

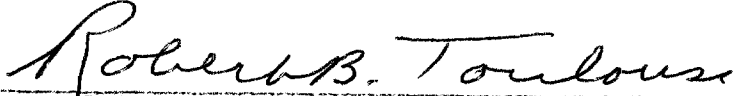
THE ECONOMIC UTILIZATION OF OLD NEWSPAPERS
WITH EMPHASIS ON RECYCLING

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This thesis discusses the recycling of old newspapers into fresh newsprint. Recycling is multi-beneficial because the solid waste problem could be alleviated, municipalities could save money on refuse disposal costs, and trees could be conserved. Only one company in the world makes newsprint from 100 per cent old newspaper furnish: Garden State Paper Company. Conventional deinking processes are inappropriate for use on newsprint, and Garden State uses a secret chemical process for deinking.

Municipal solid wastes are heterogeneous mixtures which must be utilized in their mixed form or separated into homogeneous components. Newspapers can either be recycled into newsprint or serve as partial furnish for other paper products, such as paperboard. Other possible uses include incineration to generate electric power, composting, building materials and animal feed. One recent discovery is the use of paper and garbage to produce a type of crude oil.

The thesis includes an introduction and chapters on solid wastes, recycling paper fiber, the newsprint paper industry, recycling newsprint, alternate uses of refuse including old newspapers, legislation, and a conclusion.

Chapter II discusses the magnitude of the solid waste problem, the present inadequate facilities in most municipalities, and sanitation. It also discusses the two types of refuse separation methods which are currently being constructed. Chapter III deals with the public's attitude toward recycled products and the deinking and repulping of waste paper. Chapter IV discusses the physical properties necessary to newsprint and traces the history of this segment of the paper industry. Chapter V draws heavily on speeches by the officers of Garden State Paper Company (which are reproduced in the Appendix) in discussing the direct recycling of newsprint. Several projects in which city residents have been asked to keep newspapers separate from other municipal garbage are covered. Chapter VI includes possible alternate methods of reusing newspapers. Chapter VII discusses local statutes, but concentrates on the provisions of the Resource Recovery Act of 1970.

Chapter VIII concludes that technology is extant (though not presently available to companies other than Garden State) for the direct recycling of newsprint. Garden State has indicated that it will share its technology. If it does not, other uses are available and are developing. The prediction of a paper fiber shortage within the next ten or fifteen years makes the recycling of old newspapers even more desirable. If some of the money now spent on the disposal of old newspapers were used to supplement the processing costs of recycling, secondary fiber would become more attractive to industry.

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THE ECONOMIC UTILIZATION OF OLD NEWSPAPERS
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THESIS

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CHAPTER I

INTRODUCTION

The solid waste problem is one of the several forms of environmental pollution which have received journalistic, political and popular attention in the recent past. Paper fiber, which comprises at least half of municipal solid waste,¹ is capable of being repulped to make paper again. In fact, about 20 per cent of the total amount of waste paper is reclaimed at present,² generally being used for such low grade paper products as corrugated board, newsprint, "news grade" paperboard, and building materials, among others.

Newspapers and packaging materials are usually the two biggest sources of paper fiber in municipal garbage. Packaging materials, with the exception of the ordinary kraft paper sack, usually contain some other material which tends to make reclamation of the paper fibers difficult, if not impossible: plastic, foil, laminating adhesives, wax coatings, etc.

Newspapers, on the other hand, have only one common contaminant that distinguishes them from virgin newsprint stock:

¹Jerome Goldstein, "Recycle Paper and Save the Dump," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 4.

²American Paper Institute, How the American Paper Industry Performed in 1969, A Report on Its Progress, Problems and Prospects (New York, 1970), p. 9.

ink.³ When old newspapers are deinked they can be repulped to form "new" paper. The Boy Scouts and other organizations have collected old newspapers and sold them to waste paper dealers or directly to paper mills for many years. But this has been only a token, sporadic supply of secondary fiber.

The objective of this paper will be to examine the possibilities of the large-scale recycling of newsprint, i.e., making old newspapers into new, or fresh, newsprint. If that objective is not feasible, then using old newspapers for other economically useful purposes will be examined, with landfill and incineration being lowest on the scale of desirable disposal methods. The concept of recycling old newspapers into fresh newsprint offers a reward that is multi-beneficial. The solid waste disposal problem could be alleviated, municipalities could save money on garbage disposal costs, and trees could be conserved. "It [recycling] solves the converging dilemmas of pollution and disappearing resources."⁴

With today's concern about environmental pollution, methods for reclaiming materials that used to be considered as waste products are particularly important. Financially, the saving is two-fold-- cost of disposal is avoided and new revenue can be generated.⁵

³"Eradicating the Ink," Time, LXXVI (August 1, 1960), 53.

⁴"Turning Junk and Trash into a Resource," Business Week, (October 10, 1970), 66.

⁵J. T. Geoghegan and W. E. Bambrick, "Tall Oil--A Valuable By Product," Chemistry, XLIV (January, 1971), 6.

One blockage in thinking of waste as a resource is the concept that natural resources are the only resources. The word resourcefulness as a human characteristic perhaps furnishes a clue to correct this idea. As Erich Zimmermann has stated, the most important resource is man's knowledge.⁶ Resources are what we make them. Zimmermann says, "Resources are not, they become; they are not static but expand and contract in response to human wants and human actions."⁷

There is a "built-in" bias in dealing with the solid waste problem. Even the term waste implies that the material is of no use. Americans, especially, with the affluence of recent years, tend to think in terms of disposables, thinking they can afford waste. Hopefully, we are awakening to the fact that, as a society, we cannot afford excessive and unnecessary waste. We must get used to thinking of our used materials as raw materials with many potentials. We must turn our "disposables" into "recycleables." The increasing ratio of labor costs to material costs as a result of a highly technologically developed industry make disposables attractive. If we can retrieve the material to be reprocessed, the disposable product still may be economically sound and socially acceptable. Many useful raw materials in the production chain of modern industry were once considered valueless,

⁶Erich W. Zimmermann, World Resources and Industries (New York, 1951), p. 17.

⁷Ibid., p. 15.

even being expensive to dispose of. Technology has given them new usefulness. A large number of our raw material resources are no longer natural resources; they are man-made resources, often being waste materials from another industrial process. We need to convert more of this negative value waste into a positive value raw material. A distinguishing feature, however, is the fact that the use of by-products or waste-products to create new materials has almost always occurred while the material was still owned by the same company, or at least by the private industrial sector of the economy. Our present need is to take the public-owned (in the sense that a responsibility is owned--as a liability) waste and see to it that private industry utilizes it as a raw material. This may call for innovative organizational planning as well as innovative technological procedures.

The Federal Government, through depletion allowances on taxes, subsidizes the depletion of natural resources, thus discriminating against the use of recycled materials.⁸

There has been much controversy over the politics and practicality of getting the housewife to separate garbage. But we do not have to reduce the convenience-oriented housewife to a garbage scavenger. The answer is very simple: don't mix the newspapers with the other garbage in the first place! No separation would be necessary if separate receptacles

⁸"Turning Junk and Trash into a Resource," op. cit., 67.

were used. Newspapers are one of the purest (most homogeneous) materials that we now toss into the trash can without a second thought.

Because municipal refuse is (under the present collection procedures) a heterogeneous mixture of many materials, any attempt to utilize it must either face the problem of separation or use the whole mixture. Several approaches for utilizing this solid waste involve separation and several do not. For this reason, some of the possible solutions to the waste paper problem surveyed in this thesis are not restricted to paper alone; some of the solutions apply to mixed garbage.

Throughout this thesis, except in Chapter IV, the term newspapers will be used in the broad sense, to cover, in addition to actual newspapers, newsprint items such as comic books, pulp magazines, circulars, and shopping guides. The latter item has experienced particularly large growth in the last few years. Shopping guides are composed of commercial advertisements, classified type advertisements, and sometimes a few news items of local interest. They are distributed without subscription, as are the door-to-door one-leaf circulars. Some "junk mail" is printed on newsprint grade paper. Certainly the conventional daily newspaper is by far the greatest user of newsprint. About 90 per cent of the newsprint produced is used for newspapers.⁹ Old newspapers account for a considerable portion of home garbage.

⁹"Demand for Newsprint to Grow 34% in 1970s," Industry Week, CLXVII (November 9, 1970), 56-57.

Besides the fact that we are running out of places to dump our solid wastes, landfill and incineration (as it is generally practiced today) can cause other environmental problems. Underground water contamination and air pollution, respectively, can be caused by the above disposal methods. Government and industry are working together on pilot programs such as one in Delaware for total waste reclamation which will cause no other types of pollution.¹⁰ Technologies from other industries, such as mining¹¹ and aerospace,¹² and papermaking have been applied to the waste recycling problem.

To put the problem of reusing newspapers into proper perspective, the next chapter will deal with the solid waste problem in general, Chapter III with the recycling of paper fiber, and, finally, Chapter V will discuss the recycling of newsprint. Chapters IV and VI will deal, respectively, with the organization of the newsprint paper industry and the alternate methods of recycling or disposing of refuse.

¹⁰"Reclaiming Solid Wastes for Profit," Environmental Science & Technology, IV (September, 1970), 729.

¹¹Bill Stockton, "Trash Crisis-II: Garbage May Yield New Assets," The Dallas Times Herald, November 12, 1970, Sec. A, p. 31.

¹²"Converting Solid Wastes to Electricity," Environmental Science & Technology, IV (August, 1970), 631, 633.

CHAPTER II

SOLID WASTE DISPOSAL AS A POLLUTION PROBLEM

The traditional response to solid waste has been "to put it either on the land, under the land, or down the side of a bank, where it decayed and was covered by vegetation."¹ Cities are having to go farther and farther away to find dump-grounds.² Open burning dumps are still the most predominant method of municipal solid waste disposal,³ while some cities use incinerators. Several cities have passed laws to prohibit the use of one-way bottles⁴ or to enforce the household separation of newspapers from garbage. According to Richard D. Vaughn, Director of the Bureau of Solid Waste Management of the Department of Health, Education, and Welfare, "94 per cent of existing land disposal operations and 75 per cent of incinerator facilities are inadequate."⁵ These figures are

¹Charles A. Schweighauser, "The Garbage Explosion," The Nation, CCIX (September 22, 1969), 283.

²Ibid.

³Richard D. Vaughn, "The Scope of the Solid Waste Problem and Promising Solutions," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 8.

⁴Bill Stockton, "Trash Crisis-II: Garbage May Yield New Assets," The Dallas Times Herald, November 12, 1970, Sec. A, p. 31.

⁵Vaughn, op. cit.

the result of a national survey of solid waste practices.⁶ It is abundantly evident that new solutions to the solid waste problem must be put into practice.

The recycling of some materials in our solid waste mix has alleviated the problem to some extent, but much more recycling is desirable. Thirty per cent of aluminum is recycled,⁷ and the current collection drives by Alcoa for aluminum cans may increase that figure.

Municipal solid waste, or garbage, contains many valuable components. However, modern industry requires a constant flow of homogeneous raw materials. General attitudes toward mixed waste, as well as prohibitive cost in some instances, have detracted from any incentive to recycle solid waste. The homogeneity of the raw materials insures the least amount of uncertainty in the production process, thus the avoidance of further waste.

Industrial wastes created as by-products or waste products of particular processes, are homogeneous and often pose no great problem in their use as raw materials for further processes. However, the technology to "mine" "urban ore" (municipal refuse) has not been developed, mainly because "it always has been deemed cheaper in the short term to mine

⁶Ibid.

⁷"Trade Group Receives HEW Grant for Solid Waste Recycling," Environmental Science & Technology, IV (July, 1970), 544.

the ores--trees, bauxite mines, copper deposits and the rest-- and not the waste."⁸ "Where the waste material is relatively homogeneous in nature, as it is in the scrap metal industry, a large business exists."⁹

The advertising slogan, "untouched by human hands," attempts to convince the consumer of the production sanitation. This image would be shattered if it became common knowledge that a material from garbage was the raw material used. The public attitude, however, is changing, and may reverse itself, placing a premium upon the recycled product.

The following quotations indicate the intrinsic value in garbage:

The fact is that municipal refuse is far from valueless. It contains wood fibers (from paper), glass, textile, and various metals. Many of the metals are present in concentrations larger than those in the ores from which the metals are extracted commercially.¹⁰

The nearly 180 million tons of annual municipal refuse are estimated to contain ferrous and non-ferrous metals valued at more than \$1 billion. Each ton of residue from incineration contains 500 pounds of iron and 50 pounds of aluminum, copper, lead, tin and zinc. Fly ash from incinerators weighs about 20 pounds for every ton of refuse incorporated, and contains enough silver and gold to be comparable to a normal mine assay in the West.¹¹

⁸"Solid Wastes," Environmental Science & Technology, IV (May, 1970), 384.

⁹Ibid., 389.

¹⁰Ibid., 384.

¹¹Schweighauser, op. cit.

The quantity per capita and composition of municipal garbage varies greatly from city to city throughout the world.¹² The mixture of components in home refuse is also changing with changes in packaging materials.¹³ "There are less ashes and garbage, more plastic and paper."¹⁴ The decrease in garbage "food wastes" may be due to the increase of home garbage disposal units in recent years.

TABLE I
MUNICIPAL SOLID WASTES: PHYSICAL
CHARACTERISTICS DATA
(TYPICAL RANGES)¹⁵

Category	Percent by Weight
Metal products	8-11
Glass products	8-11
Paper products	40-54
Food wastes.	10-26
Yard wastes.	3-80
Wood products.	3-70
Plastic products	1-20
Cloth, rubber, leather, synthetics	1-20
Dirt, ashes, rocks, and other inerts . . .	1-50

¹²Albert Alarie, "Can Garbage Become a 'National Asset'?" Compost Science, VIII (Spring-Summer, 1967), 3-4.

