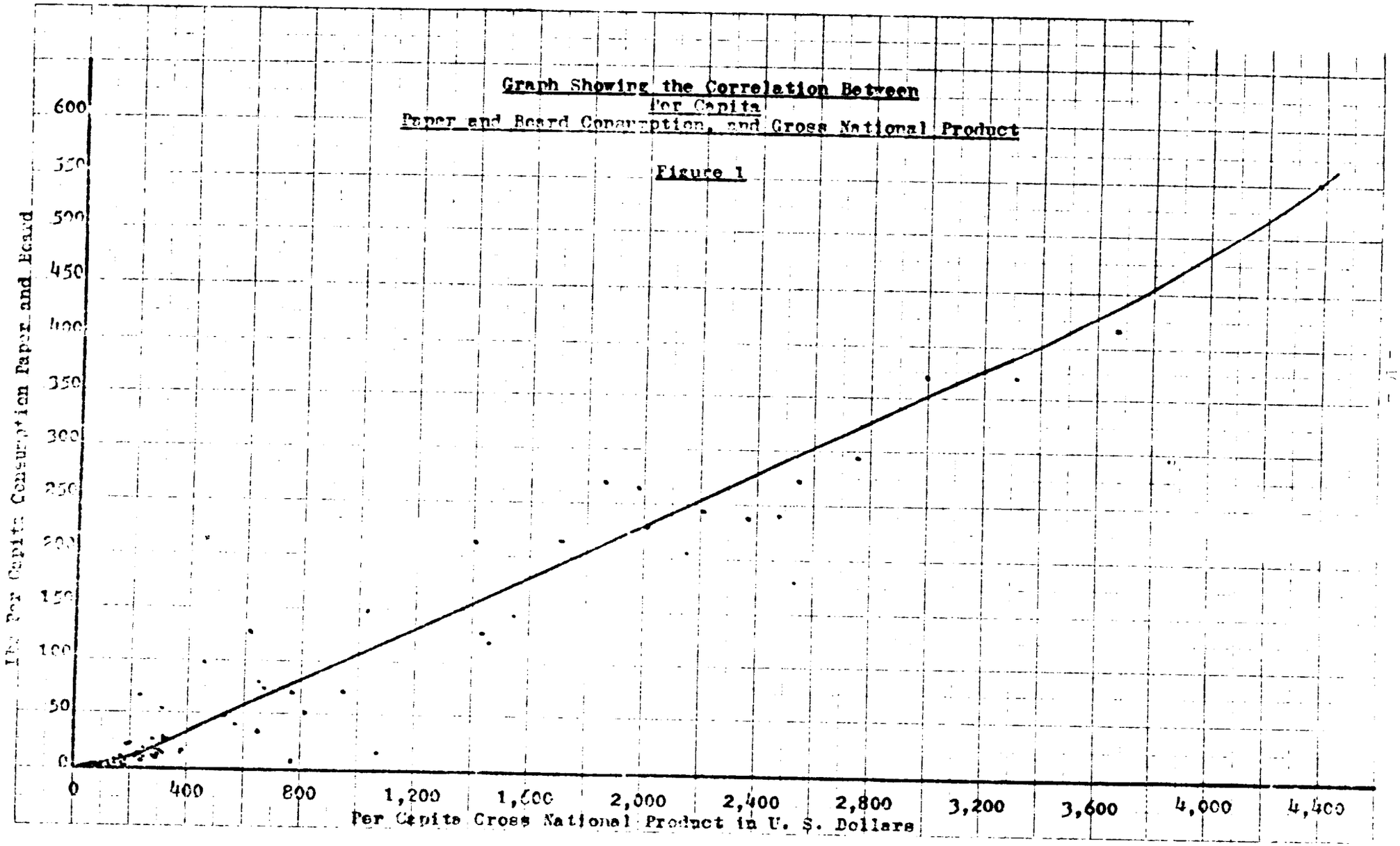
Country	$ GNP	Pounds
Uganda	96	2.8
Tanzania	74	2.9
United Kingdom	1,861	270
Uruguay	651	34
Venezuela	944	71
Vietnam, South	181 #	7.8
Zambia	298 #	12.3

* 1963 # 1967

! 1965 @ 1966

Graph Showing the Correlation Between Per Capita Paper and Board Consumption, and Gross National Product

Figure 1



prosperous because they have books, magazines and newspapers and can read and profit by them.

Where a developing country lacks fiber resources for a paper mill, the importation of waste paper may be a profitable solution to their problem.

PAPER AND WASTE PAPER USE IN VARIOUS COUNTRIES

Chart C shows the population; the per capita use of paper and board, and waste paper; and the per cent waste paper used of consumption and production. For purposes of comparison, only those countries listed as using waste paper are included.

The per cent of waste paper used is shown on both the basis of consumption and production, because, while in prosperous countries such as the U. S., Japan, W. Germany and Switzerland, the figures are not too different, in some such as Algeria, Morocco, Kenya, Tunisia and Bolivia, they are quite different and here the per cent of waste paper on production ranges from 60 to 100%.

It will also be noted, that in heavily forested countries such as Canada, Finland, Norway and Sweden which are heavy exporters of paper and board, the per cent used of production is relatively small.

Chart D shows the countries with the highest and lowest per capita paper and board, and waste paper consumption, per cent waste paper of consumption, and the gross national product. The countries are divided into four categories, Europe, Latin America, Asia and Africa.

It will be noted, that in general, there is a relationship between the per capita gross national product and the use of paper and board, and waste paper.

CHART C

1969 POPULATION; LBS/CAPITA USE OF PAPER AND BOARD, AND THE PER CENT WASTE PAPER USED OF CONSUMPTION

Countries	Millions Population	Pounds Paper	Pounds Waste	% Waste Consump.	% Waste Product.
North America					
United States	203.22	576	103	18	20
Canada	21.00	393	50	13	4
Europe					
W. Germany	60.84	270	83.5	31	45
Sweden	8.00	410	64	16	6
Norway	3.86	255	51	20	7
Finland	4.70	230	62	27	3
Denmark	4.86	313	58	18	53
Netherlands	12.87	298	85	28	31
Belgium	9.65	236	36	15	22
France	50.70	204	58	28	33
United Kingdom	55.67	282	73	26	37
Switzerland	6.17	317	101	32	42
Austria	7.38	161	65	40	23
Spain	32.70	81	20	24	28
Yugoslavia	20.35	57.6	15	26	23
Poland	32.70	69.2	15	22	26
Czechoslovakia	14.36	127	29	23	23
Greece	8.80	53	10	19	29
Hungary	10.31	88	21	24	39
Rumania	20.00	46.6	8	17	15

Countries	Millions Population	Pounds Paper	Pounds Waste	% Waste Consump.	% Waste Product.
Asia					
Japan	102.64	243	91	37	37
India	525.00	3.6	0.2	6	7
Pakistan	120.00	2.7	0.3	11	12
Thailand	34.56	13.3	1.4	10	40
Israel	2.93	122	15	12	27
South Korea	31.87	22	4.7	22	23
Taiwan	14.34	55	7	13	13
Turkey	34.45	17.6	0.8	5	10
Ceylon	12.53	6.8	0.2	3	13
Singapore	2.02	91	0.8	1	49
Africa					
U. A. R.	32.00	14	7	47	72
South Africa	19.62	87	13	15	21
Morocco	14.80	13	6	42	62
Tunisia	5.10	15	2	13	100
Nigeria	55.60	2.4	0.1	4	31
Algeria	12.90	17	4	23	60
Kenya	10.50	9.5	0.6	6	86
Oceania					
New Zealand	2.76	246	42	17	12

Countries	Millions Population	Pounds Paper	Pounds Waste	% Waste Consump.	% Waste Product.
Latin America					
Mexico	46.50	48	19	39	48
Chile	9.67	43	7	16	11
Uruguay	2.80	41	11	28	42
Cuba	8.10	34	7	22	26
Brazil	90.50	27.5	6	21	25
Argentina	24.20	81	0.3	0.4	0.6
Columbia	21.00	25.6	0.7	3	3
Peru	12.40	29	7	25	38
Panama	1.42	145	10	7	8
Bolivia	4.55	5.2	0.2	4	87
Guatemala	4.40	14.8	3	19	50

CHART D

COUNTRIES WITH THE HIGHEST AND LOWEST PER CAPITA

PAPER AND BOARD, AND WASTE PAPER CONSUMPTION, % WASTE PAPER OF CONSUMPTION AND THEIR GNP

	Pounds/Capita Paper & Board		Pounds/Capita Waste Paper		% Waste Paper of Consumption	
Area	Highest	Lowest	Highest	Lowest	Highest	Lowest
Europe	Sweden	Greece	Switzerland	Greece	Austria	Belgium
	410 GNP 3,315	53 GNP 813	101 GNP 2,754	10 GNP 813	40 GNP 1,544	15 GNP 2,154
Latin Am.	Panama	Bolivia	Mexico	Argentina	Mexico	Argentina
	145 GNP 615	5.2 GNP 170	19 GNP 566	0.3 GNP 672	39 GNP 566	0.4 GNP 672
Asia	Japan	Pakistan	Japan	India	Japan	Singapore
	243 GNP 1,404	2.7 GNP 140	91 GNP 1,404	0.2 GNP 80	37 GNP 1,404	0.9 GNP ?
Africa	S. Africa	Nigeria	S. Africa	Nigeria	U. A. R.	Nigeria
	87 GNP 647	2.4 GNP 76	13 GNP 647	0.1 GNP 76	47 GNP ?	4 GNP 76

WASTE PAPER COLLECTION

In developed countries, waste paper dealers are an important element in the supply system of raw materials for paper and board mills. Just as paper mills contract for their virgin pulp requirements with pulp brokers, similarly those using waste paper contract with the waste paper dealers for the different grades required.

While in some instances, it may be possible to buy waste paper directly at the point of generation, the dealer performs an important function in developing sources of supply and in maintaining quality.

A paper given at the Canadian Pulp and Paper Association Technical Section meeting in Montreal in January 1970 pointed out that paper sorting in dealers plants, for all practical purposes, is non-existent because of high labor costs. The only economically feasible sorting is that done at the point of generation (4).

The successful waste paper dealer must be something of a diplomat as he must impose the requirements of his customer on the employees of the generating plant. Contaminants are here to stay, and in order to prevent their inclusion in the bales of waste paper, there must be good communication between the personnel of the mill, the waste paper dealer and the employees of the generating plant (5).

In developing countries, however, the cost of labor usually is such that sorting will be feasible for some time.

In most countries, regardless of their state of development, the sources of waste paper will fall into the following categories listed in approximate order of importance. Collections from: converting plants using paper and board, such as printing establishments, envelope manufacturers, carton plants, etc.; other industrial plants; retail stores; offices; households.