¹³James E. Etzel, "Hard to Get Rid Of," Industrial Research, XII (October, 1970), Pl4.

¹⁴Ibid.

¹⁵Resource Recovery Act of 1970, 91st Congress, 2nd Session, No. 91-1155 (Washington, June 4, 1970), p. 3, citing "Characteristics of Municipal Solid Waste Management," Scrap Age, February, 1969. The wide percentage ranges in this table make it inappropriate for estimating components of "average" garbage. Its value lies in its indication of the great variation in garbage.

The Committee on Interstate and Foreign Commerce Report to the House of Representatives, preliminary to the Resource Recovery Act of 1970, contains two tables on the composition of municipal refuse. These are reproduced in Table I, above, and Table II, following.

TABLE II
COMPOSITION AND ANALYSIS OF COMPOSITE
MUNICIPAL REFUSE (1966)¹⁶

Components	Percent by Weight
Corrugated paper boxes	23.38
Newspaper.	9.40
Magazine paper	6.80
Brown paper.	5.57
Mail	2.75
Paper food cartons	2.06
Tissue paper	1.98
Wax cartons.76
Plastic coated paper76
Vegetable food wastes.	2.29
Citric rinds and seeds	1.53
Meat scraps, cooked.	2.29
Fried fats	2.29
Wood	2.29
Ripe tree leaves	2.29
Flower garden plants	1.53
Lawn grass, green.	1.53
Evergreens	1.53
Plastics76
Rags76
Leather goods.38
Rubber composition38
Paint and oils76
Vacuum cleaner catch76
Dirt	1.53
Metals	6.85
Glass, ceramics, ash	7.73
Adjusted moisture.	9.05
Total	100.00

¹⁶Ibid., citing Kaiser, E. R. Chemical analyses of refuse components, 1966.

Another study indicates that a typical dump contains 50 per cent paper, 10 per cent glass, 10 per cent metal, 20 per cent food waste, 3 per cent grass, leaves, etc., 1 per cent plastic, 1 per cent wood, 1 per cent cloth and rubber and 4 per cent ash and other material.¹⁷

Collection is the most expensive part of solid waste disposal. For this reason, the location of the disposal or recycling installation is very important. One recent innovation, that of using plastic or paper garbage bags, has increased the speed of collection by 26 per cent.¹⁸ According to one report, the use of a computer to determine the optimum collection route has been tried with success.¹⁹ In the case of recycling solid waste, the separation into the various categories is quite expensive, at least if done by present methods. James E. Etzel, Professor of Environmental Engineering at Purdue, says that two-thirds of the solid waste handling and disposal cost occurs within 50 feet of the pick-up location, or before the material is placed in the collection vehicle.²⁰

¹⁷"Turning Junk and Trash into a Resource," Business Week, (October 10, 1970), 71.

¹⁸"Cash in Trash? Maybe," Forbes, CV (January 15, 1970), 21.

¹⁹"Computerized Routes Lift Waste Pickup Efficiency 10-15 Percent," Environmental Systems News, II (January, 1971), 4.

²⁰Etzel, op. cit.

Federal studies indicate that it would be feasible to use railroads to haul garbage to distant disposal sites.²¹

"The Pullman Company maintains that cars with hinged covers and sides could allow side loading and unloading of rail-haul garbage . . . "22

It seems that we Americans have lived up to our reputation for postponing our response to problems until they become crises. A brief look at 1965 statistics shows the magnitude of the solid waste problem; and surely the situation has deteriorated in the last six years. "Every 60 seconds, people in the United States drop 251 tons of trash into their garbage cans. At the end of the day, 362,000 tons of trash have accumulated."²³

At the present time, over five pounds of municipal solid waste per capita per day is produced in the United States. The estimate for 1980 is eight pounds.²⁴ "The population of the United States today constitutes only one-sixteenth of the world's population, yet we consume over 50 per cent of the world's annual production of non-renewable resources."²⁵

²¹"Cash in Trash? Maybe," op. cit., 19.

²²Ibid., 24.

²³"Solving the Garbage Explosion," Science Digest, LVII (May, 1965), 24.

²⁴Richard D. Vaughn cited in James G. Driscoll, "What To Do About Trash? Give It A Second Life," The National Observer, IX (November 2, 1970), 3.

²⁵Francois Mergen, editor, Man and His Environment: The Ecological Limits of Optimism (New Haven, 1970), p. 14.

The paper industry sometimes tries to side-step, or at least minimize, paper's contribution to the solid waste problem by maintaining that only a very small percentage of solid waste is paper: then they cite tonnages. This is deceptive, to an extent, because it is the volume and the composition of materials that determine the ease of disposal. Trash compactors are an important contribution for this very reason. Paper, of course, is bio-degradable, but it is lightweight in comparison with many other materials. Thus, a relatively small tonnage represents a fairly large volume. Also, the percentages they sometimes cite are usually based upon total solid wastes, not upon just municipal solid wastes.

Paper and paperboard products account for $1\frac{1}{2}\%$ of the 3.5 billion tons of solid waste that this country generates, reported Henry G. Van der Eb, president of Container Corp., at the recent press conference announcing the award winners of CCA's ecological design contest . . . These products represented 15% of the municipal, household and industrial wastes, however, which total 360 million tons a year. Recent studies, he said, show that paper products account for 40% to 50% of the waste load in large metropolitan areas, and represent as much as 60% of the highway litter problem.²⁶

Putting this problem into perspective, according to Vaughn, over three and a half billion tons of solid wastes are generated in this country each year, of which more than

²⁶"Statistics on the Solid Waste Story," Paper, Film and Foil Converter, XLIV (October, 1970), 24.

two billion tons are mineral wastes.²⁷ "And the waste load from municipal, industrial, and commercial sources totals more than 360,000,000 tons annually."²⁸ Cities in the United States spend a combined four and a half billion dollars a year on garbage disposal.²⁹ Even so, the facilities are predominantly inadequate.³⁰

Another study showed the following:

All solid wastes totaled 4.4-billion tons last year, according to the environmental council report. Mineral wastes, mostly from mining, were 1.7-billion tons. Agricultural wastes, largely manure in feed-lots, came to 2.3-billion tons. Non-recycled industrial wastes were 110-million tons. Residential, commercial, and institutional wastes came to 250-million tons, of which 190-million tons were collected and disposed of by public agencies.³¹

The use of inadequate facilities for the disposal of garbage is, of course, unsanitary. It contributes to rodent and insect infestation.³² The presence of excessive garbage is also a safety hazard, just as the manual handling of garbage is dangerous, probably because of the nature of the uncertainty of the mixture of trash. Trash collectors have an

²⁷Vaughn cited in Driscoll, op. cit.

²⁸Ibid.

²⁹Leonard Singer, "Disposing of Disposables," Design & Environment, I (Fall, 1970), 25.

³⁰Vaughn cited in Driscoll, op. cit.

³¹"Turning Junk and Trash into a Resource," op. cit., 70.

³²Vaughn, op. cit., 10.

injury rate nine times that of other industrial workers.³³

The President's Council on Environmental Quality calls solid waste "the clearest threat to health and the environment."³⁴

Much research has been done recently in the area of solid waste disposal and recycling. Some innovative ideas have been produced. One of the main problems is the separation of trash into its homogeneous components. There are two basic methods of separation, the dry method and the wet method. The dry method uses an air classification or a density related approach such as the one described below:

Scientists at the Franklin Institute are building a machine they predict will be usable to separate 60 tons of household trash an hour into reusable raw material.

It [a small model] successfully sorted shredded trash into paper, glass, hard and soft plastics and cans.

The pilot model, which looked something like a farm hay baler, was dismantled several months ago. It used wire screens, shakers and a paddle wheel to separate the trash. The wheel threw the trash, and according to the weight, the cans landed in one bin, plastics in another, paper in another.³⁵

The wet method of separation of refuse makes use of papermill technology, since much of garbage is paper. Franklin, Ohio, is constructing a Black Clawson Hydrapulper

³³Ibid.

³⁴"Turning Junk and Trash into a Resource," op. cit.

³⁵"Trash Sorter Handles Junk with Finesse," The Dallas Morning News, November 16, 1970, Sec. A, p. 1.

modified to process trash. The Hydrapulper is most simply described as a giant blender. It works as follows:

A garbage truck dumps its load on a conveyer, which feeds the Hydrapulper. At the same time, water is being pulped continually into the Hydrapulper. At Franklin, the source of water will be the treated effluent from a sewage plant to be built adjacent to the solid waste plant.

In a great churning and swirling, heavy metallic objects are ejected and may be sold as scrap metal. The rest of the rubbish--paper, food waste, plastic, rubber, rags, glass, wood, leaves, and miscellaneous items--is disintegrated and carried in a liquid slurry to another piece of equipment, where glass, sand, and small pieces of metal are spun out.

At the end of the system, combustible organic materials are sorted out and propelled into a "fluid bed reactor"--a vessel 30 feet in diameter and 2 stories high--where they are oxidized as they hit against grains of hot sand being blown at high speed in the vessel.

Paper and paper products, which make up as much as 50 per cent of ordinary refuse, are reclaimed through another part of the system. Over all, up to 95 per cent of the original garbage will be reclaimed or oxidized, with the remainder, in the form of incinerator ash, to be used by the sewage plant to help sort out organic materials from industrial waste.³⁶

Centrifugal force is used to classify the materials based on their densities.³⁷ The Federal Government will pay for two-thirds of its \$1,400,000 cost. Under the Resource Recovery Act of 1970, the Government will bear three-fourths of the cost of similar projects.³⁸ The plant will initially process

³⁶Driscoll, op. cit.

³⁷Etzel, op. cit., P15.

³⁸Driscoll, op. cit.

50 tons of garbage per day during one eight-hour shift. It will serve about 50,000 people.³⁹

An interesting approach is one in which the waste is ground and incinerated at 2200 degrees Fahrenheit. The material that does not burn becomes a molten slag which is quenched with water. The resulting glass-type material can be used to manufacture fiberglass, highway aggregate, and inexpensive glass-type items.⁴⁰

There is an interrelationship among the various forms of pollution. For example, open burning creates air pollution. There is also a synergistic effect:

The health effects of environmental pollutants and stresses are both additive and dynamic, not just cumulative. Therefore, these pollutants cause conditions which are more than the sum of their individual effects.⁴¹

It is also obvious that the incineration of solid wastes gets rid of the solid wastes but can add to the air pollution problem. Likewise, landfill, if done improperly or in ignorance of the underground water level, can contribute to water pollution.

Disposable products have contributed significantly to the solid waste problem. Paper drinking cups were invented

³⁹Ibid.

⁴⁰Etzel, op. cit., P14.

⁴¹"The Interrelationships of Air, Water and Solid Wastes," Compost Science, VIII (Autumn, 1967-Winter, 1968), 30.

in 1910 in response to the discovery that disease germs could be transmitted from one person to another on the rim of an ordinary drinking cup.⁴² As pointed out by Leonard Singer, there is a paradox in that "the disposable product, introduced for its sanitary properties, has created a pollution problem of vast dimensions."⁴³ He sees the development of disposables as an outgrowth of the spirit of the times following World War II. Americans' life-style changed to convenience-foods, drive-in restaurants and servantless homes. Soon, advertising campaigns began conditioning consumers to the idea of disposability. "In this effort they were immeasurably aided by the American public's deep dislike for (1) germs and (2) non-productive labor."⁴⁴ The ad men grew proficient at advertising "flimsy and cheap" items in a favorable light as "lightweight and economical."⁴⁵

The growth of disposable bedding, clothing and utensils has been a major factor in reducing cross-infection in U.S. hospitals. Perhaps the finest, single example is the success of the sterile plastic syringe, developed after evidence was established that viruses can travel from patient to patient through contaminated needles. The first piston-type plastic syringe was developed by Schenley Laboratories in 1953 after the FDA had concluded

⁴²Singer, op. cit.

⁴³Ibid.

⁴⁴Ibid., 27.

⁴⁵See Darrell Huff, How to Lie with Statistics (New York, 1954), p. 120.

exhaustive studies on the effect of plastic in injectable solutions--and amended its previous glass-only rule. Sterile disposable syringes were marketed in quantity in 1957; starting at a unit cost of 13.5 cents, it dropped to about six cents, at a yearly volume of 100 million syringes.⁴⁶

Consumers favor "virgin" materials. "Virgin wool" on the label sells sweaters. "Reprocessed wool" does not. "Most people see a virgin product as something esthetically clean," says Mighdoll [executive director of the National Association of Secondary Materials Industries, Inc.]. "But have you ever seen a sheep?"⁴⁷

Singer notes that "paper cups, Kleenex and beer cans belong to rich, middle class and poor alike."⁴⁸ He says that since disposable items are classless, they are not really products but "functional rentals."⁴⁹ In a sense, they bridge the gap between the two economic classifications of goods and services. In a literal, temporary sense they are goods, but they have no cultural significance, only the advantage of service.

The Disposables Association was formed in 1968 to educate the public and sponsor research on disposal methods.⁵⁰ The Association has dedicated itself to the development of

⁴⁶Singer, op. cit.

⁴⁷"Turning Junk and Trash into a Resource," op. cit., 67.

⁴⁸Singer, op. cit., 28.

⁴⁹Ibid.