It is apparent, that the most important source of waste paper are the converting plants. Here, segregation into various grades is relatively simple and inexpensive.

Many industrial plants receive supplies wrapped in paper or cartons which can be baled and picked up by the waste paper dealer.

Retail stores receive merchandise in cartons and cardboard containers, often with inner wrapping. The larger stores can afford to install a baler. The smaller ones can save the waste for pickup by a dealer.

Office waste, except for large organizations such as insurance companies and government agencies, is usually badly contaminated. Even office files often contain such contaminents as carbon paper and plastics.

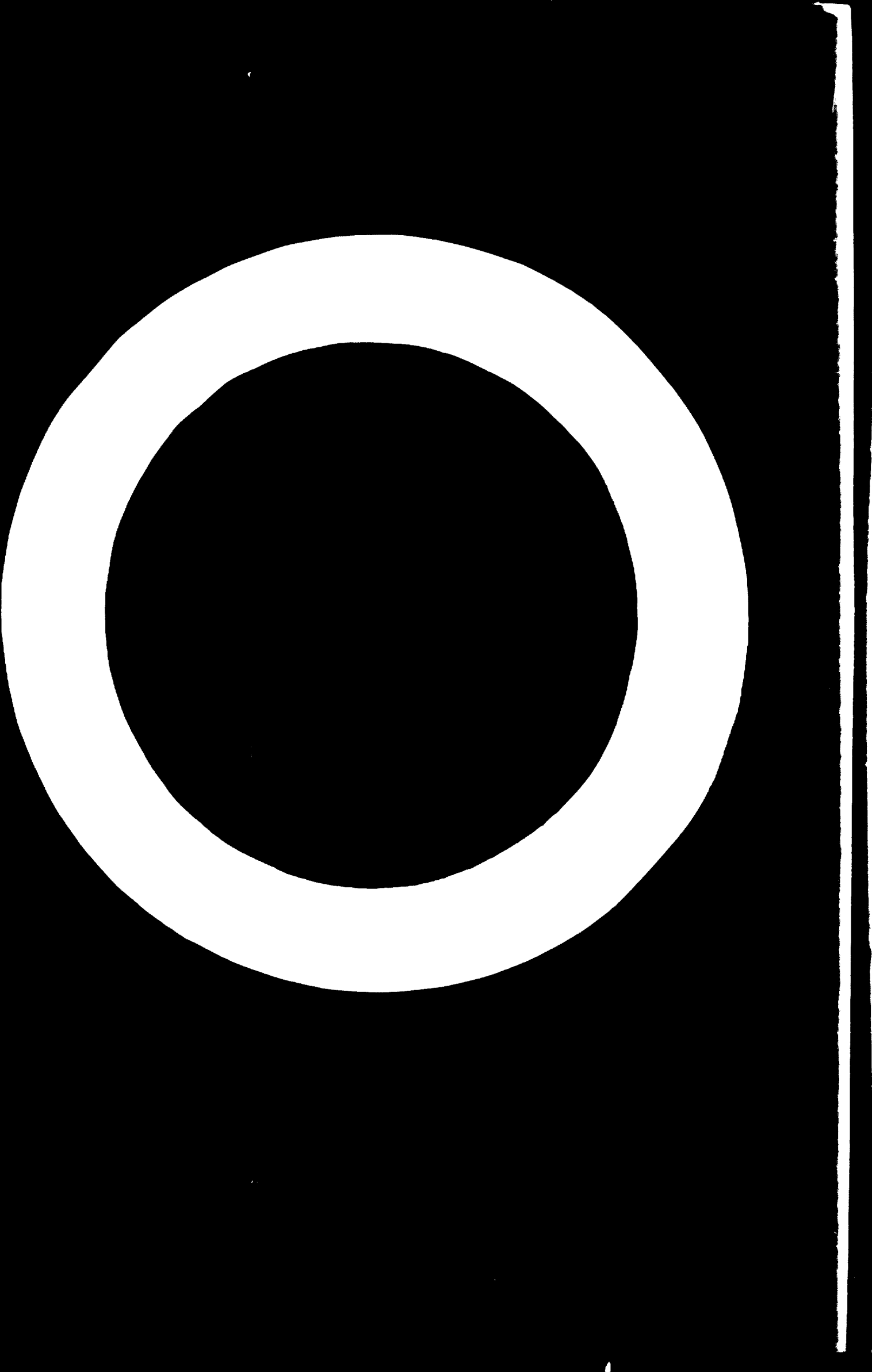
Household collections from developing countries will, in all probability, be very small as newspapers, magazines, wrapping paper and cartons will have considerable secondary value, and will have a higher value to the owner than the dealer can afford to pay. It isn't too many years ago

that in Canada, old Simpson and Eaton, and in the U. S., Sears Roebuck and Montgomery Ward catalogs had considerable secondary use.

The Paper Stock Institute of America have drawn up 'Paper Stock Standards and Practices' in Circular PS-70 that could serve as a model for waste paper dealers in developing countries, a copy follows. This could be modified to suit local conditions.

The nucleus of an organization of waste paper dealers will be found to exist in all countries, whether or not there is a paper industry, in the dealers that collect scrap metal and other waste materials.

There must be a high degree of cooperation, understanding and trust between the waste paper dealer and the paper or board mill in order to achieve a mutually satisfactory relationship. At the start, this will require a period of education and adjustment on the part of both the dealers and the mills.



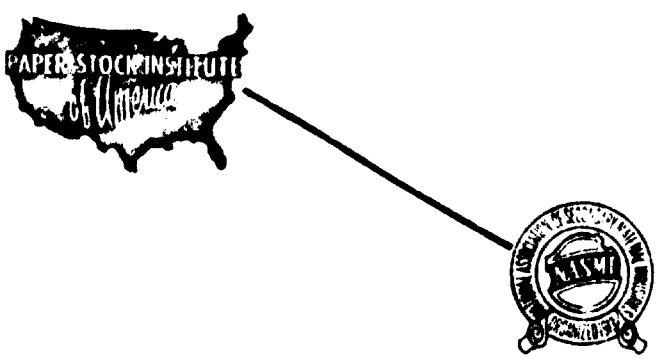
PAPER STOCK INSTITUTE OF AMERICA

A Commodity Division of

NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, Inc.

Paper Stock Standards and Practices

CIRCULAR PS-69



Effective as of January 1, 1969

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This is printed on Thor Cote Satin—made with reconstituted paper stock fibers.

PREAMBLE

These standards and practices apply to paper stock for repulping only and are for use in the United States and Canada. Transactions covering shipments to or from other countries shall also be in accordance with these standards and practices, unless modified by mutual agreement between buyer and seller.

Basic to the success of any buyer-seller relationship is an atmosphere of "good faith."

In keeping with this, the following underlying principles have been accepted as necessary to the maintenance of amicable dealings:

1. Seller must use due diligence to ascertain that shipments consist of properly packed paper stock and that shipment is made during the period specified
2. Arbitrary rejections, deductions and cancellations by the buyer are counter to acceptable good trade practice.
3. Seller shall deliver the quality of paper stock agreed upon but shall not be responsible for its use or the paper or paperboard manufactured therefrom.

I The Purchase Agreement

Each transaction covering the purchase or sale of Paper Stock should be confirmed in writing and include agreement on the following items:

1. Quantity

   Where possible the quantity shall always be specified in terms of a definite number of tons of 2,000 lbs. each.

   a. If the quantity is specified in tons, the order shall be considered completed when aggregate shipments are 5% under or over the quantity ordered.

   b. If the quantity is specified in carloads, a carload is defined as not more than 10% above minimum weight agreed upon.

   c. If the quantity is specified in truckloads, unless otherwise agreed to, a truckload is defined as:

   A motor truck loaded to full visible capacity but the weight of the load shall not exceed legal limits.

2. Grades

   Where possible, each grade purchased shall be specified in accordance with the grade as defined in SECTION VI hereof.

3. Packing

   Whether units are to be bales, skids, rolls, pallets, boxes, or bundles should be stated. Where possible, approximate sizes or weights should be specified.

4. Price Units

   The price agreed upon shall be clearly stated in dollars and cents per 2,000 lb. ton or in dollars and cents per hundredweight.

5. Transportation Charge

   This shall be clearly indicated with the use of the phrases "f.o.b. shipping point" or "delivered destination" or "f.o.b. shipping point—($$$) freight allowed."

6. Shipping Instructions

   Shipping instructions should clearly specify shipping schedule, route, delivering carrier and destination.

7. Shipping Period

   The shipping period shall be understood to be within 30 days of date of order unless otherwise specified.

8. Terms

   Terms shall be "net cash 30 days after date of shipment" unless otherwise agreed upon.

9. Method of Invoicing

   Invoicing instructions shall be clearly stated.

II. Fulfillment By The Seller

Practices of the seller shall be in accordance with the following:

1. Acceptance

   An order is confirmed if verbal or written agreement or initial shipment is received by the buyer.

2. Grading

   Paper stock which is sold under the grade names appearing in SECTION VI shall be warranted to conform to those grading specifications.

3. Baling

   Each bale must be secured with a sufficient number of bale ties drawn tight to insure a satisfactory delivery. The maximum weight of any bale SHOULD not exceed 2,000 lbs.

4. Tare

   Sides and headers must be adequate to make a satisfactory delivery of the packing but must not be excessive, nor can they consist of prohibitive materials. The weight of skids or iron cores should be deducted from a gross invoice weight.

5. Identification

   The shipper should mark each individual bale as to weight and grade.

6. Loading

   Paper Stock shall be loaded as follows:

   a. Before they are loaded, cars and trucks shall be free from objectionable materials, odors, and have sound floors.

   b. Grades should be loaded in straight loads unless otherwise agreed to. When two or more grades are included in the same shipment, units of each grade should be kept together in a separate part of the car or truck.

   c. Paper stock must be loaded in a manner that will minimize shifting and breakage. Excessive breakage due to improper loading shall be cause for rejection.

Shipping Notice

A shipping notice or an invoice showing the date of shipment, car number and contents shall be mailed to the buyer within 24 hours of shipment. On request, a bill of lading should also be furnished.

Invoicing

Invoicing should conform to instructions on the order and include the following data:

a. Date of Shipment
b. Car or Truck Number
c. Customer's Order Number
d. Shipper's Invoice Number
e. f.o.b. Point
f. Number of bales, rolls, etc.
g. Quantity and Grade
h. Price and Extension
i. Terms

Rejection

When a seller has been notified of a rejection, he must within 48 hours advise the buyer as to which of the following procedures he has decided upon:

a. Order reshipment of the material.

b. Require the opportunity to inspect the quality of the rejected material within three business days and during such period give buyer final disposition.

c. Agree with the buyer to a compromise acceptance and settlement.

d. Request the buyer to agree to submit the rejected shipment to arbitration.