⁵⁰Ibid., 29.

truly disposable and recycleable products.⁵¹ Research is being done by some plastics manufacturers to "build-in" biodegradability or self-destruction.⁵² This is a complete about-face in the packaging industry, where moisture transmission and market shelf life and durability have been king. There will probably have to be some compromises, but both goals should be attainable with adequate applied research.

The National Association of Secondary Materials Industry is also doing research on the solid waste problem.⁵³ They are currently engaged in a one-year study financed by a \$364,000 grant by the Department of Health, Education and Welfare.⁵⁴ The Batelle Memorial Institute is doing the actual research, which includes scrap metals, paper and textiles.⁵⁵ This study is to include both the technical and the economic aspects.⁵⁶

⁵¹"Trade Group Receives HEW Grant for Solid Waste Recycling," op. cit.

⁵²"Turning Junk and Trash into a Resource," op. cit., 71.

⁵³Richard B. Scudder, "Recycling Waste Paper Into Newspaper," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970. See Appendix.

⁵⁴"Trade Group Receives HEW Grant for Solid Waste Recycling," op. cit.

⁵⁵Ibid.

⁵⁶Ibid.

At the National Packaging Forum, held by the Packaging Institute, U.S.A., in October, 1970, solid waste was the central topic.⁵⁷ Testin and Perrins of Reynolds Metals Company called for more recycling of packaging's share (13.3 per cent) of solid waste. They pointed out that although the cost of such a program would be very high, the cost of not doing anything would be much greater.⁵⁸

One deterrent to innovation in waste disposal management is the desire of the local politicians to let other communities go through the problems involved in new technology. Each municipality would prefer to see a project in full scale operation and know for certain how effective and efficient it is before committing its taxpayers' money for a particular project.⁵⁹

⁵⁷"'Waste Disposal' Pervades Forum," Modern Packaging, XLIII (December, 1970), 48.

⁵⁸Ibid.

⁵⁹"Turning Junk and Trash into a Resource," op. cit., 67.

CHAPTER III

RECYCLING PAPER FIBER

The per capita annual consumption of paper used to be considered a useful (and is still probably a valid) statistic which was quoted to indicate the degree of education (reading material) and sanitation (packaging), and thus the progress and industrialization that a developed nation had achieved. This figure is sometimes contrasted with a fraction of a pound of paper per capita used in some undeveloped African country.¹ An example follows:

It [paper] . . . is a primary indicator of a modern civilization. Nations with the highest standards of living have a directly parallel high usage of paper. Per capita consumption in the United States, for example, is close to 600 pounds a year.²

Most of the great volume of paper in the United States is discarded in the form of packaging, newspapers, junk mail, paperback books, etc. This waste paper is a major component of municipal garbage.

The following statistics, published by the American Paper Institute (API), give perspective to the size of the

¹Example: Linda Elaine Kilgore, Paper Making in Texas (Austin, 1963), Introduction.

²"Let's Begin with Some Basics," Paper Fights Pollution (no date), 4.

paper industry and the current share of recycled fiber in the industry:

Of the 58.5 million tons of paper and paper-board consumed in the U.S. in 1969, over 7 million tons remained in permanent use in such forms as books and building materials or were disposed of in home fireplaces or, in the case of such products as tissues, in sewer systems. Some 11.4 million tons, or 20 per cent of the total, were reclaimed and reused. Most of the remaining 40 million tons entered the solid waste stream. On the basis of what is known of the disposition of solid wastes as a whole, it is estimated that in 1969 about two million tons of waste paper may have been used for landfill, 6 million tons incinerated, and some 30 million tons deposited in municipal and town dumps, where the biodegradability of paper causes its gradual disintegration. A current trend to divert more solid waste from dumping to landfill and recycling may well alter these proportions in the years ahead.

Of the tonnage reclaimed, the largest components are used corrugated containers, corrugated clippings and mixed papers from office buildings, closely followed by newspapers and high-grade papers from printing and converting plants. Of all the corrugated boxes produced in 1969, about 25 per cent were collected and reprocessed. Of all the newspapers printed, some 23 per cent were recycled.³

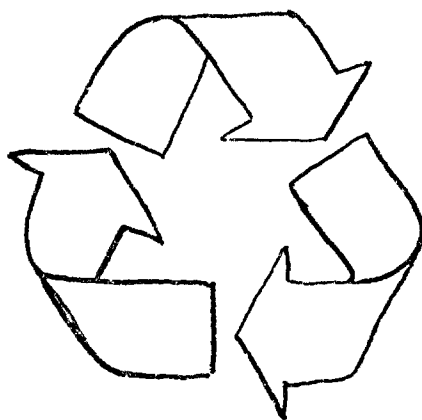
Public Awareness and Attitudes

The publicity given to the environmental problems may be turning the tide of consumer attitudes toward the recycled product. One company which does much paper recycling, Container Corporation of America, recently held a national student contest for a symbol to indicate and promote recycling.⁴ This

³American Paper Institute, The Paper Industry's Part in Protecting the Environment (New York, 1970), p. 21.

⁴"Ecology Symbol for Recycling," Paper, Film and Foil Converter, XLIV (October, 1970), 23.

symbol will be used to attract public attention to the fact that a package or other item is either made from recycled materials, or is capable of being recycled.⁵ The winning design was one consisting of three arrows, following one another in a circle:



CCA made the recycling symbol available to the whole packaging industry and to other industries that recycle materials.⁶ There were over five hundred entries in the contest.⁷ The first prize was a \$2,500 scholarship, which was won by Gary Anderson, a University of Southern California student.⁸ "The

⁵Ibid.

⁶"For the Love of Earth," Tappi, LIII (November, 1970), 2015.

⁷"New Symbol to (Hopefully) Encourage and Promote Recycling Processes," Pulp and Paper Magazine of Canada, LXXI (October 16, 1970), 18.

⁸"Packaging's Recycling Symbol," Packaging Design, XI (September-October, 1970), 11.

company hopes display of the symbol will spread awareness among concerned citizens that waste paper recycling is an important and effective method of conservation."⁹

Previously, the fact that a material had been recycled was not mentioned, or if labeling was required, as in the case of clothing, vague phrases obscured the fact. M. J. Mighdoll, executive vice-president of the National Association of Secondary Materials Industries, Inc., said in a recent speech that manufacturers often used such "phrases as 'cotton fiber content' instead of 'rag content,' and 'wood pulp substitute' instead of 'secondary fiber.'"¹⁰ Henry Van der Eb, president of Container Corporation of America, said at the recent Waste Paper Recycling Seminar in Washington, D. C.:

Expansion of markets will occur to the extent that the psychology of boxboard buying can be reversed. The preference which many buyers currently have for virgin grades should diminish as environmental concern increases, and they become aware of the fact that recycled products are environmentally preferable, in the context of solid waste management.¹¹

Another speaker at the seminar, Bernard W. Recknagel, a St. Regis Paper Company executive, said:

⁹Ibid.

¹⁰M. J. Mighdoll cited in "Secondary Fiber Pulping Conference Draws Environmentalists," Tappi, LIII (December, 1970), 2339.

¹¹"Recycling: Time to Discard Old Attitudes," Chem 26: Paper Processing, VI (December, 1970), 23.

A vigorous marketing effort will have to be mounted for these [recycled] paper products, perhaps supported by a public relations campaign, that certain products have been made either entirely or in part from reclaimed fiber, and, therefore, require public support.¹²

Mighdoll says, "the day has come when the premium will be on a product that can be identified as made from secondary fiber and other recycled materials!"¹³

Deinking Waste Paper

Waste paper merchants sort collected papers into many categories because of the physical characteristics of different grades of paper. Some printed papers are used to produce the gray news grade cardboard which, of course, does not require deinking. If the waste paper is to be recycled into paper per se, then usually deinking is necessary. One exception to this is when the waste paper is trim (broke) from the manufacturing or slitting processes, in which case the paper has not been printed.

The first attempt to reclaim waste paper occurred in 1695 in Denmark.¹⁴ The British Patent Office issued a patent for repulping waste paper to Matthias Koops in 1800.¹⁵

¹²Ibid., 28.

¹³Mighdoll cited in "Secondary Fiber Pulping Conference Draws Environmentalists," op. cit.

¹⁴A. M. Altieri and others, Deinking of Waste Paper (New York, 1956), p. 1.

¹⁵Ibid.

"Whereas manufacture was never successful from a commercial standpoint, the basic principles involved have not changed."¹⁶

In the deinking process, the waste paper is reduced to pulp form by chemical and mechanical means and the ink is removed, usually by a flotation method. Somewhat similar methods are used to remove polyolefin and wax coatings, except that a chlorinated solvent is used which also removes the ink.¹⁷

Deinking is viewed as a type of laundry process in which the paper is wetted and defibered, the ink binder (resin which causes the pigment to adhere to the paper) is softened, and the pigment is washed away from the pulp.¹⁸ The exact procedure used and the chemicals used vary greatly from mill to mill.

At one time or another, a great variety of chemicals has been proposed for deinking. Caustic and soda ash are frequently used, either singly or in combinations. Sodium silicate is employed in some cases. More recently, sodium peroxide and hydrogen peroxide (with alkali) have found considerable favor, particularly for deinking high groundwood papers. Zinc hydrosulphite is also utilized in the deinking of high groundwood papers, and as an aid to color removal in special cases.

.....

Numerous other chemicals such as diatomaceous earth, bentonite, hydrocarbon oils, lime, alkali

¹⁶Ibid.

¹⁷"Waste Recycling Really Works," Environmental Science & Technology, IV (October, 1970), 808.

¹⁸Altieri and others, op. cit., pp. 45-46.

phosphates, and ammonia have been proposed, each apparently having had good features for the particular stock and conditions being investigated.¹⁹

The deinking of waste paper is becoming progressively more difficult because of the new sophisticated combinations, particularly in packaging structures. The increasing variety of waste paper has been called "the biggest problem encountered by deinking mills."²⁰

Waste paper often contains wax, tar, "hot melt" adhesives, wet strength resins, etc. Treatment is necessary to remove these materials because they will appear as specks on the surface of the finished paper. In addition, "they clog up the wires and felts, contaminate the dryer cylinders and necessitate a major outlay on maintenance."²¹ Musselmann also says, "The difficulties arising through lumps produced by the employment of, for example, wet-strength papers, are generally well known."²²

The Black Clawson Company's Polysolv process uses a chlorinated hydrocarbon solvent, trichloroethylene, to dissolve

¹⁹Philip S. Bolton and Clarence E. Libby, editors, The College Textbook of Pulp and Paper Manufacture, Vol. I of 2 vols. (New York, 1958), p. 21.

²⁰Gunther H. Baldauf, "A Consultant Looks at Deinking," Paper Mill News, LXXXVIII (March 16, 1964), 15.

²¹W. Musselmann, "Laboratory Trials on the Pulping of Wet-Strength and Bituminised Waste Papers," translated from Wochenblatt fur Papierfabrikation, XCVI (Mid-May, 1968), 1.

²²Ibid.

wax and plastic coatings.²³ This solvent, used in industry as a "de-greaser," is similar in solvency to carbon tetrachloride, but it is safer to handle and is not flammable.

Deinking causes another pollution problem: disposing of the deinking sludge.

The recovery of secondary fibers, and especially the deinking process, while helping to reduce air pollution and solid wastes problems, results in a different environmental problem, that of water pollution. Typically, the raw effluent from a deinking process contains very high concentrations of settleable solids and dissolved solids, high BOD [Biochemical Oxygen Demand], and a very persistent straw color that defies treatment, even in the activated sludge process. Fortunately, the settleable solids are easily removed in mechanically cleaned primary clarifiers.²⁴

Spraying of effluent into vegetation, and filtration through the soil is a common disposal practice of many industries.²⁵ "Even hydrocarbons and oily sludge wastes can be effectively degraded by soil microorganisms in an aerobic environment and assimilated within the soil matrix."²⁶

Conventional in-plant treatment of deinked wastes can reduce the BOD, but cannot reduce the dissolved solids much or greatly improve the color of the effluent.

²³A. E. Johnson, "What the Polysolv Process Is and How It Works," Paper Trade Journal, CLIII (October 6, 1969), 55.

²⁴Wesley A. Flower, "Spray Irrigation for the Disposal of Effluents Containing Deinking Waste," Tappi, LII (July, 1969), 1267.

²⁵James O. Evans, "The Soil As a Resource Renovator," Environmental Science & Technology, IV (September, 1970), 734.

²⁶Ibid.

Dissolved solids are also substantially reduced, most notably phosphates and nitrates which are rapidly assimilated by plant growth, resulting in removals of up to 99% of the phosphorus and about 70% of the nitrogen. These and other dissolved solids, according to work by Farrell et al. (1) are removed by absorption, chemical precipitation, ion exchange, biochemical transformation, and biological adsorption.²⁷

Research has also been conducted on the use of the deinking sludge as a fertilizer.²⁸ Many mills have agreements with municipalities for the latter to process their deinking waste along with municipal sewage.²⁹

Several European countries recycle waste paper in greater percentages than in this country. Czechoslovakia, for instance, recycles 31 per cent into paper and board.³⁰ "It is stated that over 48 per cent of German's papermaking material is derived from reused paper; figures of 33 and 36 per cent apply respectively to the U.K. and Japan."³¹

In nearly all recycled paper and board which is made from wastepaper, the wastepaper comprises only a part of

²⁷Flower, op. cit.

²⁸Lynn L. Harrison, "Potential Commercial Use of Deinked Pulp Sludge as Fertilizer," Pulp & Paper, XLI (July 10, 1967), 35-37.

²⁹Baldauf, op. cit., 16.

³⁰Vaslav Hnetkofsky, "Processing Waste Paper by New Principles," translated from Zellstoff und Papier, XIX (February, 1970), 50.

³¹J. Grant, "Fibrous Raw Materials for the Paper Industry: Past, Present and Future," Paper Technology, XI (June, 1970), 189.

the furnish, i.e., virgin pulp is combined with the recycled pulp. This is done to maintain strength of the final sheet, since the repulp beating shortens the fibers. In some ways recycled paper is superior to paper produced from virgin pulp. The recycled paper has greater dimensional stability, higher bulk, more opacity and softness.³²

³²Baldauf, op. cit., 15.

CHAPTER IV

THE NEWSPRINT INDUSTRY

It is appropriate at this point to briefly discuss the technical aspects of newsprint, the organization and pricing practices of the newsprint industry, and the volume of newsprint production and consumption.

The Physical Composition and Characteristics of Newsprint

The technical and economic aspects of newsprint are intertwined.¹ Every technical problem which has to be overcome has a corresponding cost.² There are a number of materials that can furnish cellulose for the manufacture of paper, including straw, rags, wood and bamboo.³ Newsprint is a very inexpensive grade of paper; the temporary nature and value of newspapers demands no expensive paper. Wood is the ideal material because of its availability in large quantities at low cost, its usual proximity to manufacturing requirements: water and power.⁴ "Hence wood is universally employed as

¹John A. Guthrie, The Newsprint Paper Industry (Cambridge, 1941), p. 47.

²Ibid.

³Ibid., pp. 47-48.

⁴Ibid., p. 48.

the principal raw material of the cheaper papers."⁵

In the southern United States, pine is the primary source for the manufacture of newsprint; in the north (and Canada), spruce, fir and hemlock are used.⁶ "Southern pine matures in 20 to 30 years vs. 60 to 70 for Canadian."⁷

Newsprint has been variously defined as "the grade of paper used in the regular editions of daily and weekly newspapers,"⁸ "a generic term used to describe paper of the type generally used in the publication of newspapers,"⁹ and "cheap machine-finished paper, chiefly from wood pulp, and used mostly for newspapers."¹⁰ The definition, then, is based upon function. Ellis gives the term a more specific meaning, as well as discussing the history of production:

Newsprint, as the term will be used in the following narrative, is a wood pulp paper which came into general use in the United States in the

⁵Ibid.

⁶L. Ethan Ellis, Newsprint: Producers, Publishers, Political Pressures (New Brunswick, New Jersey, 1960), p. 10.

⁷"Let the Customer Help," Forbes, CVII (February 15, 1971), 53.

⁸United Nations Educational, Scientific and Cultural Organization, The Problem of Newsprint, one in a series of studies on Press, Film and Radio in the World Today, (Paris, 1949), p. 15.

⁹Technical and Education Committees, National Association of Printing Ink Manufacturers, Inc., and the National Printing Ink Research Institute, Printing Ink Handbook, 2nd ed. (New York, 1967), p. 86.

¹⁰Webster's New Collegiate Dictionary, (Springfield, Massachusetts, 1960).

1870's. It combines mechanical pulp, made by a process developed in Germany in the 1840's and used first in this country in the late 1860's, with chemical pulp, made here in the 1880's, in the ratio of approximately 80 per cent wood pulp and 20 per cent chemical pulp. Both processes were originally patented, but this protection expired before large-scale production became a fact. Inertia and prejudice slowed the adoption of the new article. Once it gained a foothold, however, it rapidly displaced paper made from rags and straw in supplying newspaper publishers, who were forced to seek a cheaper medium for their hungry readers.

The process, while subjected to many refinements and repeatedly speeded up, has remained basically unchanged. Spruce has proved the most adaptable of several usable varieties of wood. This has profoundly influenced the geographical, economic and political aspects of the industry. The location of large stands of spruce in proximity to abundant water power first led to the establishment of news-print mills in the northeastern United States.¹¹

The type of press is determined by the circulation of the particular newspaper. . Cylinder presses are used for small-circulation papers such as weeklies, "moderate-speed rotary presses for small dailies, and high-speed multiple rotary presses for papers of large circulation."¹² The presses are usually of the letterpress variety. Basically, the letterpress printing process is accomplished by a printing plate with a raised surface which applies ink to the paper.

¹¹Ellis, op. cit., Appendix, "Print Paper Pendulum," p. 3.

¹²Technical and Education Committees, op. cit., p. 23.

The rotary presses require paper in the form of rolls instead of sheets.¹³ This requirement gives rise to a necessary characteristic of newsprint: tensile strength.¹⁴ The tensile strength must be sufficient for the paper to get through the press without breaking.¹⁵ The ink dries very rapidly by absorption into the newsprint sheet, and very high speed presses are used.¹⁶ Thus absorption, which would be considered an unwanted characteristic in a higher grade of paper, is desirable in newsprint, because it allows fast press speeds, a necessary requirement for the newspaper presses. Speed is important because of the quantity of papers produced as well as the rapid distribution that is necessary before the news becomes "stale."

A higher quality grade of newsprint is used for pre-prints such as the rotogravure supplements that accompany the Sunday (or Saturday) editions of many newspapers. This paper is called "newsroto."¹⁷

¹³United Nations Educational, Scientific and Cultural Organization, op. cit.

¹⁴Ibid.

¹⁵In the industry, this is termed a "web" break. A web is the single thickness of paper going through the press as the roll unwinds.

¹⁶United Nations Educational, Scientific and Cultural Organization, op. cit., pp. 15-16.

¹⁷C. A. Thompson, "Gravure Newspaper Supplement Magazines in the United States," Tappi, XLVIII (January, 1965), 88A.

Today the vast majority of newspaper supplements are printed by gravure and offer the advertiser quality and uniformity superior to that available from other printing processes on similar grades of paper. The comment has also been made that gravure can print on inexpensive papers and deliver magazine-like quality and color. This should be clarified because it does not mean that gravure can print with satisfactory results on any quality paper. There is a minimum quality level for paper for gravure newspaper supplement printing, and this is well above the level of so-called standard newsprint used for letterpress printing of daily newspapers.¹⁸

These supplements contain no recent news information, so they are often printed weeks in advance of the distribution date. Some are syndicated and some are owned by the distributing newspaper.

The word intaglio is synonymous with gravure and indicates "that the design being reproduced is etched or inscribed beneath the surface of the printing plate or cylinder."¹⁹ Adequate tensile strength is also a requirement for this special grade of newsprint. In fact, C. A. Thompson says, "Tensions on rotogravure press operations are normally higher than those encountered on letterpress operations."²⁰ The type of printing process involved also requires a smoother surface than that of standard newsprint. Absorbency, which is desirable in newsprint, is a disadvantage in newsroto paper because the thin gravure ink dries by solvent evaporation rather than

¹⁸Ibid., pp. 88A-89A.

¹⁹Frank B. Wiborg, Printing Ink (New York, 1926), p. 117.

²⁰C. A. Thompson, op. cit., 89A.

by being absorbed into the sheet. With gravure printing, the maximum color value is obtained if the ink pigment layer remains on the surface of the paper.²¹

There has been a recent shift from letterpress to offset (lithography) printing by the small newspapers. A lighter weight (30 lb./ream) newsprint can be used, resulting in savings on paper cost and mailing fees.²² Half of the newspaper plants in the United States are now using offset for newspaper production, but since these are small circulation papers, only a small percentage of the total newsprint consumed is printed by offset.²³ W. D. Rhinehart of A.N.P.A.'s Research Institute predicts, "by the end of '78 there will be 1,376 plants on offset using 2 million tons of newsprint and 184 on letterpress using 8,886,000 tons of news."²⁴

The term offset printing, which has come to be synonymous with the term lithography is a printing process in which printing plates transfer the ink to a rubber "blanket," which "offsets" from the blanket onto the paper.²⁵ The Printing Ink

²¹Ibid.

²²"Demand for Newsprint to Grow 34% in 1970s," Industry Week, CLXVII (November 9, 1970), 57.

²³Ward C. Williams, "Mills Strongly Affirm Future of New Twin-Wire Formers," Pulp & Paper, LXV (January, 1971), 61.

²⁴W. D. Rhinehart cited in Ward C. Williams, op. cit.

²⁵Herbert J. Wolfe, Printing and Litho Inks (New York, 1957), p. 289.

Handbook contains a good description of the litho printing process:

The lithographic process is based on the principle that oil and water do not readily mix: chemicals and chemistry play a leading role.

The printing plate consists of printing and non-printing areas which are substantially on the same plane or level. The printing area is ink-receptive; the non-printing area is water-receptive. The image is transferred from the ink-receptive area rather than from raised surfaces (as in the case of letterpress) or from depressed surfaces (as in gravure).²⁶

The offset press is ideal for small jobs because press "make-ready" (adjustment) is not required. As a result of this and other factors, "offset is substantially cheaper than letterpress."²⁷

Tensile strength can be measured in both machine direction and cross direction, meaning respectively, in the direction the roll is wound, and in the direction that represents the width of the sheet. The machine direction (MD) tensile is the critical parameter in the instance of newsprint, because of the tension on the sheet as it goes through the press. It is important that the edges of the rolls be protected against cuts or tears, because they will also cause web breaks.

²⁶Technical and Education Committees, op. cit., p. 25.

²⁷"Technology for Tomorrow, Part V," Dun's Review and Modern Industry, LXXX (November, 1962), 86.

Description and History of the Structure
of the Newsprint Industry

Almost all newsprint is sold on a contract basis between the manufacturer and the consumer (newspaper publisher).²⁸ The contracts are for from three to five years, with some being for even ten or twelve years.²⁹ The "spot market" is the open newsprint market used by small publishers and occasionally a large publisher who has a temporary paper shortage. This market is 10 per cent, or more, higher in price, occasionally being "two or three times as high as long term quotations."³⁰

The smaller publishers, through the years, have been more militant than the larger ones who avoided "too vigorous governmental interference in the newsprint situation on the grounds that it constituted a threat to the freedom of private enterprise."³¹ Of course, the larger newspapers were not quite as concerned about newsprint prices because they bought by contract at the lower prices.

Richard B. Scudder says that about nine million tons of newsprint are used annually in the United States, and two

²⁸Theodore J. Kreps, "The Newspaper Industry," The Structure of American Industry, 3rd ed., edited by Walter Adams (New York, 1967), p. 514.

²⁹Ibid.

³⁰Ibid.

³¹Ellis, Newsprint: Producers, Publishers, Political Pressures, op. cit., p. 16.

million tons of this are produced by mills which are owned by newspapers.³² This statement acquires much greater significance when it is realized that U.S. annual production of newsprint is only a little over three million tons. However, a large quantity of the newsprint used in this country is produced in Canada, and it may be that much of those two million tons of newspaper-owned production mentioned by Scudder is produced in Canada. So this would not mean that two-thirds of the U.S. production is newspaper-owned.

There have been hostilities between the newspaper publishers and the newsprint manufacturers for at least the last seventy-five years.³³ In some instances, the American Newspaper Publishers Association (A.N.P.A.) has led the fight. John Norris of The New York World testified before the House Ways and Means Committee in 1896 that a group of eastern newsprint producers were about to form a selling agency for the purpose of collusion to raise the price of newsprint.³⁴ This accusation was an effort by the publishers to have Congress abolish the tariff on imported newsprint.³⁵

³²Richard B. Scudder, "Recycling Waste Paper into Newsprint," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970. See Appendix.

³³Ellis, Newsprint: Producers, Publishers, Political Pressures, op. cit., p. v.

³⁴Ibid., p. 6.

³⁵Ibid., p. 7.

In 1898, International Paper Company was formed from seventeen members. The price of newsprint increased, whether because of the combination or because of the Spanish-American War.³⁶

A further price increase in 1899 stimulated the A.N.P.A. to request Congress to study the paper situation, but entry of the Great Northern Paper Company (November, 1901) and other independent producers into the market broke the price, and several quiet years ensued.³⁷

In 1904, Norris and Don Seitz accused International Paper and the General Paper Company (comprising 26 midwestern mills) of price collusion. International successfully refuted the charges, but General Paper Company was found guilty of violation of the Sherman Act and it was dissolved as a result of a court order in 1906.³⁸ Higher newsprint prices returned in 1906. The American Newspaper Publishers Association demanded a tariff reduction and anti-trust action. A House Committee did extensive study on the problem. The Mann Committee, in its report, noted the necessary dependence of the U.S. on Canada's spruce forests.³⁹

Between 1909 and 1911 the newsprint question became an issue in international politics as well as in the domestic economy. Publisher pressures finally prevailed, and newsprint went on the free

³⁶Ibid.

³⁷Ibid.

³⁸Ibid., pp. 7-8.

³⁹Ibid., p. 11.

list, first as a side effect of the abortive Reciprocity Agreement of the latter year, and permanently in the Underwood Tariff of 1913.⁴⁰

As a result, the Canadian newsprint mills began to grow rapidly and the U.S. mills began shifting to more expensive grades of paper which were still protected by tariffs.⁴¹

In 1916 a business boom caused a newsprint shortage. As a result of World War I, European exports slowed in 1916, and North America was forced to rely largely upon its own production of newsprint.⁴² Many large newspapers found it necessary to buy some of their newsprint supply in the "spot market." "Newsprint rose in price from a range of \$1.98 to \$2.35 per cwt. in 1915 to a range of \$2.09 to \$3.27 per cwt. the second quarter of 1916 for the New York-New Jersey area."⁴³

As a result, the price in the "spot market" increased, causing a Federal Trade Commission investigation of price collusion among producers.