III. Fulfillment By The Buyer

The practice of the buyer shall be in accordance with the following:

Unloading

After arrival of the shipment the buyer is to inspect the contents so far as possible while it is still loaded.

If the shipment appears to be in accordance with the order and shipping notice, the buyer shall proceed with the unloading.

Where the bales are tagged or labeled, the buyer shall keep an accurate tally by identifying each bale by number, grade and weight.

If the shipment does not appear to be in accordance with the order and shipping notices, or if the quality of the stock is not in accordance with specifications as agreed, the buyer shall immediately notify the seller of such rejection before unloading.

If during the process of unloading, any portion of the shipment not visible in the original inspection is not in accordance with specifications, shipping notice and order, that portion shall be set aside and the seller immediately notified of its rejection.

If at any time within 21 days after receipt of shipment the buyer upon opening the bales finds objectionable materials heretofore not visible, he shall have the right to reject the stock and shall immediately notify the seller.

In the event of any rejection, the buyer shall use due diligence to protect all controversial paper stock from excessive deterioration or contamination.

Settlement

In the event that the buyer does not intend to make settlement in accordance with the seller's invoice for reasons OTHER THAN QUALITY,

—the buyer shall within 10 days of unloading notify the seller of any necessary changes and shall furnish detailed information with regard to these changes.

IV. Miscellaneous Practices

1. Ownership

a. If the shipment is purchased "f.o.b. shipping point" and is in accordance with the agreement covering the transaction, it becomes the property of the buyer upon date of shipment.

b. If the shipment is purchased on a "delivered destination" basis and is in accordance with the agreement covering the transaction, it remains the property of the seller until it is delivered to the buyer by carrier.

c. If the shipment is purchased on an "f.o.b. shipping point, specified freight allowed" basis and is in accordance with the agreement covering the transaction, it becomes the property of the buyer upon date of shipment.

2. Demurrage Charges

a. Any demurrage accruing on a shipment due to the failure of the seller to ship in accordance with the order, except with respect to quality, is the liability of the seller.

b. In the event that a rejection for quality stands, any demurrage accruing on the shipment prior to notification to the seller shall be the buyer's liability.

c. In the event that negotiation of a substantiated rejection for quality results in agreement by the buyer to accept the shipment, then only the demurrage, following notification of rejection and including 24 hours after the agreement, becomes the liability of the seller. Demurrage accruing prior to and including the day of notification becomes the liability of the buyer.

3. Switching and Freight Charges

Any extra switching or excess freight charges accruing on a shipment due to the failure of the seller to protect the agreed upon minimum rail rate or to ship in accordance with the agreement, is the liability of the seller.

4. Weight Discrepancies

No debits, credits or adjustments shall be issued on any shipment of paper stock when the weight variation is 1% or less.

In the event that a discrepancy exceeds those mentioned above as 'allowable,' the buyer and seller shall exchange copies of unloading and loading records showing individual bale weights. In the event that both parties have such records, and errors cannot be determined, it is recommended that the weight closest to the public carrier's scale weight shall be assumed to be correct. In the absence of such records on the part of one of the parties, the records of the other party shall govern.

5. Moisture Content

a. All Paper Stock must be packed air dry:
Where excess moisture is present in the shipment, the buyer has the right to reject it.

6. Replacement of Shipment

a. In the event that any shipment is rejected due to quality,

Whether or not the shipment is to be replaced is to be decided by mutual agreement between buyer and seller.

7. Promptness of Shipment

a. In the event that shipments are postponed,

(1) on instructions of the BUYER
the seller shall have the option of extending the time limit of the order by the same number of days of the postponement, or of cancelling that portion of the order on which shipment was postponed. Seller shall promptly notify buyer of option selected.

(2) on instructions of the SELLER
the buyer shall have the option of extending the time limit of the order by the same number of days of the postponement, or of cancelling that portion of the order on which shipment was postponed. Buyer shall promptly notify seller of option selected.

8. Outthrows

a. Outthrows shall be understood to be all papers that are so manufactured or treated or are in such form as to be unsuitable for consumption as the grade specified.

9. Prohibitive Materials

a. Any materials which by their presence in a packing of Paper Stock, in excess of the amount allowed, will make the packing unusable as the grade specified.

b. Any materials that may be damaging to equipment.

FOR EXAMPLE

It is important to note in connection with Items 8 and 9 above that a material can be classified as an "Outthrow" in one grade and as a "Prohibitive Material" in another grade.

Carbon paper, for instance, is "UNSUITABLE" in #2 Mixed Paper and is therefore classified as an "Outthrow"; whereas, it is "UNUSABLE" in White Ledger and in this case is classified as a "Prohibitive Material."

V. Arbitration

1. In the event of a total disagreement between buyer and seller, the dispute should be submitted to arbitration by a mutually satisfactory third party.

2. In all cases the cost of arbitration shall be borne by the party found to be at fault.

VI. Grade Definitions

The grade definitions described are definitions intended to define grades as they should be packed and graded. CONSIDERATION SHOULD BE GIVEN TO THE FACT THAT PAPER STOCK AS SUCH IS A SECONDARY MATERIAL PRODUCED MANUALLY AND MAY NOT BE TECHNICALLY PERFECT.

OUTTHROWS

The term "Outthrows" as used throughout this section is defined as "all papers that are so manufactured or treated or are in such a form as to be unsuitable for consumption as the grade specified."

PROHIBITIVE MATERIALS

The term "Prohibitive Materials" as used throughout this section is defined as:

a. Any materials which by their presence in a packing of Paper Stock, in excess of the amount allowed, will make the packing unusable as the grade specified.

b. Any materials that may be damaging to equipment.

(See example under Section 9, Article IV)

Note: The maximum quantity of "Outthrows" indicated in connection with the following grade definitions is understood to be the TOTAL of "Outthrows" and "Prohibitive Materials."

A detailed list of most of the Prohibitive Materials and Outthrows that supplement and augment the Grade Definitions 38, 39, 40, 41, 42, 43, is available on request from Association Headquarters.

(1) #2 — MIXED PAPER

Consists of a mixture of various qualities of paper not limited as to type of packing or soft stock content.

Prohibitive materials may not exceed.....2%

Total Outthrows may not exceed.....10%

(2) #1 — MIXED PAPER

Consists of a mixture of various qualities of paper, packed in bales weighing not less than 500 pounds and containing less than 25% of soft stocks such as News.

Prohibitive materials may not exceed.....1%
Total Outthrows may not exceed.....5%

(3) SUPER MIXED PAPER

Consists of a clean sorted mixture of various qualities of papers, packed in machine compressed bales not less than 60 inches in length and containing less than 10% of soft stocks such as newspapers.

Prohibitive materials may not exceed ...½ of 1%
Total Outthrows may not exceed.....3%

(4) BOXBOARD CUTTINGS

Consists of baled new cuttings of paperboard such as are used in the manufacture of folding paper cartons, set-up boxes and similar boxboard products.

Prohibitive materials may not exceed.... ½ of 1%
Total Outthrows may not exceed.....2%

(5) MILL WRAPPERS

Consists of baled kraft paper as used as outside wrappers for rolls, bundles or skids of finished paper.

Prohibitive materials may not exceed... ½ of 1%
Total Outthrows may not exceed.....3%

(6) #1 — NEWS

Consists of newspapers packed in bales of not less than 54 inches in length containing less than 5% of other papers.

Prohibitive materials may not exceed....½ of 1%
Total Outthrows may not exceed.....2%

(7) SUPER NEWS

Consists of sorted fresh newspapers, not sunburned, packed in bales of not less than 60 inches in length, free from papers other than news and containing not more than the normal percentage of rotogravure and colored sections

Prohibitive materials.....None permitted
Total Outthrows may not exceed.....2%

(8) OVER-ISSUE NEWS

Consists of unused over run regular newspapers printed on newsprint, baled or securely tied in bundles, and shall contain not more than the normal percentage of rotogravure and colored sections.

Prohibitive materials.....None permitted
Total Outthrows.....None permitted

(9) SOLID FIBRE CONTAINERS

Consists of solid fibre containers having liners of either jute or kraft, packed in bales.

Prohibitive materials may not exceed.....2%
Total Outthrows may not exceed.....5%

(10) CORRUGATED CONTAINERS

Consists of corrugated containers having liners of either jute or kraft, packed in bales of not less than 54 inches in length

Prohibitive materials may not exceed.....1%
Total Outthrows may not exceed.....5%

(11) NEW CORRUGATED CUTTINGS

Consists of baled corrugated cuttings having two or more liners of either jute or kraft. Butt rolls, slabs of medium and printed containers are not acceptable in this grade.

Prohibitive materials may not exceed.....1%
Total Outthrows may not exceed.....5%

(12) NEW DOUBLE KRAFT LINED CORRUGATED CUTTINGS

Consists of baled corrugated cuttings having all liners of kraft. This grade shall be free from non-soluble adhesives, butt rolls, slabs of medium, and printed containers.

Prohibitive materials.....None permitted
Total Outthrows may not exceed.....2%

(13) NEW BROWN KRAFT CORRUGATED CUTTINGS

Consists of baled corrugated cuttings having all liners of brown kraft. The corrugated medium must be either semi-chemical or kraft. This grade shall be free from non-soluble adhesives, butt rolls and printed containers.

Prohibitive materials.....None permitted
Total Outthrows may not exceed.....2%

(14) #1 — USED BROWN KRAFT BAGS

Consists of baled brown kraft bags free of objectionable liners or contents

Prohibitive materials.....None permitted
Total Outthrows may not exceed.....½ of 1%

(15) MIXED KRAFT BAGS

Consists of baled used kraft bags free from twisted or woven stock and other similar objectionable materials.

Prohibitive materials may not exceed.....2%
Total Outthrows may not exceed.....5%

(16) #1 — BROWN KRAFT PAPER

Consists of baled, used brown kraft papers excluding twisted or woven stock.

Prohibitive materials may not exceed.....2%
Total Outthrows may not exceed.....5%

(17) SUPER SORTED BROWN KRAFT

Consists of baled clean sorted brown kraft papers free from twisted or woven stock, sewed edges and heavy printing. Bales must be 60 inches or more in length.

Prohibitive materials.....None permitted
Total Outthrows may not exceed.....2%

(18) NEW COLORED KRAFT

Consists of baled new colored kraft cuttings, sheets and bag waste of bleachable colors but free of sewed or stitched papers.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(19) NEW BROWN KRAFT CUTTINGS

Consists of baled new unprinted brown kraft cuttings or sheets entirely free from sewed edges, twisted or woven stock.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(20) NEW BROWN KRAFT BAG WASTE

Consists of new brown kraft cuttings and sheets, including cosprint bags. Stitched or sewed papers are not acceptable in this grade.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(21) NEW BROWN KRAFT ENVELOPE CUTTINGS

Consists of baled new unprinted brown kraft envelope cuttings or sheets.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(22) MIXED SHAVINGS

Consists of baled trim of magazines, catalogs and similar printed matter, not limited with respect to groundwood or coated stock, and may contain the bleed of cover and insert stock as well as beater dyed papers and solid color printing.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 2%

(23) #1 — GROUNDWOOD SHAVINGS

Consists of baled trim of magazines, catalogs and similar printed matter free from beater-dyed papers, and may contain not over 5% of solid color printing.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(24) WHITE NEWSBLANKS

Consists of baled unprinted cuttings and sheets of white newsprint paper or other papers of white groundwood quality.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(25) SUPER WHITE NEWSBLANKS

Consists of baled unprinted cuttings or sheets of white newsprint of uniform brightness and quality.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed ..... ½ of 1%

(26) PUBLICATION BLANKS

Consists of baled unprinted cuttings, or sheets of white coated or tinted white groundwood content paper.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(27) #1 — FLYLEAF SHAVINGS

Consists of baled trim of magazines, catalogs and similar printed matter. It may contain the bleed of cover and insert stock to a maximum of 10% of dark colors, and must be made from predominantly bleached chemical fibre. Beater-dyed papers may not exceed 2%. Shavings of novel news or newsprint grades may not be included in this packing.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(28) #1 — SOFT WHITE SHAVINGS

Consists of baled shavings and sheets of all-white sulphite printing papers, free from printing. This grade may contain sulphite papers containing a small percentage of groundwood.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed 1%

(29) SUPER SOFT WHITE SHAVINGS

Consists of baled shavings and sheets of all-white sulphite and sulphate printing papers of reasonably uniform brightness free from printing but may contain not more than 5% of coated papers.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed ..... ½ of 1%

(30) HARD WHITE SHAVINGS

Consists of baled shavings or sheets of all untreated white bond ledger or writing papers. Must be free from printing and groundwood.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed ..... ½ of 1%

(31) HARD WHITE ENVELOPE CUTTINGS

Consists of baled envelope cuttings or sheets of untreated hard white papers free from printing, groundwood and soft stocks.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed ..... ½ of 1%

(32) SUPER HARD WHITE ENVELOPE CUTTINGS

Consists of baled cuttings or sheets of untreated white envelope papers of reasonably uniform brightness free from printing, groundwood and soft stock.

Prohibitive materials ..... None permitted
Total Outthrows may not exceed ..... ½ of 1%

(33) NEW COLORED ENVELOPE CUTTINGS

Consists of baled untreated colored envelope cuttings, shavings or sheets of bleachable colored papers, predom-

...antly sulphite or sulphate ... from all printing.

Prohibitive materials ... None permitted
Total Outthrows not to exceed ... 2%

(34) SEMI BLEACHED ENVELOPE CUTTINGS

Consists of bleached envelope cuttings, shavings or sheets of manila colored papers predominantly sulphite or sulphate, free from all printing.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(35) SUPER SEMI BLEACHED CUTTINGS

Consists of bleached cuttings and sheets or untreated sulphite or sulphate papers, free from printing.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... ½ of 1%

(36) COLORED TABULATING CARDS

Consists of printed colored or manila cards predominantly sulphite or sulphate which have been manufactured for use in tabulating machines. Unbleached kraft cards are not acceptable.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 1%

(37) MANILA TABULATING CARDS

Consists of printed manila colored cards, predominantly sulphite or sulphate which have been manufactured for use in tabulating machines. This grade may contain manila colored cardboard cards with tinted margins.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(38) #1 SORTED COLORED LEDGER

Consists of printed or unprinted sheets, shavings, and cuttings of colored or white sulphite or sulphate ledger, bond, writing and other papers which have a similar fibre and filler content. This grade must be free of treated, coated, padded, or heavily printed stock.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(39) SUPER COLORED LEDGER

Consists of sheets and side trim of new printed or unprinted colored or white sulphite or sulphate papers such as are used in the manufacturing of manifold forms, continuous forms, register forms, and similar office forms. Those forms used once for machine data processing may be included. All stock must be untreated and uncoated.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(40) #1 SORTED WHITE LEDGER

Consists of printed or unprinted sheets, shavings and cuttings of white sulphite or sulphate ledger, bond, writing, and other papers which have a similar fibre and filler content. This grade must be free of treated coated, padded, or heavily printed stock.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(41) SUPER WHITE LEDGER

Consists of sheets and side trim of new printed or unprinted white sulphite or sulphate papers such as are used in the manufacturing of manifold forms, continuous forms, register forms, and similar office forms. Those forms used once for machine data processing may be included. All stock must be untreated and uncoated.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(42) #1 GRADED MAGAZINES

Consists of a mixture of any clean magazines only, free from newspaper magazines, pulp magazines, novel news, comic books, pocket books, paper of course or shiny papers. Movie magazines, fan magazines, detective magazines and similar publications are not acceptable.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(43) #1 BOOK STOCK

Consists of bleached sulphite or sulphate papers, printed or unprinted in sheets, bookbinders, unfolded books or quire waste. A small percentage of papers containing fine groundwood for illustration may be included.

Prohibitive Materials ... None permitted
Total Outthrows may not exceed ... 2%

(44) PRINTED BLEACHED SULPHATE CUTTINGS

Consists of printed bleached sulphate cuttings free from misprint sheets, printed cartons, wax, greaseproof lamination, gilt, and inks, adhesives or coatings that are non-soluble.

Prohibitive materials may not exceed ... ½ of 1%
Total Outthrows may not exceed ... 2%

(45) MISPRINT BLEACHED SULPHATE

Consists of misprint sheets and printed cartons of bleached sulphate free from wax, grease proof lamination, gilt, and inks, adhesives or coatings that are non-soluble.

Prohibitive materials may not exceed ... 1%
Total Outthrows may not exceed ... 2%

THE IMPORTATION OF WASTE PAPER

There are two sources of waste paper available for mills now operating or contemplated in developing countries, that generated within the country, and that imported.

Chart E shows the tons of waste paper, its total value and the average cost per ton at the point of shipping in the United States (6). Twenty six countries are listed.

It will be noted that there is a wide spread between the 80 tons imported by Bahamas at a value of $156 per ton and the 132,147 tons imported by the Philippines at $17.90 per ton. Probably the former consisted of side runs or rejected paper, not actually waste paper and the latter low grades of high groundwood content.

The other large users besides the Philippines; Canada, Mexico , Venezuela, Italy and Japan used grades that averaged between $49.40 and $63.30 per ton and probably consisted of ledgers and tab cards.

The tonnage of waste paper exported from the United States in only about 5% of that consumed and the total only 19% of the paper and board consumed. This means that a very considerable tonnage of waste paper can be made available for the requirements of mills in developing countries by waste paper dealers in the United States.

It is true, of course, that there will be a greater supply of some grades than others and that great care must be made in the selection of grades to be purchased. The same is

CHART E

WASTE PAPER EXPORTED FROM THE U. S. IN 1970

Country	2,000# Tons	Total Value	Value/Ton
Canada	63,381	$3,135,315	$49.50
Mexico	61,674	3,631,141	58.90
Panama	2,159	156,431	72.50
Bahamas	80	12,492	156.00
Jamaica	136	20,230	149.00
Haiti	251	20,511	81.70
Dominican Republic	231	23,580	102.20
Venezuela	48,387	2,391,644	49.40
Ecuador	433	50,742	117.00
Peru	200	14,600	73.00
Uruguay	2,712	143,217	53.00
Argentina	846	40,193	47.50
West Germany	413	31,827	77.00
Spain	4,331	207,708	47.90
Italy	48,523	2,554,965	52.60
Lebanon	405	48,292	119.10
Thailand	7,074	506,198	71.60
South Vietnam	1,385	50,248	36.30
Philippines	132,147	2,367,270	17.90
South Korea	16,148	988,733	61.20
Hong Kong	421	20,271	48.20
Taiwan	15,285	963,260	63.00
Japan	86,996	5,508,292	63.30
Australia	6,889	343,251	49.80
Mozambique	2,296	122,675	53.50
South Africa	5,705	391,700	68.60
Others	1,280	64,260	50.20
Total	509,788	$23,809,046	46.80 Av.

true of the waste paper dealers selected. When waste paper is purchased locally, should a car or truck load prove to be unsatisfactory, the mill tells the dealer to remove the shipment. This is not possible with that imported and some definite financial arrangement should be made in advance on the disposal of rejected shipments.

An investigation of world pulp prices and freight rates on waste paper reveals quite a complicated structure. Freight rates for baled pulp and waste paper depend upon the bale density, the lower the weight per cubic foot, the higher the rate. For this reason, care should be taken to specify bales of the highest density possible.

The following example of ocean freight rates on waste paper furnished by the Process Evaluation & Development Corp. shows something of its complexity.

Shipping Waste Paper in compressed bales, wire strapped

1. From NY or Eastern Seaboard to Capetown, South Africa

Volume & Weight		Rate	
Up to 80 cu. ft.	per 2240 lbs	$37.50	per 2240 lbs
110	2240	48.50	2240
130	2240	56.50	2240
Over 130	2240	66.00	2240
Insurance All Risk plus war		$0.60	per $100.00

2. From NY or Eastern Seaboard to Buenos Aires, Argentina

Up to 40 cu. ft.	per 2000 lbs	$47.00	per 2000 lbs
Insurance All Risk plus war		$0.40	per $100.00

3. From NY or Eastern Seaboard to Valparaiso, Chile

Up to 40 cu. ft. per	2000 lbs	$45.00 per	2000 lbs
75	2000	51.00	2000
100	2000	58.00	2000
Over 100	2000	82.50	2000

Additional Charges: Plus 5% on total freight for bunker and 3% Chilean Tax.

Insurance: All Risk plus war $0.40 per $100.00

4. From San Francisco and West Coast to Manila, Philippines

Up to 60 cu. ft. per	2000 lbs	$39.25 per	2240 lbs
75	2000	47.75	2240
90	2000	49.00	2240
105	2000	50.25	2240
120	2000	52.25	2240
135	2000	54.00	2240
Over 135	2000	55.75	2240

Additional Charges: $2.00 per 2000 lb bunker
2.35 2000 handling
1.00 2000 wharfage

Insurance: All Risk plus war $0.60 per $100.00

5. From San Francisco and West Coast to Yokohama, Japan

Up to 75 cu. ft. per	2000 lbs	$34.50 per	2240 lbs
90	2000	40.75	2240
105	2000	43.25	2240
120	2000	46.25	2240
135	2000	48.50	2240
Over 135	2000	50.50	2240

Additional Charges and Insurance the same as for #4.