In 1917, the F.T.C. condemned the producers' recent practices and accused them of restricting competition. The United States soon became involved in World War I, and price inflation resulted.

⁴⁰Ibid., p. 12.

⁴¹Ibid., p. 14.

⁴²Louis Tillotson Stevenson, The Background and Economics of American Papermaking (New York and London, 1940), p. 170.

⁴³Ibid.

The Trade Commission publicly confessed its inability to deal with the newsprint problem but published considerable evidence that the manufacturers were controlling the market to their own advantage. Its proposed remedy was government supervision of production and distribution. This caused some publishers to fear interference with freedom of the press, and a confusing situation resulted.⁴⁴

The producers pleaded nolo contendere, paying small fines. The Newsprint Manufacturers Association was dissolved because it was held that it had a restricting effect on trade.

Early in the 1920's a recession lowered newsprint prices, which stayed depressed until the thirties. During this decade, there was a vast shift in the production from the U.S. to Canada. Canadian production soared from 800,000 tons in 1920 to 4,000,000 tons in 1930.⁴⁵ Meanwhile, U.S. production of newsprint diminished and shifted to more profitable grades.⁴⁶ By 1929, Canada was producing 66 per cent and the U.S. 34 per cent of the U.S. newsprint consumption.⁴⁷ Figure 1. shows the U.S. and Canadian production of newsprint every five years from 1920 through 1955, plus 1958. At the present, Canada supplies about 65 per cent of the U.S.

⁴⁴Ellis, Newsprint: Producers, Publishers, Political Pressures, op. cit., p. 15.

⁴⁵Ibid., p. 16.

⁴⁶United Nations Educational, Scientific and Cultural Organization, op. cit., p. 29.

⁴⁷Stevenson, op. cit., p. 175.

consumed newsprint. The Scandinavian countries contribute 2 per cent and the U.S. producers 33 per cent.⁴⁸

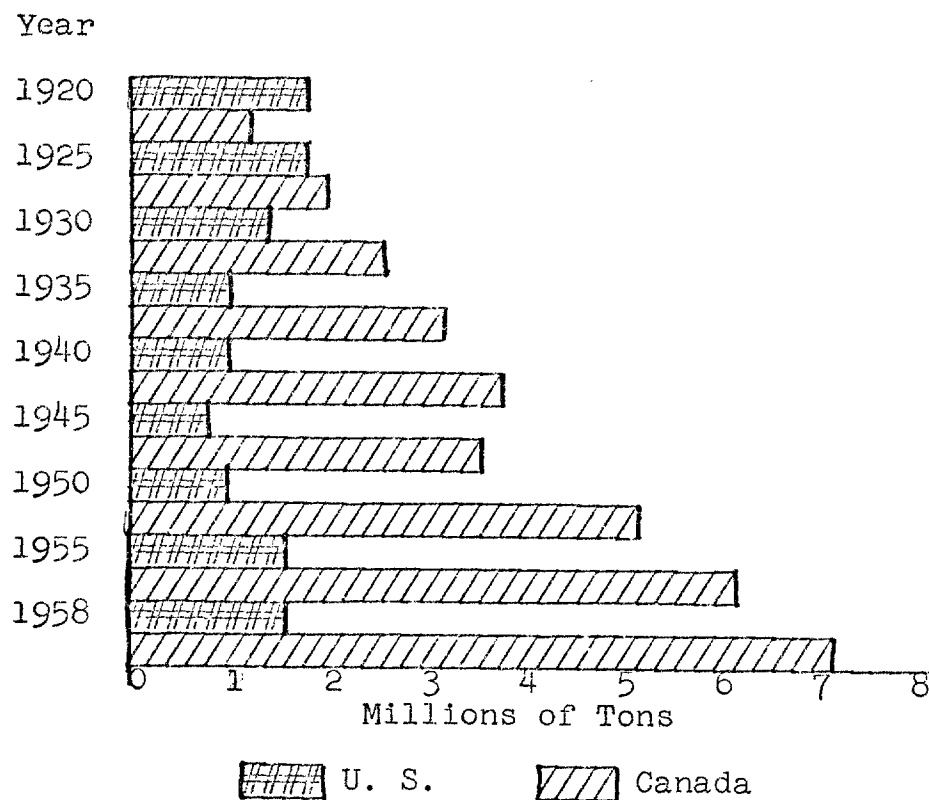


Fig. 1--U.S. and Canadian Newsprint Production⁴⁹

In the early thirties, there were two groups of Canadian newsprint producers. The International Paper group in Quebec ran at full rated capacity under Hearst contracts. However, the other group, the Newsprint Institute of Canada, Ltd.,

⁴⁸"Demand for Newsprint to Grow 34% in 1970s," op. cit.

⁴⁹Ellis, Newsprint: Producers, Publishers, Political Pressures, op. cit., data taken from pp. 241, 243. There is an error in the tables, i.e., the data are a thousand times as large as they should be. This discrepancy was acknowledged by Dr. Ellis in a letter to the writer on February 27, 1971.

included the other major producers, and ran at only about 85 per cent capacity. After an allocation of orders agreement broke down in 1930, cutthroat competition existed in the shadow of bankruptcy. "By September [1932] only International and a few newspaper affiliates could look into the future with anything but dread."⁵⁰

Nineteen thirty-five was a transition year with a seller's market in sight.⁵¹ The years 1935 through 1939 were relatively stable, with fairly good harmony between producers and consumers.⁵²

The OPA management froze the price of newsprint for a while at \$50 per ton. This irritated the Wartime Prices and Trade Board of Canada (WPTB), which was having its own problems with a short labor supply.⁵³ The U.S. newsprint shortage was aggravated by the government's supplying the liberated European countries newsprint with U.S. production.⁵⁴

At an important meeting on November 15 the Newspaper Industry Advisory Committee voted to remove controls on December 31, following a report of "'generally favorable'" replies to Williams' proposal of voluntary self-discipline. It was then voted to call a meeting on November 28 to consider adoption of a plan already elaborated by the New England Daily Newspaper Association

⁵⁰Ibid., pp. 17-18.

⁵¹Ibid., pp. 18-19.

⁵²Ibid., pp. 40-41.

⁵³Ibid., p. 52.

⁵⁴Ibid., p. 82.

whereby publishers agreed to contribute a maximum of 3 per cent of their total tonnage to be doled out to papers in imminent danger of suspension for want of newsprint.⁵⁵

According to Ellis, one of the most important effects of the war on newsprint was the focus on trying to increase Canadian production as well as reverse the downward trend of U.S. production.⁵⁶

In the early postwar period, newspaper publishers were short on newsprint, but none of them had to suspend publication.⁵⁷ The larger newspapers were protected by contracts, but the smaller ones had to buy on the "spot market" at very high prices. U.S. production began a slow climb and the "Canadian industry ended the period [1946-1949] in a good position to expand conservatively."⁵⁸

There was considerable expansion on both sides of the border in the early fifties. Canada exercised price leadership, setting the price at \$125 a ton in 1952.⁵⁹ The F.B.I. conducted an investigation:

. . . directed largely toward the possibly monopolistic aspects of the operations of United States concerns which controlled or were affiliated

⁵⁵Ibid., p. 89.

⁵⁶Ibid., p. 92.

⁵⁷Ibid., p. 95.

⁵⁸Ibid., p. 132.

⁵⁹Ibid., p. 188.

with Canadian producers and which, through their binational character, were able to evade anti-monopoly legislation on both sides of the border.⁶⁰

Although the report asserted that there was not enough evidence to prove that the prices were set by "impersonal market forces,"⁶¹ it was unable to prove collusion to fix prices by either U.S. or Canadian producers.

The newspaper publishers remain in an enviable position of being able to influence public and governmental action to some extent.⁶² Approximately 30 per cent of the cost of newspaper production is due to the expenditure for paper.⁶³

In the 1960's, U.S. production of newsprint gradually increased from about two million tons to well over three million tons, as shown in Figure 2.

In 1970, newsprint mill expansions in the United States "slowed the inflow of Canadian newsprint."⁶⁴

As mentioned earlier, Canada supplies approximately 65 per cent of the newsprint that is used in the United States. The U.S. produces 33 per cent of its total supply, and the Scandinavian countries supply 2 per cent.

⁶⁰Ibid., p. 223.

⁶¹Ibid., p. 226.

⁶²Ibid., p. 236.

⁶³Ibid., p. 66.

⁶⁴"Papermakers Write Off '70," Chemical Week, CVIII (January 13, 1971), 14.

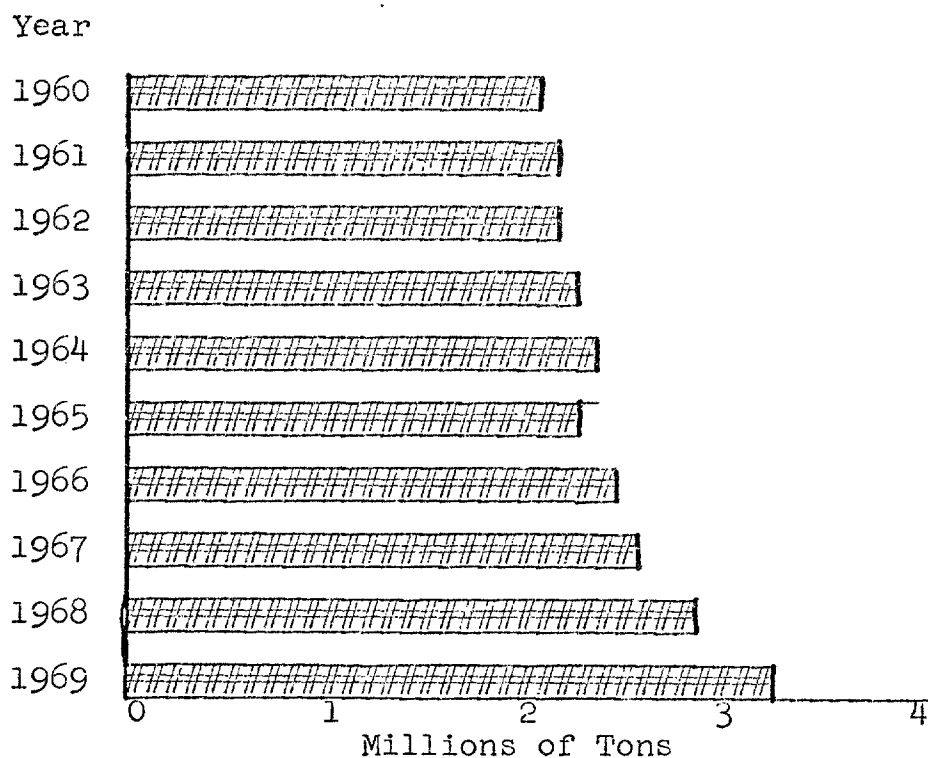


Fig. 2--U.S. Newsprint Production, 1960-1969⁶⁵

The biggest newsprint producer in the world is England's Bowater Paper Corp. Ltd., which has several mills in the Southern U.S.⁶⁶ Their mills supply 17 per cent of the U.S. consumed newsprint.⁶⁷

One Canadian newsprint producer uses barges to deliver newsprint to U.S. customers. MacMillan Rothesay Ltd. now operates three barges serving the U.S. west coast and is

⁶⁵American Paper Institute, How the American Paper Industry Performed in 1969, A Report on Its Progress, Problems and Prospects (New York, 1970), p. 7.

⁶⁶"Let the Customer Help," op. cit.

⁶⁷Ibid., 54.

having one constructed to serve the east coast.⁶⁸ The deepsea barge is a cheaper form of transportation than rail and ship transporting.⁶⁹

Table III lists the average contract prices in New York from 1918 through 1958.

TABLE III
AVERAGE CONTRACT PRICES FOR NEWSPRINT PAPER:
NEW YORK CITY DELIVERY⁷⁰

Year	Price per Ton	Year	Price per Ton
1918	\$64.30	1939	\$49.00
1919	79.40	1940	49.47
1920	112.60	1941	49.90
1921	111.35	1942	50.00
1922	76.80	1943	54.66
1923	81.80	1944	58.00
1924	80.80	1945	60.63
1925	76.80	1946	72.57
1926	71.80	1947	88.50
1927	71.80	1948	97.70
1928	67.50	1949	100.00
1929	62.00	1950	100.92
1930	62.00	1951	110.55
1931	57.00	1952	120.45
1932	48.33	1953	125.80
1933	41.25	1954	126.00
1934	40.00	1955	126.00
1935	40.00	1956	130.00
1936	41.00	1957	133.33
1937	42.50	1958	134.00
1938	49.00		

⁶⁸"Industry News," Pulp and Paper Magazine of Canada, LXXII (January, 1971), 15.

⁶⁹Ibid.

⁷⁰Ellis, Newsprint: Producers, Publishers, Political Pressures, op. cit., p. 242.

Note the fluctuation in the price per ton, especially in the early twenties. Increases in recent years are partly due to inflation, of course,

An investigation of the future prospects of recycling newsprint presupposes the continued existence of the newspaper. One alternative available to newspaper publishers, if newsprint costs go too high, is the use of electronic communication devices, such as "home fax."⁷¹ Many of the larger newspapers are affiliated with television and radio stations. The present news programs on radio and television present a good outline of the news, but they do not usually cover the news stories in depth as they are covered in newspapers. Many people now use television and radio broadcasts for the fresh news, but rely on the newspaper for details. Statistics for the number of daily newspapers in the United States shows a gradual decrease from 2,461 in 1916 to 1,762 in 1958; however, total daily circulation grew from 24 million in 1909 to almost 58 million in 1957.⁷² In 1968, the total weekday circulation was 60.1 million copies.⁷³ Advertising volume increased from 3.7 billion dollars in 1960 to 5.6 billion in 1969, according to A.N.P.A.⁷⁴

⁷¹Williams, op. cit., pp. 60-61.