To give a rough idea of the comparative prices of pulp and waste paper delivered to the dock of the receiving country, the following example is given. All prices are given in dollars per metric ton for the sake of simplicity.

Country	So. Bl. Pine Kr.	Unbl. Kr.	#1 News	Corrug. Cont'rs	White Ledger	Tab Cards
Argentina	$208	$186	$71	$69	$101	$146
Philippines	201.72	177.47	62	65	100	128
Japan	188.49	165.35	54	56	92	119

It is evident that a considerable saving can be made by the substitution of waste paper for virgin pulp where both must be purchased abroad.

THE USE OF WASTE PAPER IN DEVELOPING COUNTRIES

There is only one valid reason for the use of waste paper as a source of fiber, that is, if it is cheaper than the virgin fiber. If it is more expensive, its use should not be encouraged.

Developing countries which have fiber resources within their borders such as suitable forests, bamboo, agricultural residues like bagasse or straw, should concentrate on these as their cost will be less than imported waste paper and the quality more uniform. This, of course, does not preclude the use of domestic waste paper if it costs less than virgin fiber.

The price of waste paper in the United States, during the past few years, has remained more or less stationary, while that of pulp has increased. Chart F shows pulp and waste paper prices in 1962 and 1971 (7). Waste paper prices, however, are more subject to short term fluctuations because its generation is not as steady as pulp production. It will be noted that, in several instances, waste paper prices have decreased while pulp prices all have advanced. The present emphasis on recycling in the United States may cause an upward trend in price. It is difficult at this time to foresee whether or not such a trend will persist.

Waste paper can be efficiently utilized and a wide variety of grades of board produced on a multi-cylinder machine due to its ability to make use of a wide variety of stocks. For

CHART F

MARKET WOOD PULP

First quarter contract prices per short air dry ton

3/22/71

U.S. Delivered Basis

	U.S.	Canadian
Groundwood	$ 90/ 95	$ 90/ 95
Bl Groundwood	100/105	100/105
Kraft Bl. Sfwd.	169/172	169/172
Kraft Bl Hwd.	146/155	146/148
Kraft Semi-Bl.	163/164	163/164
Kraft Unbl.	130/145	—/152
Sulphite Bl.	162/167	162/167
Sulphite Unbl.	142/147	142/147

3/26/62

	U.S.	Canadian
Groundwood	$82.50/ 90.00	$82.50/ 90.00
Bleached Gw'd.	97.50/100.00	97.50/100.00
Kraft, Blchd.	$140.00/150.00	$140.00/150.00
Kraft, Blchd. Hdwd.	135.00/140.00	
Kraft, Semi-bleached.	130.00/140.00	
Kraft, Unbl.	117.50/125.00	125.00/ —
Sulphite, Blchd.	$135.00/140.00	$135.00/140.00
Sulphite, Bl. Hdwd.	135.00/ —	
Sulphite, Unblchd.	125.00/ —	125.00/ —
Sulphite, Unb'l. Gl'sn.		140.00/ —
Soda, Blchd.	130.00/135.00	130.00/135.00

March 22, 1971 WASTE PAPER MARKET*

MILL PRICES, f.o.b. Trucks Shipping Point—includes Brokerage

These quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers and brokers. Special packings and spot tonnage not included. Prices nominal.

	New York March 12	Boston March 13	Chicago March 12	Los Angeles March 12
No. 1 Mixed Paper	2.00/ 5.00	$ 3.00/ 7.00	4.00/ 8.00	$ 4.00/ 7.00
No. 1 News	7.00/ 14.00	12.00/ 16.00	19.00/ 21.00	8.00/ 12.00
Overissue News (Lg. Size)	9.00/ 19.00	10.00/ 13.00	21.00/ 23.00	10.00/ 16.00
Mill wrappers	$ 2.00/ 6.00	4.00/ 6.00	6.00/ 8.00	8.00/ 10.00
Old Corrugated Containers	12.00/ 20.00	13.00/ 15.00	17.00/ 19.00	15.00/ 18.00
Super Resorted Kraft Paper	22.00/ 23.00	40.00/ 45.00	30.00/ 35.00	30.00/ 32.50
Double Ld. Kr. Corr. Cuts	27.50/ 45.00	20.00/ 25.00	25.00/ 30.00	18.00/ 25.00
(Semi-chem. medium)	32.00/ 50.00	25.00/ 30.00	27.50/ 30.00	— / —
New Br. Kraft, Env. Cuts	55.00/ 60.00	37.50/ 52.50	50.00/ 60.00	35.00/ 42.50
New Br. Kr. Bag Waste Prntd.	37.50/ 60.00	60.00/ 65.00	40.00/ 42.50	32.50/ 37.50
New Br. Kr. Bag Waste Unprtd.	45.00/ 55.00	65.00/ 70.00	42.50/ 55.00	35.00/ 40.00
No. 1 Groundwood Shvs.	10.00/ 19.00	20.00/ 25.00	19.00/ 21.00	6.00/ 10.00
White Newsblanks	25.00/ 35.00	40.00/ 45.00	30.00/ 35.00	45.00/ 50.00
No. 1 Soft White Shvs.	37.50/ 42.50	50.00/ 55.00	45.00/ 50.00	— / 40.00
Super Soft White Shvs.	45.00/ 47.50	65.00/ 70.00	50.00/ 55.00	— / —
Hd. White Shvs.	57.50/ 80.00	80.00/ 85.00	70.00/ 75.00	70.00/ 76.00
Hd. White Env. Cuts	60.00/ 85.00	100.00/105.00	80.00/ 85.00	82.50/ 90.00
Col. Tab. Cards	42.50/ 60.00	55.00/ 60.00	50.00/ 55.00	30.00/ 37.50
Manila Tab. Cards	65.00/ 90.00	80.00/ 85.00	75.00/ 80.00	65.00/ 75.00
No. 1 Col. Ledger	20.00/ 27.50	35.00/ 40.00	25.00/ 30.00	22.50/ 27.50
White Ledger	25.00/ 32.50	42.00/ 47.00	40.00/ 45.00	40.00/ 47.50
Mixed Book & Mag. †	2.00/ 9.00	— / —	4.00/ 6.00	— / —
No. 1 Books ‡	4.00/ 11.00	16.00/ 18.00	4.00/ 8.00	— / —

* Under present market conditions all waste paper prices are nominal.

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

MARCH 26, 1962	New York March 19	Boston March 17	Chicago March	Los Angeles March
No. 1 Mixed Paper	$ 12.00/ 13.00	$ 9.00/ 12.00	$ 6.00/ —	$12.00/ —
No. 1 News	24.00/ 26.00	19.00/ —	22.00/ —	15.00/ —
Overissue News (Lg. size)	23.00/ 25.00	17.00/ 23.00	27.00/ —	19.00/ —
Mill Wrappers	19.00/ 22.00	12.00/ 14.00	11.00/ —	13.00/ —
Old Corrugated Containers	22.00/ 25.00	18.00/ 18.50	20.00/ —	16.00/ —
Super Resorted Kraft Paper	35.00/ 40.00	— / —	30.00/ —	50.00/ —
New Double Kr. Ld. Corr. Cuts	27.50/ 30.00	30.00/ 32.00	30.00/ —	27.50/ —
(Semi-chem. medium)	45.00/ —	40.00/ 42.50	— / —	— / —
New 100% Kraft Corr. Cuts	42.50/ 47.50	— / —	50.00/ —	— / —
New Br. Kraft, Env. Cuts	65.00/ 75.00	65.00/ 75.00	45.00/ —	40.00/ 42.50
New Br. Kr. Bag Waste Prntd.	50.00/ 55.00	50.00/ 60.00	45.00/ —	35.00/ —
New Br. Kr. Bag Waste Unprintd.	55.00/ 60.00	60.00/ 65.00	55.00/ —	45.00/ 47.50
No. 1 Groundwood Shvs.	20.00/ 25.00	22.50/ 27.50	21.00/ —	25.00/ —
White Newsblanks	50.00/ 55.00	40.00/ 50.00	30.00/ —	55.00/ —
No. 1 Soft White Shvs.	60.00/ 65.00	55.00/ 55.00	50.00/ —	75.00/ —
Super Soft White Shvs.	55.00/ 75.00	70.00/ 80.00	60.00/ —	— / —
Hd. White Shvs.	85.00/ 90.00	80.00/ 90.00	75.00/ —	80.00/ —
Hd. White Env. Cuts	95.00/100.00	100.00/105.00	80.00/ —	107.00/107.50
Col. Tab. Cards	45.00/ 60.00	54.50/ 60.50	47.50/ —	35.00/ —
Manila Tab. Cards	62.50/ 65.50	67.50/ 72.50	70.00/ —	75.00/ —
No. 1 Col. Ledger	35.00/ 40.00	35.00/ 37.50	40.00/ —	33.00/ —
White Ledger	55.00/ 57.50	50.00/ 55.00	50.00/ —	43.00/ 45.00
Mixed Book & Mag.†	15.00/ 15.00	— / —	10.50/ —	— / —
No. 1 Books‡	15.00/ 20.00	25.00/ —	27.50/ —	8.00/ 13.00

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood.

example, in white patent coated, the outer liner uses a fully bleached stock, the inner liner unbleached or semi-bleached, and the middles low grades or outthrows. Many grades of board are also made on Fourdrinier machines. By far the greater proportion of waste paper is used in board.

By using the proper grades of waste paper and the right equipment, it is possible to make practically any grade of paperboard. After this page is a sample of 0.46 mm 75 Brightness White Lined Chip made from 100% waste paper. The white liner is from white unprinted shavings, the brightness enhanced by titanium dioxide, the balance of the sheet being made from coarse undeinked grades run through a Defibrator system.

Similarly almost any grade of fine paper can be made from 100% deinked stock if the proper grades of waste paper are selected. This is also true for grades such as wrapping and bag papers.

The usual practice in most mills using deinking is to use a certain percentage of virgin fiber, often a high strength softwood bleached kraft in order to be better able to control the strength specifications.

Three examples of fine papers follow. The 52 gram book paper contains 85%, the 60 gram bond 75% and the 52 gram airline ticket stock 70% of deinked fiber of the total pulp furnish.

There are several courses open to a mill that wishes to produce fine grades of paper or board. They can use virgin pulp, deinked stock, or unprinted waste paper.

Unprinted white waste paper commands a much higher price than printed grades. For instance, the June 12, 1971 issue of Official Board Markets, for the New York market, gives the price of white ledger as $45.00 per ton, whereas the price for hard white envelope cuttings is quoted at $100.00 per ton.

The advantage of the unprinted grades is that they enable a mill to produce fine grades or use white liners without the capital expense of a deinking plant.

There is still another course open, that is, the use of printed grades such as colored and white ledger, bleached and unbleached kraft and tab cards without any deinking. The bales of waste paper are defibered in the machine pulpers and the stock run on the machine similar to the way in which virgin or deinked fibers are used. No unprinted or virgin fiber is used. The only cleaning the stock receives is at the machine screens and Centricleaners. Two examples follow, a 74 gram bond and a 74 gram offset which has been printed for an edition of the magazine Chemical 26.

These samples are included to show what can be done using waste paper with a minimum of capital expenditure.

HOW TO USE WASTE PAPER AND DEINKING

General

The same economic laws hold true for mills using waste paper as a source of raw material as for integrated sulphite or kraft mills, the larger the unit, the lower the per ton cost for capital charges and direct manufacturing cost.

The following examples of bleached and unbleached eucalyptus pulp mills illustrate the dangers of too small an operation, the percentages will apply approximately to any type of mill. It will be noted that both the Direct Cost and Capital Charges per ton for a 50 ton per day mill are approximately twice that for a 300 ton per day mill (8).

Tons per Day	50 Unbl.	100 Unbl.	200 Unbl.	300 Unbl.
Capital Charges	$89.14	$67.71	$49.14	$45.71
Direct Mfg. Costs	80.57	57.71	44.43	40.10
Total	$169.71	$125.41	$93.57	$85.81
% Total of 300 Ton	198	146	109	100

Tons per Day	50 Bl'd.	100 Bl'd.	200 Bl'd.	300 Bl'd.
Capital Charges	$134.86	$107.71	$77.29	$69.33
Direct Mfg. Costs	91.43	64.86	50.14	45.24
Total	$226.29	$172.57	$127.43	$114.57
% Total of 300 Ton	197	151	111	100

Another fundamental principle is that the cost of the equipment actually is a relatively minor consideration compared with what it will do. Therefore, it is of the utmost importance to purchase workable trouble free equipment. This

is especially true for developing countries where supplies, expert mechanics and well equipped machine shops are likely to be rare or nonexistent.

As pointed out before, there are two main categories in the use of waste paper, for board, and for fine papers. By far the greater proportion is used in board. Here, generally, there is no deinking or washing and the process essentially consists of pulping and screening. The effluent disposal problem is relatively minor and the rejects can be trucked to a dump.

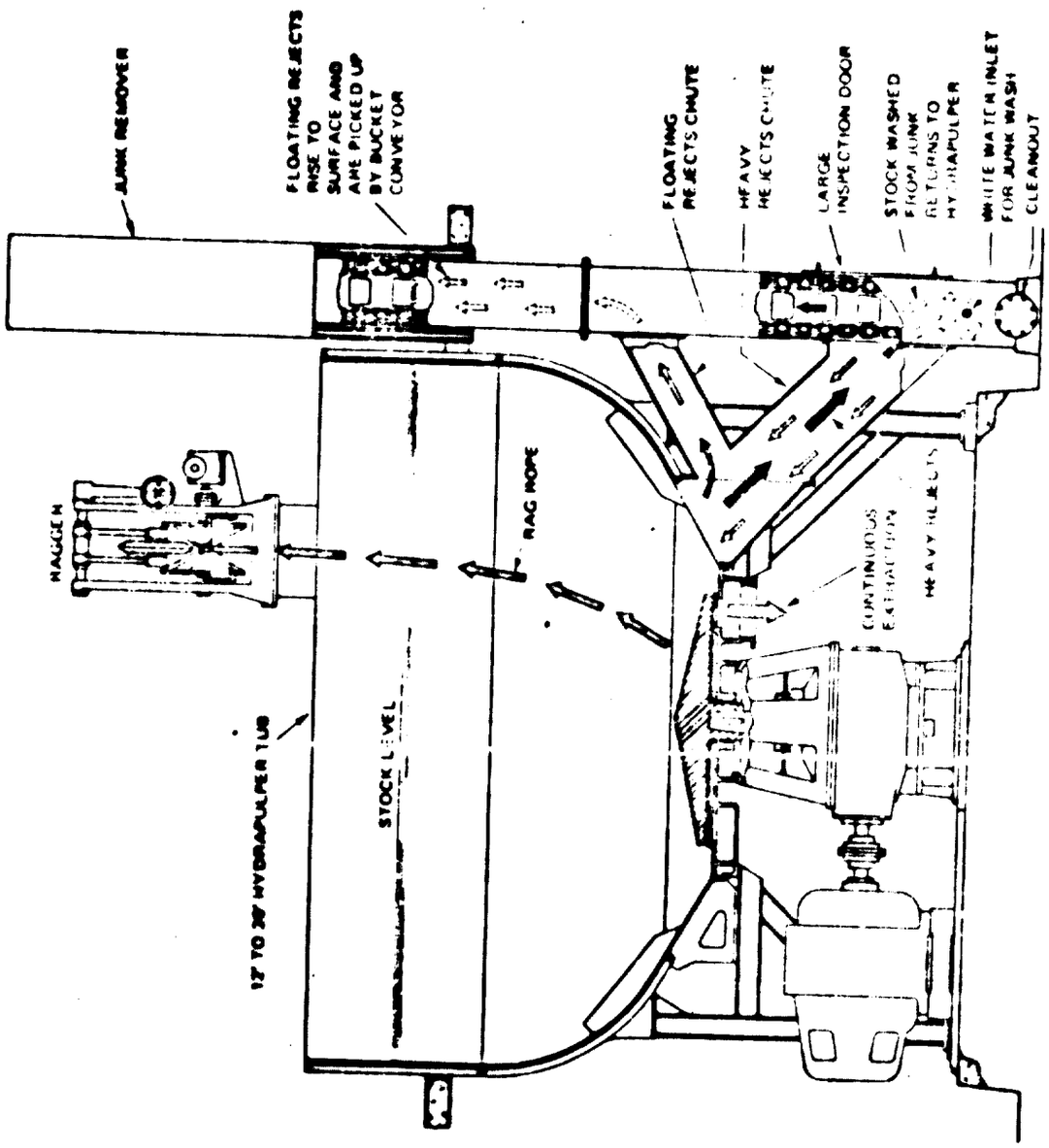
The first operation in the use of waste paper is to break it up in some sort of pulper. Figure 2 shows the Black Clawson Hydrapulper which can be operated either batch or continuously. For fine papers, the bales should be opened and spread out on an inspection belt to prevent difficult to remove contaminants from entering the system. This type of pulper has the advantage of reliability, high capacity and low labor cost.

After pulping, the stock is diluted, screened and thickened for use on the paper machine.

Board

Many board mills use a stage of high consistency, high temperature cooking to emulsify any asphalt present. The Asplund Defibrator process is widely used for this both in the United States and abroad with 85 units in use producing a total of about 12,000 tons per day. This is shown in Figure 3.

Figure 2


JUNK REMOVER
FLOATING REJECTS RISE TO SURFACE AND ARE PICKED UP BY BUCKET CONVEYOR
FLOATING REJECTS CHUTE
HEAVY REJECTS CHUTE
LARGE INSPECTION DOOR
STOCK WASHED FROM JUNK RETURNS TO HYDRAPULPER
WHITE WATER INLET FOR JUNK WASH
CLEANOUT
RAG ROPE
STOCK LEVEL
12' TO 20' HYDRAPULPER TUB

Flow diagram of the Asplund Defibrator Process for Treatment of Waste Paper Stock.

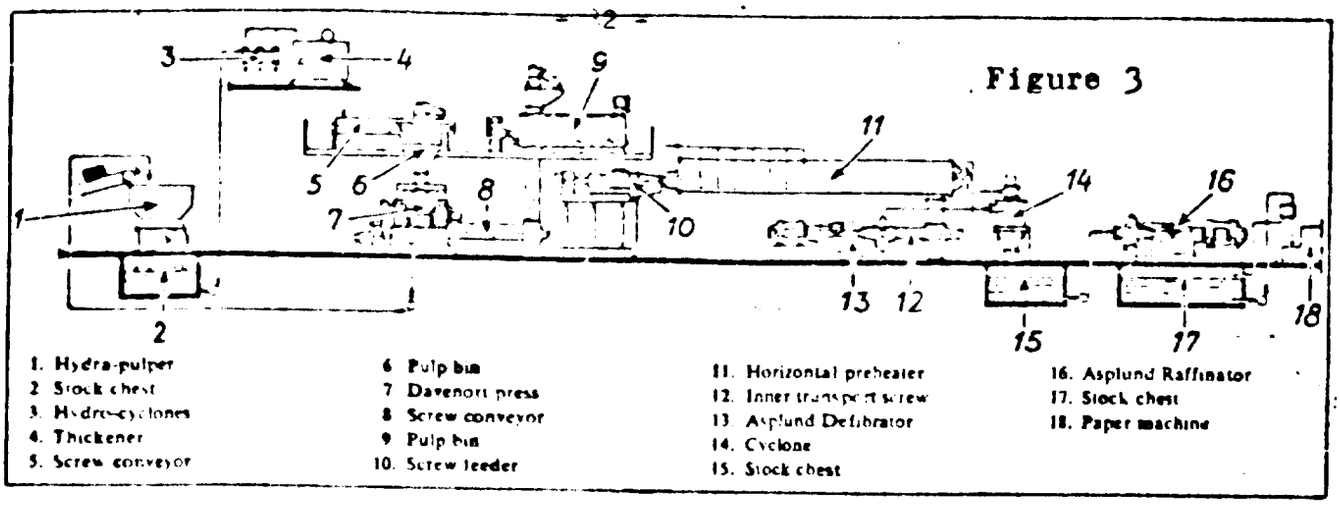


Figure 3

1. Hydra-pulper
2. Stock chest
3. Hydro-cyclones
4. Thickener
5. Screw conveyor
6. Pulp bin
7. Davenort press
8. Screw conveyor
9. Pulp bin
10. Screw feeder
11. Horizontal preheater
12. Inner transport screw
13. Asplund Defibrator
14. Cyclone
15. Stock chest
16. Asplund Raffinator
17. Stock chest
18. Paper machine

418 PRESSURIZED

REFINING SYSTEM

THE BAUER BROS. CO.