⁷²Kreps, op. cit., p. 510.

⁷³"Demand for Newsprint to Grow 34% in 1970s," op. cit.

⁷⁴Ibid.

The consumption of newsprint in the U.S. during the 1970's is expected to increase by about 34 per cent.⁷⁵ The consumption has increased much faster than has the population, and this trend is expected to continue.⁷⁶ The per capita consumption of newsprint in the early 1960's was about 80 pounds a year; in 1969 it was 96 pounds and is predicted to be 114 pounds by 1980.⁷⁷ However, North American newsprint consumption declined approximately 2 per cent in 1970.⁷⁸

Predicasts Inc., Cleveland, forecasts 9.8 million tons of newsprint will be consumed in the U.S. this year--with demand rising to 11.5 million tons by 1975 and 13.1 million tons by 1980. Back in 1960 only 7.3 million tons were used.⁷⁹

According to a recent survey by the Canadian Pulp and Paper Association, "Projection of current growth rates indicates world demand of about 26.3 million tons in 1975, of which 12.3 million will be in North America."⁸⁰

The American Newspaper Publishers Association predicts, "The years 1970-75 promise to be a period of substantial growth for newspapers and newsprint consumption."⁸¹

⁷⁵Ibid.

⁷⁶Ibid.

⁷⁷Ibid.

⁷⁸"Industry News," op. cit.

⁷⁹"Demand for Newsprint to Grow 34% in 1970s," op. cit.

⁸⁰"Industry News," op. cit., 16.

⁸¹"Demand for Newsprint to Grow 34% in 1970s," op. cit.

Virgin newsprint currently sells for approximately \$153 a ton.⁸²

⁸²Ruth C. Adams, "Recycling Is the New Watchword," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 13.

CHAPTER V

RECYCLING NEWSPRINT

One Hundred Per Cent Recycling

"As cost-sensitive newspaper publishers have observed for years, there is only one truly basic difference between fresh and used paper: ink."¹ Since newspapers comprise between 10 and 40 per cent of household garbage, the solid waste problem would be helped greatly, and many millions of trees would be saved annually if newspapers could be repulped and reprocessed to form fresh newsprint. It is a startling and an ironic fact that "In New York City it costs more to dispose of the Sunday New York Times than to buy it . . ."²

"Projects to make fresh newsprint out of discarded newspapers have been tried unsuccessfully many times since the early 1900's . . ."³ Old newspapers have been used for many years to produce a miscellany of paper products, but no one had success in reusing newspapers for newsprint.

¹"Eradicating the Ink," Time, LXXVI (August 1, 1960), 53.

²"Disposal Costs!" Environmental Systems News, II (January, 1971), 5.

³"Newsprint from Old," Newsweek, LVI (October 10, 1960), 62.

Secret Deinking Process

Richard B. Scudder, publisher of the Newark Evening News, began experimenting with deinking newspapers in the 1950's, in response to the great shortage of newsprint after World War II.⁴ He and his engineer at the newspaper publishing house, Robert Illingworth,⁵ discovered a deinking process which has remained a secret. In October, 1961, the first Garden State Paper Company plant was opened at Garfield, New Jersey. This first plant was sometimes referred to as "Scudder's Folly."⁶ In 1967, a similar mill was opened at Pomona, California.⁷ In 1968, Garden State, in a joint venture with Marshall Field, built a mill at Alsip, Illinois.⁸ Field is publisher of the Chicago Sun Times and Daily News.⁹ Garden State is "the only company in the world manufacturing newsprint entirely from old newspapers."¹⁰

⁴"A Tour Through Garden State Paper Company," furnished by Garden State Paper Company, Garfield, New Jersey, 1971, 1.

⁵"Newsprint from Old," op. cit.

⁶Lenora Williamson, "Recycled Newsprint Spurs Newspaper Salvage Drives," furnished by Garden State Paper Company, Garfield, New Jersey, 1971, source and date unknown.

⁷"A Tour Through Garden State Paper Company," op. cit.

⁸Ibid.

⁹"Eradicating the Ink," op. cit.

¹⁰Letter from William E. Hancock, Director of Paper Stock Procurement, Garden State Paper Company, Inc., Garfield, New Jersey, January 4, 1971. See Appendix.

Since Garden State pays a premium price for bales of hand sorted newspaper, plastics, glue, metal and other foreign matter are not a problem.¹¹ Overhead conveyer containers load the paper into a batch pulper. Then 15,000 gallons of water and the deinking chemicals are added. A large rotor at the bottom of each batch pulper breaks the paper into individual fibers. At this stage, the pulp mixture is 95 per cent water and 5 per cent fiber. The pulp is then mechanically cleaned to remove staples, string, wire, etc., and most of the ink-saturated water is removed by pressing the pulp to a 25 per cent consistency. Clean water is later added to reduce the pulp to a 4 per cent fiber mixture. The pulp is then put through a process to further break up any paper flakes that were not defibered in the pulpers. Vibrating screens and centrifuges further clean the pulp of staples, rubber bands, string, etc. The pulp is then washed and is ready for the Fourdrinier (papermaking machine). The newsprint next is dried as it passes over and under many steam heated rollers and smoothed by the calender rollers. Next the rolls of newsprint are slit to the desired width, wrapped, and stored for shipment to customers.¹²

Importance of Mill Location

All three of these mills are strategically located. Just as paper mills which use virgin pulp are located near to

¹¹"A Tour Through Garden State Paper Company," op. cit.

¹²Ibid.

their source of raw material, it is an economic necessity for the newsprint recycling mills to be near the source of their raw material. None of the three cities is very large, but a close look at the map will show that Garfield, New Jersey, is just ten miles from Manhattan Island; Alsip, Illinois, is a suburb of Chicago; and the Pomona mill is very near to Los Angeles. The Garden State mills have another advantage: they are near to their market, or a large part of it, in the form of the big city newspapers. The recycling mill is close to both its raw materials and its market, so transportation costs are minimized. Conventional paper mills do not usually enjoy this double advantage. Transportation cost is a very important factor in waste paper disposal and in recycling. "It is estimated that transportation of waste newspapers more than 100 miles makes it uneconomical vis-à-vis mechanical pulp made from wood."¹³ Garden State uses the same trucks to ship their newsprint and to pick up old newspapers from their paper dealers.¹⁴ They estimate that it takes approximately 5 million people in an area to generate enough old newspapers for one papermaking machine.

¹³"Paper Recycling May Come, but Wood Still Costs Less," Canadian Pulp & Paper Industry, XXIV (February, 1971), 23.

¹⁴Richard B. Scudder, "Recycling Waste Paper into Newsprint," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970. See Appendix.

Garden State does not purchase newspaper directly from the general public at this time, but depends on brokerage firms to supply its mills. In the east, we purchase our paper from Bruno & D'Elia of Hackensack, N.J., and Great Eastern Packing and Paper Stock Corporation of Roselle, N.J.

The Alsip mill purchases its paper from Pioneer Paper Stock Division, Container Corporation of America in Chicago, and on the West Coast, the Pomona mill deals with Garden State Fiber Company, Inc., of Pomona, California.¹⁵

Field Enterprises, the co-owner of the Alsip mill, also has a history in the use of secondary fiber for newsprint. The following excerpt is from a 1959 Science Digest:

The Chicago Sun-Times is using about 10,000 tons of newsprint made from wastepaper in its daily press runs . . .

The problem of making newsprint from wastepaper has been researched for the past six years at the Manistique Pulp and Paper Co., Manistique, Mich. . . . finally satisfactory sheet was produced from 100 percent waste.¹⁶

The process used was a new one and allowed use of 100 per cent waste paper, but not 100 per cent old newspaper. The Field (Manistique) mill used the following deinking process:

The wastepaper is produced by a means called flotation. The paper is re-pulped and transferred to tanks containing mechanisms for aerating the pulp. As the aeration occurs at the bottom of the

¹⁵Hancock, op. cit.

¹⁶"Chicago Paper Is Using 'Wastepaper' Newsprint," Science Digest, XLVI (September, 1959), 92.

tank, bubbles covered with a reagent having an affinity for ink are formed and rise to the surface.

The ink adheres to the bubbles which rise to the top of the tank and are skimmed off by paddles. Remaining at the bottom is the clear pulp, its fibers undamaged by excessive washing and cooking at high temperatures for prolonged periods, as occurred in previous de-inking processes.¹⁷

The grade of wastepaper that was being used was not specified in the above article. However, the next year (1960), this mill was using slick magazine-type waste paper because of its lower cost and a higher fiber content than old newsprint, so that it could stand the chemical deinking process better.

Collection Projects

There have been paper drives for many years in which the Boy Scouts or other charitable organizations collected old newspapers and magazines. As mentioned above, however, these have often been sporadic. The last few years, with the great increase in public awareness of the deteriorating environment, there have been other projects and drives to collect old newspapers. "Before the word 'ecology' took the spotlight a year ago, nothing short of a world war has galvanized the public's interest in salvage. Nothing, that is, except the price paid by scrap dealers."¹⁸ Though using different approaches and

¹⁷Ibid.

¹⁸John H. Rich, President of Garden State Paper Company, address before the Commonwealth Club of California, October 12, 1970, San Francisco, California. See Appendix.

methods, most of these recent efforts have been considered successful. And because of the different approaches to the problem, we have learned several things about newspaper collection.

Madison, Wisconsin

For the last three years,¹⁹ residents of the eastern half of Madison have voluntarily separated their old newspapers and other garbage for regular city collection.²⁰ After the first two years, the project was expanded to include the entire city.²¹ The first two years Garden State bought all of the supply, but they were joined last year by an insulation manufacturer.²² The project has received the cooperation of over 60 per cent of the population.²³

San Francisco, California

The San Francisco Examiner & Chronicle recently ran a series of editorials and sponsored an old newspaper drive. The following excerpt from the first editorial indicates the type of appeal used:

¹⁹Ibid.

²⁰Ibid.

²¹Ibid.

²²Ibid.

²³Jerome Goldstein, "Wisconsin Develops 'Intermediate Composting,'" Compost Science: Journal of Solid Wastes and Soil, XI (November-December, 1970), 13.

This paper is printed on re-used newsprint. . . . The Examiner is sponsoring a month-long experiment to determine whether San Francisco readers will participate in wholesale collection of newspapers so the newsprint may be reclaimed for a second, a third, even a fourth use. For every ton of re-processed newsprint, the equivalent of 17 trees will be saved. For every ton reclaimed there will be one less ton for disposal.²⁴

In San Francisco, people were asked to separate their old newspapers from other trash. "The paper was then collected by professional scavengers, of which there are two in San Francisco."²⁵

San Diego, California

"Five, eight and eleven" is the slogan used in San Diego.²⁶ Newspaper drop boxes are located all over the city and every full drop box "represents five dollars for the city's youth, eight dollars of the sanitation department's budget saved, and 11 trees spared from the woodsman's axe."²⁷

All of the above projects were considered successful and all were strictly voluntary. However, the following one was required by law:

²⁴Jerome Goldstein, "Recycle Paper and Save the Dump," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 4.

²⁵Scudder, op. cit.

²⁶Rich, op. cit.

²⁷Ibid.

Irvington, New Jersey

In this instance, again, the old papers are separated from other trash and placed on the curbs. Civic organizations are granted permission to collect the paper in a particular area. If there is no application made for a particular area, the municipal trash collectors pick up the newspapers.²⁸ The papers are collected each Saturday.²⁹ Two hundred tons per month are collected in this way.³⁰

The Madison, San Francisco, San Diego and Irvington programs are four different approaches to the same problem. In some areas, the public, given the proper incentive, will cooperate with dramatic results. In other areas, enforcement is the answer. It may be of interest at this point to note that Madison, concerned with the poor cooperation by apartment house dwellers, is considering adoption of an ordinance similar to the one in force in Irvington.³¹

Louisville, Kentucky

The Louisville, Kentucky, Courier-Journal recently announced that it will begin using some recycled newsprint. It will attempt to sponsor the recycling of (and use the paper from) 6-9 thousand tons per year.³²

²⁸Ibid.

²⁹Williamson, op. cit.

³⁰Goldstein, "Recycle Paper and Save the Dump," op. cit.

³¹Rich, op. cit.

³²Bill Stockton, "Trash Crisis: Recycling Ideas Encourage Disposing of Disposables," The Dallas Times Herald, November 13, 1970, Sec. B, p. 28.

Technical Feasibility and Economics

Recycling of newsprint is possible; Garden State Paper Company has proved that. The reason for their success hinges on their proprietary, or secret, deinking process for newsprint. As is true of many companies in many industries, Garden State chose to maintain their process as a secret rather than patent it. If they had patented it in 1960, the patent would expire in a few years from now and would be open knowledge for any company to use. In a recent speech at a seminar for recycling waste paper held by the American Paper Institute, Richard Scudder briefly mentioned sharing Garden State's technical secrets. But will it actually be done, and when?

I think consideration has to be given to a sharing of technologies. In a situation of this kind, I could hardly see Garden State holding its secrets to its breast while the country smothered in waste paper. I think that Garden State would cooperate with all kinds of people in this regard, and I hope that the rest of the industry would do the same.³³

Conventional deinking processes have been proved to be inapplicable to the problem of reprocessing 100 per cent old newspapers into fresh newsprint. "The conditions required for deinking newsprint are quite different from those given for magazine and book stock."³⁴

³³Scudder, op. cit.