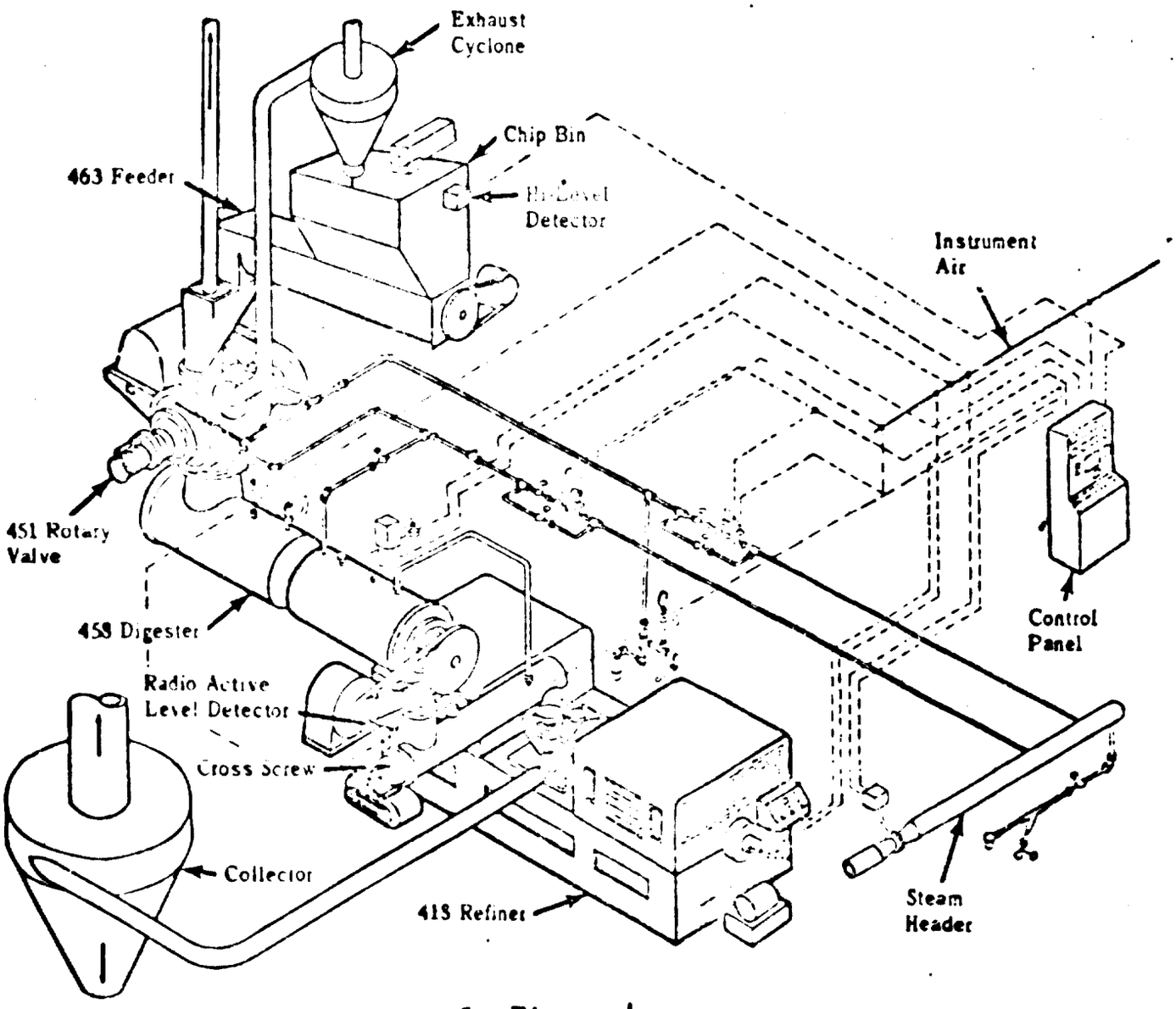


Figure 4

Another method is shown in Figure 4, the Bauer system which is widely used for semi-chemical pulping. This could be adapted to waste paper according to the builders.

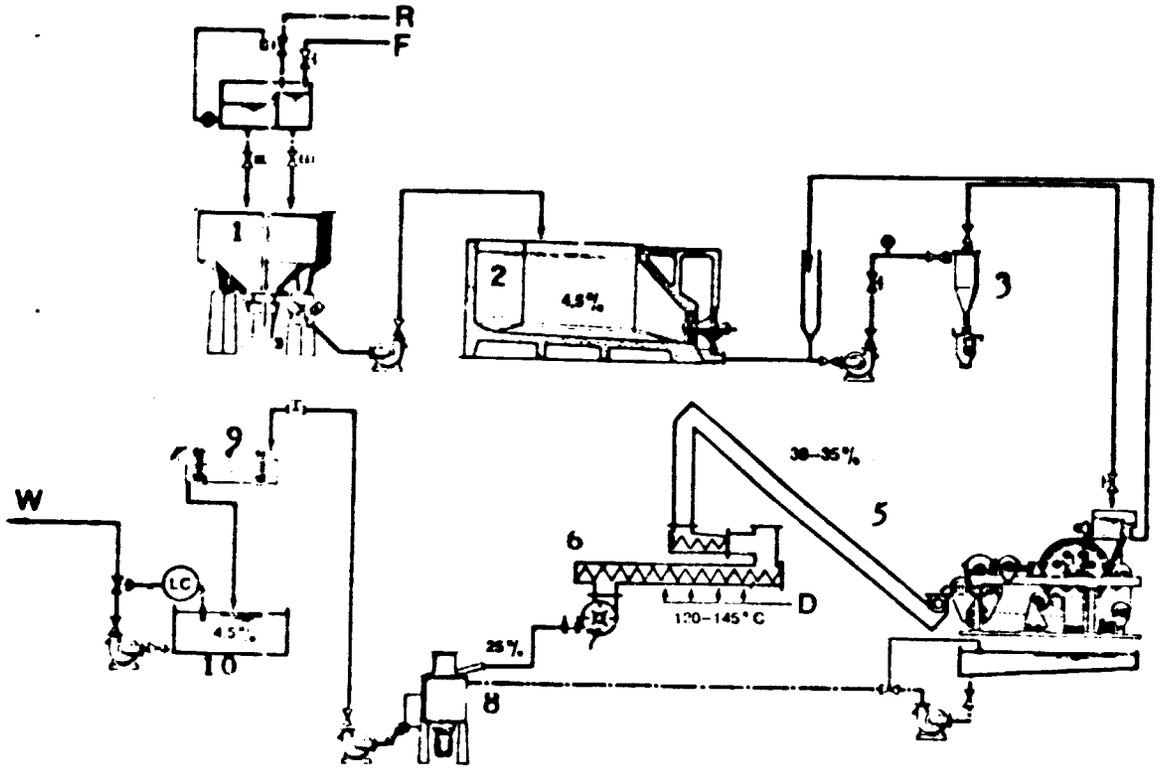
Voith has a system similar to the Defibrator and is shown in Figure 5. In both, the waste paper is pulped, goes to a chest, is precleaned, thickened to about 30% consistency, then fed to a digester where the temperature is raised to as high as 150°C. The stock is now refined under pressure and blown to a chest and further screened and cleaned as required.

The Jones Division of Beloit Corporation has a high temperature system which bypasses the pulper by shredding the waste paper and feeding it into the digester where water and chemicals are added to bring the consistency to 30% and steam to raise the temperature to 150°C. Extensive tests were run on this Condi (continuous digestion) system on both board and fine papers and excellent results obtained. The equipment, however, was subject to excessive downtime and maintenance.

Some of the advantages of the high temperature systems are:

1. Better ink dispersion and lower speck count (9).
2. Lower chemical and detergent cost. Experiments showed that some papers could be deinked without chemical treatment at high temperature.
3. Lower steam cost because of the high consistency.
4. Wet strength papers, which usually can be bought at a low price, defiber easily. With the Voith and Defibrator systems, the wet strength papers would probably have to be shredded and fed into the 30%

VOITH HOT DISPERSION SYSTEM



1. VS Pulper
2. Dump Chest
3. Precleaner
4. Belt Thickener
5. Screw Conveyor
6. Preheater
7. Pressure Disintegrator
8. Repulper
9. Vibration Screen
10. Intermediate Chest
R. Return Water
F. Fresh Water
W. To Further Processing

Figure 5

consistency stock going to the digester.

5. Asphalt and carbon papers are dispersed.
6. The high temperature gives complete sterilization so that the stock produced can be safely used in the manufacture of foodboard.

Much board, of course, is produced without high temperature equipment, but the product is not as good and the mill is more restricted as to the grades of waste paper it can use.

Deinking

There are two methods for separating the ink from the fibers, floatation and washing.

Floatation systems are usually used on groundwood papers and those with a low filler content. One article states that there are twenty plants in Europe producing 400 tons per day, or twenty tons apiece on the average (10). There are relatively few in the United States. One at Fibreboard Corp., Vernon, California, is rated at 22 tons per day (11). A magazine article (12) gives flow diagrams, power requirements, consistencies, temperatures and chemicals to use. A list of seventy-one installations throughout the world published by Voith shows that the size runs from 4 to 100 tons per day capacity with only seven 50 tons per day or over.

Because much of the printed waste paper available contains considerable amounts of fillers, washing is used in all the large deinking operations in the United States and Canada.

The pulping of the waste paper may be either batch or

continuous and each method has its advantages. Continuous operation gives a much higher production from a given pulper than batch. For instance, a fourteen foot diameter Hydrapulper will easily pulp 200 tons of waste paper per day. The batch method enables the operator to segregate cooks containing excessive contaminants. In both cases the pulpers should be equipped with traps for tramp metal.

A recent article (13) makes some comments on the state of the art of deinking and lists some of the principles as follows:

"Most deinking systems in use today just grew and only a fraction of the design and engineering skills went into them that is used in a modern kraft mill. This is wrong. A deinking plant is as much a pulping operation as the kraft or sulphite process and should be given the same care in design and engineering if optimum results are to be obtained. As pointed out earlier, the same economic rules apply, the larger the plant, the lower the cost per ton.

There are certain fundamental principles for deinking that are well to consider in the design of a plant:

1. Waste paper, as fed to the pulper, will vary widely in quality. In order to provide a final product of uniform quality to the paper machines, there must three blending chests of one to two hours holding capacity, one after the pulper, one after the washing, and the third as large as feasible after bleaching. This chest not only evens out quality, but acts as a surge tank to smooth out fluctuations in

demand. It is important that the deinking plant operate at full capacity at all times in order to realize the lowest cost.

2. A deinking plant should be designed so that any sort of contaminant will be removed. At the present state of the art and the equipment available, this is not possible, but this should be the aim.
3. There is merit in having the pulping operation done without heat in order to keep plastics, hot melt, latex and other contaminants in as large pieces as possible so that they can more readily be removed by screening. The stock then would be fed at high consistency to a high temperature digester to emulsify any asphalt, ink or carbon.
4. How elaborate the system should be will be determined by the grades of waste paper to be used. Some plants would be better termed 'decolorizing' than deinking. However, it is well to have the maximum facilities for washing, screening and bleaching in order to be able to use the grades that will give the lowest final cost and provide the maximum safety of operation.
5. All waste paper should be inspected whether the pulping be batch or continuous. No matter how well intentioned the dealer or the generator of waste paper may be, from time to time contaminants will get in which would cause serious trouble unless detected and removed.
6. Screening should be progressive, starting at the

pulper, progressing through a device such as the Centriffler, coarse screens such as the Jonsson to the final screening which should take place after bleaching. Screens for the last stage should be of the slotted plate variety with the slot size no wider than 0.012 inches, preferably 0.010 inches. The final speck removal is then best accomplished with a centrifugal cleaner such as the three inch Centricleaner.

7. Washing efficiency is determined by the ratio between entering and leaving consistencies at the washer. For instance, if a Lancaster washer has an entering consistency of one per cent and a leaving one of six per cent, the washing efficiency number of a series of three would be 6x6x6 = 216. On an inclined washer the ratio will be about one to three. Therefore four inclined washers in series would have an efficiency number of 3x3x3x3 = 81, only about a third as efficient as three stages of Lancasters. However, if the four inclined are preceded by a Lancaster washer, the efficiency number jumps to 486, which is about where it should be for fine papers. The stock turns over and over on an inclined washer, exposing fresh surfaces. This does not give better washing as commonly supposed. The inclined washer has two advantages, low first cost and low maintenance. The wire covershould be at least 80 mesh to keep down fiber losses. The Lancaster covering should be at least 40 mesh for the same reason.

8. In order to take advantage of the wide variety of grades available and to keep costs to a minimum, the bleach plant should be able to handle unbleached sulphite and kraft as well as some groundwood. This requires a stage of chlorination if good brightness and quality are desired. Techniques and equipment now available render the conventional chlorination tower unnecessary and give better quality with less chlorine (14, 15). Vacuum washers should be used in the bleachery as deckers are not efficient. Dilution of the unbleached stock should be done with effluent from the chlorination washer. A stage of high density hypochlorite may suffice, but still better is a caustic extraction stage followed by hypochlorite with a vacuum washer after each. Improved brightness and quality will result if chlorine dioxide is used in the final stage. This would not be economically justified in a small plant. It may be that oxygen bleaching will have some advantages for deinked stock as well as the use of ammonia gas in the extraction stage instead of caustic soda. At the final vacuum washer an anti-chlor such as SO_2 should be added to minimize color reversion.
9. Final screening should take place after the last stage of bleaching at low consistency, about 0.7%.
10. Paper mill white water can be used in the bleachery and excess water at the washers can be used in the deinking operation.
11. Effluent disposal is a serious problem from both an

aesthetic and a biological oxygen demand point of view where washing is used to remove the ink and filler. The floatation system has fewer problems but has had relatively little application in American mills where large tonnages are processed.

Two hours of settling will remove about half of the suspended solids. The addition of polyelectrolytes will raise this to 80 per cent or better. After the settling tank, aeration in a lagoon or a trickling filter will reduce the B. O. D. The settled sludge can be thickened on a disk filter to about 30 per cent solids for removal to a dump. One company uses spray irrigation, but this method is restricted to summer months and sandy soil (16).

Recent work by the Hydrotechnic Corp. for the Federal Water Control Administration at the Southerly Sewage District, City of Cleveland, indicates that the deep bed, multi-media, high rate filtration process might have value in the treatment of deinking and paper mill effluent in reducing both suspended solids and B. O. D. (17).

12. Research work in this field has been woefully small. If recycling for both board and fine papers is to come of age, a great deal of research will have to be done. Recently a new Fractionator (18) has come on the market which is reported to separate long from short fibers. Such a device will be of immense value in processing waste paper grades such as old

cartons and mixed papers. In the first case the softwood kraft would be separated from the semi-chemical fibers. In the second, the chemical pulp would be separated from the groundwood fibers. In both cases the value would be enhanced."

A new method of running a Centricleaner was recently developed whereby the normal flow of stock is reversed, the accepted stock coming out the bottom and the rejected leaving at the top (19). Prior to entering the Centricleaner, fine air bubbles and a small amount of kerosene are injected into the stock. This causes contaminants of low specific gravity to become still lighter and to be removed at the top. This method will permit fine paper mills to use grades of waste paper not previously possible.

Deinking is a process that enables a developing country, without fiber resources, to produce high grade printing and writing papers at a lower cost than possible with virgin fiber alone.

An excellent monograph on deinking was published by the Technical Association of the Pulp and Paper Industry in 1967. Copies may be obtained from them at 360 Lexington Avenue, New York, N. Y. 10017 (20).

PROBLEMS INVOLVED IN THE USE OF WASTE PAPER AND DEINKING

The use of waste paper and deinking in a developing country have special problems which must be solved for successful operation.

Modern technology has provided many materials and chemicals to enhance the end use of paper and board, but which cause serious troubles when recycled. The British most aptly term these 'pernicious contraries'. These include certain synthetic base inks, latex, hot melts, asphalt, wet strength papers and plastic films. These can be controlled by limiting the purchase of waste paper to reliable dealers, by careful inspection prior to pulping, tests after pulping, and by incorporating the best cleaning equipment available in the design of the plant.

Where most of the waste paper must be imported, the amount of inventory necessary has to be greatly increased. If the entire supply can be obtained within the country, three weeks supply is sufficient. If most of it has to be imported, the inventory will have to be much larger, the actual days supply necessary will depend on the reliability and frequency of shipment possible.

A deinking plant using stock that contains coated and filled papers has a serious effluent problem because of the suspended solids, fillers and fine fibers in addition to the inks, and the biological oxygen demand caused by the fiber and the dissolved organic compounds such as starches, glues, etc.

The fine fiber and fillers, while not harmful to the stream in themselves, constitute what might be termed aesthetic pollution, especially if the point of discharge is above a city or a resort area. It is particularly noticeable if the fillers have a high index of refraction such as TiO_2.

It is very important to have the mill located on a river with a high rate of flow throughout the year so that the mill effluent will be greatly diluted at the point of discharge. The effluent also should be distributed across the river. This enables the bacteria in the water to reduce the B. O. D. much more quickly and also reduces the aesthetic pollution.

The effluent problem can be solved, in most instances, to the satisfaction of the local authorities. The effluent treatment facilities should be incorporated in the design of the plant, and if necessary, acceptance by the proper government authorities be obtained before construction is started.

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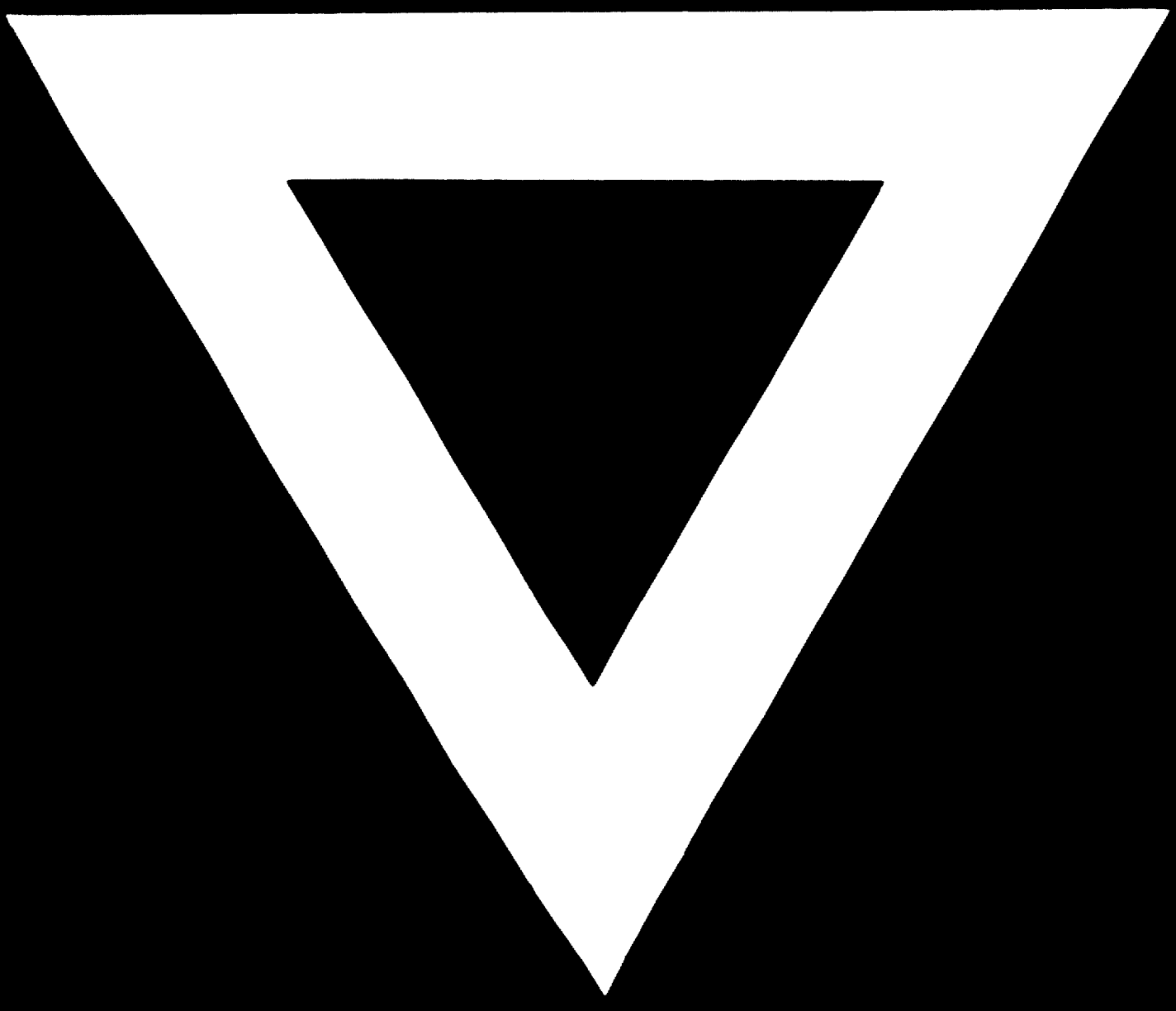

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