³⁴L. A. Beeman and others, The Bleaching of Pulp (New York, 1953), p. 269.

Garden State's "Go Slow" Policy

Garden State officials warn against generating too much local interest in recycling newsprint. They have seen cities begin collecting newspapers on a large scale almost overnight. What they fear is that a city will collect newspapers without checking on the local market and mill facilities, become disenchanted with the idea, and be much harder to convince later on when a local market exists. John Rich, President of Garden State, says, "Responding to the lure of reclamation in 1970, only to see the paper trucked off to the dumps in 1971 before it could be used in 1972, could extinguish the fires of enthusiasm . . . for many years."³⁵

Garden State prefers to set a floor on the price that they will pay and guarantee to buy all the stock generated by a municipal paper drive, although they do not usually buy directly from the collectors. According to Garden State, there is only a limited market for recycled newsprint, partly because of the long term contracts between publishers and newsprint producers and because of the fact that "two million tons are made by mills that are owned by newspapers."³⁶

Of course, if Scudder's deinking process were made a matter of public record, or if they would lease the process to other paper companies, many newsprint mills could produce

³⁵Rich, op. cit.

³⁶Scudder, op. cit.

recycled newsprint. Richard Scudder says that a mill for recycling newsprint, to be a financial success, must be located in an area capable of supplying 300 tons of old newspapers per day.³⁷ In the case of waste newspapers, the economic roles are reversed. The subscriber, or reader, of the newspaper becomes, in a sense, the producer of the waste newspaper; while the paper mill becomes the consumer. According to Scudder, only the most populous areas in the U.S. could generate enough old newspapers to provide a steady supply of 300 tons per day.³⁸

Scudder's mills probably do not often get back the newspapers made from their recycled newsprint. If so, it is a negligible percentage of their furnish. The question emerges: How many times can the same fibers be recycled, or, more accurately, what percentage of already recycled fiber could be reused again, keeping in mind that 100 per cent of Garden State's furnish is waste newspapers, and no virgin pulp is added. Scudder says that he feels that 40 to 45 per cent is technically feasible. He says,

". . . this would mean that the furnish for a mill like ours would be 60 percent new newsprint [old newspapers which were made from virgin pulp], 24 percent newsprint that had been reused once; 9.6 percent newsprint that had been reused twice; 3.8 percent 3 x 2, something and so on until it disappeared."³⁹

³⁷Ibid.

³⁸Ibid.

³⁹Ibid.

Since the fibers are shortened somewhat with each repulping, if all newsprint mills were to use a furnish of 100 per cent old newspapers, the fibers would produce an inferior sheet by the time they had been repulped several times. But mills using a 100 per cent waste newspaper furnish in an industry which generally uses virgin pulp can operate satisfactorily. Likewise, if all mills used a mixture of old newspapers and virgin pulp, the product would probably be satisfactory.

Another stumbling block in the way of recycling newsprint in particular, and paper in general, is the negative attitude of many paper companies. In contrast, Container Corporation of America, Bergstrom Papers, Garden State, and a few others do much recycling of waste papers. In fact, about 20 per cent of the waste paper in the United States is recycled. Many paper companies, however, consider the use of virgin pulp more economical than waste paper pulp.⁴⁰ Some people have advocated municipalities' subsidizing the waste paper mills because of the great saving rendered the municipalities in garbage collection and disposal. One such advocate is Samuel J. Keating, Jr., former Sanitation Commissioner of New York City:

Of course, if the cost of disposal were applied to the cost of the product--it costs \$6 to \$8 a ton just to burn paper in a New York incinerator--the

⁴⁰Goldstein, "Recycle Paper and Save the Dump," op. cit., 5.

entire picture would change. Suddenly the manufacturers of newsprint and cardboard containers could justify investments to reclaim and recycle used paper.⁴¹

Garden State sells its recycled newsprint at a discount of \$8-10 a ton. The current price of recycled newsprint is about \$145 a ton.⁴² They also sign long-term contracts with many newspaper publishers, as do many other newsprint producers.⁴³ They state that recycled newsprint is comparable to newsprint made from virgin pulp, and even possibly superior in some ways. Possibly they sell at a discount because the stigma attached to deinked (recycled) newsprint still holds, and possibly they do so in order to rapidly increase their volume of sales. Or perhaps their discount is due to a combination of both motives.

Nearly 20 per cent of newsprint production is by newspaper-owned mills. The long contracts between most of the other producers and newspaper publishers probably would deter any effort to rapidly begin production of recycled newsprint. As mentioned above, Garden State itself uses these long-term contracts. It also has the advantage of a chairman of the board who is publisher of a large newspaper and who attended college with many of the leading publishers and editors

⁴¹Ibid., 6.

⁴²Hancock, op. cit.

⁴³Scudder, op. cit.

and therefore has a personal relationship with many of his major customers and potential customers.⁴⁴

Partial Recycling and Use in Other Finished Products

One paper company in England uses a furnish (paper-making raw material formula) of 25 per cent deinked overissue newspapers and magazines for the production of newsprint.⁴⁵

As mentioned earlier, 23 per cent of the newspapers produced are recycled, but most of these are not recycled into newsprint, or if they are, they represent only a relatively small percentage of the pulp furnish. Most of the recycled newspapers are used to produce "news" grade cardboard,⁴⁶ the gray color of which comes from the ink particles in the newspapers. Much board production has this material as a base sheet, but is covered with a smooth white surface for printing.

⁴⁴Who's Who in America, 1970-71, Vol. XXXVI (Chicago, 1970), p. 2035. See also Scudder, op. cit.

⁴⁵"Peter Dixon's New Deinking Plant Has Proven Successful," Paper Trade Journal, CXIII (November 3, 1969), 52.

⁴⁶"Eradicating the Ink," op. cit.

CHAPTER VI

ALTERNATE USES OF REFUSE INCLUDING OLD NEWSPAPERS

Incineration

Incinerators offer an alternate disposal method which can be coupled with others. For instance, the refractory material left after incineration can be used for landfill or it can be "mined." Incineration of refuse leaves a more concentrated "ore" which is about 30 to 50 per cent ferrous metals which can be retrieved by magnets, and about 50 to 55 per cent glass and slag.¹ Incinerators can also be used to produce electricity.

Incinerators are now quite expensive because of the air pollution requirements. As stated in Chapter II, 75 per cent of the existing operating incinerators are inadequate. However, much research is going into incinerator design and some very large ones are being built. One problem with incinerators, according to Richard B. Scudder, is that once they are designed to handle a given waste mix, the mix cannot be altered much. So we are committing ourselves economically to future paper fiber incineration because of the way we are designing today's incinerators. If we have a paper fiber shortage in the future,

¹"Turning Junk and Trash into a Resource," Business Week, (October 10, 1970), 71.

as has been predicted, then we will face a dilemma of destroying needed paper fiber to keep the incinerators working (so they can burn the other components of the refuse mixture). Scudder says, "Once built, these things are going to be used; It might be naive to expect that once such incinerators are built fiber is going to be released for production again, shortage or no shortage."² Garden State considers the "counterattack on incineration" one of its major challenges in the 1970's.³

Generation of Electric Power

Incinerators have been designed and used both in North America and in Europe to produce electric power from the burning of refuse. "Milan, Italy, will soon be running all of its streetcars and subways by electricity generated by incinerated solid waste."⁴ Similar units are being constructed in Chicago and in Harrisburg, Pennsylvania.⁵

Paris now annually converts 1.5-million tons of garbage into steam and electricity; Munich expects refuse to supply it with up to 10% of its

²Richard B. Scudder, "Recycling Waste Paper Into Newsprint," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970. See Appendix.

³John H. Rich, President of Garden State Paper Company, address before the Commonwealth Club of California, October 12, 1970, San Francisco, California. See Appendix.

⁴Charles A. Schweighauser, "The Garbage Explosion," The Nation, CCIX (September 22, 1969), 284.

⁵"Turning Junk and Trash into a Resource," op. cit., 74.

power needs in a few years; Geneva gets 300 kw. from each metric ton of garbage it burns. On this continent, Montreal has the biggest project under way--an \$8.7-million refuse-for-power plant, and Norfolk's, the first in operation, is a \$2.2-million unit, which the U.S. Naval Station put into use in April [1967].⁶

This type of unit transfers the heat to water, creating steam to turn turbines. Refuse has a caloric value per pound that is approximately one-third that of coal. It also has the advantage of a low sulfur content, which means that very little sulfur dioxide will be released into the atmosphere when it is burned.⁷ No odor is produced because of the high temperature. Electrostatic precipitators or other devices can be used to remove virtually all of the fly ash.⁸ On a bone-dry basis, newspaper has an almost identical BTU per pound heating value with wood.⁹

Research is being performed at the Combustion Power Company in Palo Alto, California, to perfect equipment for a more direct generation of electric power from the burning of solid wastes.¹⁰ Combustion Power Company has developed a

⁶"Garbage for Health and Power," Business Week, (July 1, 1967), 82.

⁷Ibid.

⁸"Refuse Is the Sweetest Fuel," The American City, LXXXIII (May, 1967), 116.

⁹Ibid., 117.

¹⁰James G. Driscoll, "What To Do About Trash? Give It a Second Life," The National Observer, IX (November 2, 1970), 3.

CPU-400 unit which eliminates the steam production step by generating electricity directly by using a gas turbine.

The unit consumes 400 tons per day of solid waste--the amount produced by 160,000 persons-- to produce 15,000 kilowatts of electricity, approximately 5-10% of the total power consumed by that number of people. In the jargon of recycle and reuse, the energy value of solid waste is used to produce electricity, leaving other valuables to be recycled.¹¹

The waste input is shredded, then separated by an air classification system. Metals, glass, etc., are removed to be recycled. The remainder of the material is dried, then completely burned in a fluid bed of sand at 1650 degrees Fahrenheit in the presence of an abundance of oxygen. Then a 15,000-kilowatt gas turbine generates electricity.¹²

This compact unit, which meets air pollution requirements, could be located in basements of office buildings. Combustion Power emphasizes the transportation cost of garbage disposal and suggests small units strategically located to minimize transportation costs rather than following European technology of large regional incinerators.¹³

A full-scale prototype has not been constructed, nor has a projected one-tenth scale model, but Combustion Power claims that its technology has been verified in subscale

¹¹"Converting Solid Wastes to Electricity," Environmental Science & Technology, IV (August, 1970), 631.

¹²Ibid., 632.

¹³Ibid.

experiments. The Bureau of Solid Waste Management is financing the construction of the one-tenth scale model which is now being built.¹⁴ The CPU-400 would dispose of solid waste at a cost of only \$1.20 per ton.¹⁵

The Committee on Interstate and Foreign Commerce Report to the House of Representatives preliminary to the Resource Recovery Act of 1970 contains a statement that special attention should be given to technology for generating electric power from solid wastes, and that "adequate funds should be made available promptly to reduce the leadtime in the case of this particular technology as much as possible."¹⁶

Pyrofuser

The Pyrofuser was developed by Scienscope, Inc., Harrisburg, Pennsylvania. It is a natural gas furnace for solid waste which operates at 3000 degrees Fahrenheit. It totally destroys all combustible materials and fuses metals, glass, etc., into a type of construction material.¹⁷ Its method of operation is briefly described below:

¹⁴"Turning Junk and Trash into a Resource," op. cit., 74.

¹⁵"Converting Solid Wastes to Electricity," op. cit., 633.

¹⁶Resource Recovery Act of 1970, 91st Congress, 2nd Session, No. 91-1155 (Washington, June 4, 1970), p. 2.

¹⁷"Natural Gas Furnace System," Science News, XCVI (December 6, 1969), 520.

The system starts with the burning of natural gas, which heats air forced into silicon carbide tubes. The hot air is sent to a pyrolizer (furnace) where the refuse is burned, and molten slag from noncombustibles is collected. Harmful gasses, such as carbon monoxide, are burned in a combustor, then cooled and chemically filtered so the system produces nearly no air pollutants.¹⁸

Fusion Torch

It has been predicted by atomic physicists that the mastery of controlled fusion will lead to the development of a fusion torch, "a superheated plasma which would be turned on waste products which would then be vaporized."¹⁹ The waste would be reduced to its component chemical elements which could be separated and reused.²⁰ Controlled fusion and the fusion torch still belong to the realm of technological forecasting, but the idea is interesting and it may someday be a reality. A few of the predicted problems that might be encountered are stated in the following quotation:

When or if the fusion torch becomes a reality, it seems there might be almost insurmountable problems of paying for it, locating it where it would present no environmental hazards and operating it with personnel trained to be competent in this most complex and difficult field.²¹

¹⁸Ibid.

¹⁹Ruth C. Adams, "Recycling Is the New Watchword," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 13.

²⁰Ibid.

²¹Ibid.

Production of Crude Oil

Chemists at the Bureau of Mines of the Department of the Interior have recently succeeded in converting paper fibers and garbage into a crude oil.²² A combination of carbon monoxide, a high atmospheric pressure, and a high temperature have produced a quite useful type of oil.²³ A pilot plant study is underway.²⁴

Urban refuse, cellulosic wastes, and sewage sludge have been converted to heavy oil by heating under pressure with carbon monoxide and steam. Conversions of the organic matter to oil, water, and gas have averaged near 90 per cent at temperatures of 250° to 400° C. and pressures of 1,500 to 5,000 psi. The yield of oil, based on the dry organic matter of the waste materials, is usually near 40 barrels of oil per ton of dry, ash-free waste material. The oil from urban refuse and cellulosic wastes has a sulfur content near 0.1 per cent. This low sulfur content makes the oil from refuse a desirable source of fuel oil.²⁵

Pyrolysis can be defined as the controlled decomposition of wastes at a high temperature and pressure and in the absence of oxygen, so the material does not burn during the process.²⁶ This process can be used to produce heating

²²"And Garbage to Gas and Oil," All Clear, II (January, 1970), 6.

²³Herbert R. Appell, Irving Wender, and Ronald D. Miller, Conversion of Urban Refuse to Oil, Bureau of Mines Technical Progress Report, No. 25 (Washington, D. C., May, 1970), p. 1.

²⁴Ibid., p. 5.

²⁵Ibid., p. 1.

²⁶"Reclaiming Solid Wastes for Profit," Environmental Science & Technology, IV (September, 1970), 730.

oil,²⁷ hydrocarbon gasses,²⁸ chemicals,²⁹ charcoal,³⁰ and other "good quality carbon products."³¹

Building Materials

Some paper fiber is used in various building materials such as in asphalt shingles and pressed board. In Japan, Tezuka Kosan Co., Ltd., has introduced a press which compacts garbage into a high-density block. "Depending on the ultimate use of the refuse block, it may be wrapped in chicken wire and then dipped into a vat of hot asphalt or encased in cement or vinyl."³²

The press "can produce one ton of 'stone' from eight truckloads of raw garbage every six minutes."³³ A compacting plant can be built for about 20 per cent of an incinerator's cost and the operation cost is only one-fourth that of incineration. A dozen of these have been built in Japan.³⁴

²⁷Bill Stockton, "Trash Crisis--II: Garbage May Yield New Assets," The Dallas Times Herald, November 12, 1970, Sec. A, p. 31.

²⁸"Reclaiming Solid Wastes for Profit," op. cit.

²⁹"Turning Junk and Trash Into a Resource," op. cit., 71.

³⁰Ibid.

³¹"Reclaiming Solid Wastes for Profit," op. cit.

³²"Building with Garbage," Mechanix Illustrated, LXV (February, 1969), 75.

³³Ibid., 74.

³⁴Ibid., 75.

Conventional compacting machines can't handle refuse too well because of its characteristic spring-back force. Tezuka's pressure system, however, has multiple pressure points inside a vertical ramhead to provide a ten-fold increase in the pressure applied, much like the impact pressure of a woman's spiked heel. Under this super-high-pressure hydraulic compacting system, the refuse reaches its yield point and loses its spring-back propensity.³⁵

In Cleveland, Ohio, a similar approach is being used to make small dense building blocks using solid waste, dried sewage sludge, incinerator residue, fly ash and lake and river dredgings.³⁶ The bricks are used "to reclaim submerged lands adjacent to Lake Erie."³⁷

In Illinois, a ski-slope is being built on a hill of garbage covered by dirt.³⁸ "Virginia Beach, Va. is building an amphitheatre on solid waste, and incorporating a soap box derby run."³⁹

Landfill

As cited in Chapter II, a national survey shows that 94 per cent of the present land disposal operations are inadequate.⁴⁰ Sanitary landfill must be considered both as a

³⁵Ibid., 74-75.

³⁶Schweighauser, op. cit.

³⁷Ibid.

³⁸"Cash in Trash? Maybe," Forbes, CV (January 15, 1970), 22.

³⁹Ibid.

⁴⁰Richard D. Vaughn, "The Scope of the Solid Waste Problem and Promising Solutions," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 8.

primary method and as a secondary method of disposal. The secondary method would be to dispose of the remainder of waste left from incineration or the materials incapable of being recycled from a separation installation.⁴¹

Gulf Research Institute is conducting research under a federal grant "to develop barrier materials that can be made from existing waste products."⁴² These barrier materials would be used to coat the earth surrounding the landfill (the sides and bottom) site "to prevent materials from leaking and penetrating the soil or ground water."⁴³ A landfill of this type operated by Geological Operations & Waste Systems, Inc. (GROWS, Inc.), in Pennsylvania, "has a barrier at its base."⁴⁴

All water that penetrates the surface of the fill is trapped by the barrier and caused to flow to designated collection points where metals and biological materials are removed. . . .

After treatment, the water collected from the landfill may be discharged to adjoining streams, or--under certain conditions--recirculated to promote rapid stabilization of the wastes.⁴⁵

⁴¹"Recycling: Time to Discard Old Attitudes," Chem 26: Paper Processing, VI (December, 1970), 28.

⁴²Adams, op. cit., 12.

⁴³Ibid.

⁴⁴"Landfill Site Wears Diaper," Public Works, CII (February, 1971), 102.

⁴⁵Ibid.

The location of landfill sites is a "hot" topic in local politics. Most people don't want to live near a landfill site. Politics and the cost of land influence a city to transport its garbage to the outer fringes and high transportation costs prohibit its going very far. This poses a particular problem for the large cities.

Composting

Composting is a biological process in which the organic fraction of the refuse undergoes bacteriological degradation in the presence of oxygen. The end product is an innocuous [sic.] material which may be used as a soil conditioner. A composting system usually includes manual sorting of the refuse, size reduction, magnetic separation of ferrous metals, digestion for two to five days in an aerated reactor, aging, regrinding, and sale of the finished product as a soil conditioning agent. The only compos(t)ing plant in Texas closed down in 1970, partially because of a lack of market for the compost, and reclaimed materials, which was caused in part by the economic slowdown.⁴⁶

In many countries, composting has been very popular.⁴⁷ In the U.S., however, composting generally has been unpopular. This contrast is due to several factors. One is Americans' attitude of "out of sight, out of mind" toward waste. Europeans and Asians historically have been more concerned with reusing many materials. Many American soldiers bring home stories of

⁴⁶Joseph F. Malina, Jr., and Robert G. Makela, "Solid Waste-A Problem of Disposal," Texas Professional Engineer, XXX (January, 1971), 17.

⁴⁷Rodney R. Fleming, "Solid-Waste Disposal, Part II: Incineration and Composting," The American City, CXXXI (February, 1966), 96.

Asians making useful articles from discarded aluminum cans, etc. Another factor, according to The American City, is the different composition of garbage in the U.S.:

The cold, harsh facts are that the refuse collected in this country is a poor raw material for the manufacture of compost. It doesn't have enough organic garbage; it has too much metal, paper, plastic, glass that shatters into splinters.⁴⁸

There is a lack of demand for compost in this country, partly because of public attitude, and partly because of the competition of synthetic fertilizers.⁴⁹

A number of composting operations have failed in recent years. These include plants in Phoenix, McKeesport, Pennsylvania, and Houston. Other proposed plants have never got underway because financial backers balked.⁵⁰ Milwaukee dries and packages sewage sludge without going through the composting digestion process, but it warns the method is financially unsound.⁵¹ The material is sold under the name Milorganite, a "natural organic fertilizer."⁵²

⁴⁸"The Unhappy Record of Composting," The American City, LXXVIII (December, 1963), 7.

⁴⁹Raymond W. Regan and John S. Jeris, "A Review of the Decomposition of Cellulose and Refuse," Compost Science: Journal of Solid Wastes and Soil, XI (January-February, 1970), 17.

⁵⁰"The Unhappy Record of Composting," op. cit.

⁵¹Ibid.

⁵²Jerome Goldstein, "Wisconsin Develops 'Intermediate Composting,'" Compost Science: Journal of Solid Wastes and Soil, XI (November-December, 1970), 13.

A recent article in Mechanical Engineering describes research on "garbage farming," i.e., plowing raw ground-up refuse into the topsoil.⁵³ Pre-stabalized refuse (compost) was more compact and easier to apply.⁵⁴ Paper is biodegradable and paper is the largest component of garbage, but an experiment with the rate of assimilation of newsprint into soil was "disappointing."⁵⁵ This is to be expected, according to the Sanitary Engineering Research Laboratory at the University of California:

Kraft paper, which is wood-free, was shown in previous studies to be readily destroyed by anaerobic digestion (over 90%). However, newspaper contains about 75% ground wood pulp, and thus may be expected to be much more resistant to biodegradation.⁵⁶

Animal Feed

Research is being conducted in which cattle are fed paper which has been enriched with vitamins and minerals.⁵⁷ Cattle are capable of digesting cellulose and converting it into protein.⁵⁸ Studies of the palatability and digestibility of

⁵³S. A. Hart, W. J. Flocker and G. K. York, "The Garbage Farm," Mechanical Engineering, XCII (September, 1970), 25.

⁵⁴Ibid., 26.

⁵⁵Ibid., 29.

⁵⁶Clarence G. Golueke, Comprehensive Studies of Solid Wastes Management, Third Annual Report (Berkeley, California, June, 1970), p. 88. The term "wood-free" as used in this quotation means containing only chemical, as opposed to mechanical (groundwood) pulp.

⁵⁷Schweighauser, op. cit.

⁵⁸Ibid.

paperboard as an animal feed was conducted at the Michigan State University and on a Michigan farm. The ground paperboard was mixed with regular feed molasses and in the later stages of the experiment with urea.⁵⁹ "The ability of the ruminal microorganisms to degrade urea to ammonia and to incorporate the resulting ammonia nitrogen into microbial protein at the ruminal level is well known."⁶⁰ The cattle attempted to reject the paper material until it was more finely ground and mixed. They remained healthy; in fact, one won second place in a county fair.⁶¹ Post mortem examination showed no unusual conditions.⁶²

A panel taste test indicated that "the addition of paper stock to the animal feed had an insignificant influence on the quality of the steaks."⁶³ Suggestions for future tests include testing milk cows fed a feed mixture containing paper fiber. "Feeds consumed and milk produced would be measured and the general health of animals observed."⁶⁴

⁵⁹R. A. Bahlman, Studies of Palatability[sic.] and Digestibility of Paperboard as an Animal Feed and Tests of Odor and Flavor of Meat from Paper-Fed Steers (Kalamazoo, Michigan, October, 1970), pp. 5-7.

⁶⁰Ibid., p. 10.

⁶¹Ibid., p. 7.

⁶²Ibid., p. 10.

⁶³Ibid., p. 15.

⁶⁴Ibid., p. 14.

The broad implications of this work is apparent in statistics which show that, of a total cattle population of 100 million head in the United States, some 15 million are regularly fed highly concentrated diets for rapid weight gains in feedlots near large centers of population. Shortages of hay in these areas prompt feeders to look for other roughages. Even a minor fraction of the total feed requirements for these cattle would utilize substantial amounts of paper as roughage. For example, if these 15 million cattle were fed paper feed at the average rate of the tests of 5 lbs. per day, then the market would be for 30,000 tons per day, or 10,950,000 tons per year. This would still be filling only 15 to 18% of their feed needs.

Because of the digestibility of ground paperboard, it need not be considered as a roughage with little or no nutritive value. Rather, it may be considered an energy feed especially with the addition of low cost urea which is converted by ruminants into protein.⁶⁵

Lignin, a major component of wood, is indigestible by cattle. The cooking and chemical processing which most pulp is subjected to during its manufacture removes the lignin and leaves the cellulose. However, groundwood, the major constituent of newsprint, is produced by mechanically grinding logs, and it still contains lignin. (Groundwood fiber is less expensive than chemical fiber because its yield is high since the lignin is not removed.) Cattle may not be able to digest ground newsprint as they have paperboard in these experiments. Repulped waste paper (in pulp form) is a good source of delignified cellulose.⁶⁶

⁶⁵Ibid., p. 12.

⁶⁶Ibid.

Some of the shredded trash output of the trash separator being built by the Franklin Institute mentioned in Chapter II is to be used as animal feed.⁶⁷

Traditionally, in rural areas, kitchen refuse, or "slop," was fed to the hogs and chickens. This food waste was accumulated separately from paper.

It seems . . . that this custom is gradually going out of fashion. The household garbage grinder, and the fact that foods come cleaned and pre-packed, are responsible for a decrease in the wastes available for this purpose.⁶⁸

Certainly the migration to the cities and the decline of the family farm have also contributed to this decrease. Restaurants often contract with hog raisers to have their food wastes collected. Sanitary codes usually require the garbage to be cooked before it is consumed by the hogs.⁶⁹

Fermbionics, Inc., has carried on a closely related project for the last two years.⁷⁰ They ferment garbage composed of paper, food wastes and grass trimmings with a new strain of bacteria.⁷¹ The fermented feed has produced "the liveliest,

⁶⁷"Franklin Institute to Build Full-Scale Trash Separator," Environmental Science & Technology, V (January, 1971), 15.

⁶⁸Albert Alarie, "Can Garbage Become A 'National Asset'?" Compost Science, VIII (Spring-Summer, 1967), 5.

⁶⁹Ibid.

⁷⁰"Food for Livestock Seen in City Trash," The Dallas Times Herald, November 23, 1970, Sec. A, p. 22.

⁷¹Ibid.

healthiest pigs in the country."⁷² Fermbionics is located in Joplin, Missouri, and has recently considered a joint venture with Metropolitan Waste Conversion Corp. in Houston, Texas.⁷³ The latter corporation has submitted the plan to the Houston City Council as a possible solution for recycling city garbage.⁷⁴

Pipelines

Waste disposal via pipeline is one solution receiving attention. Pipelines could either transport the ground waste to a sorting facility, or into the ocean. The latter approach is suspect because of ocean pollution. However, much of the municipal waste generated in the U.S. is close to the sea. Cyrus Adler says, "45% of the population resides in counties adjacent to the ocean areas."⁷⁵ Another report says, "The coastal counties of the U.S. have 15% of the land area, 33% of the population and 40% of the manufacturing plants."⁷⁶

The use of pipelines for the transportation of solids in industry dates back to early in this century, but the moving

⁷²Ibid.

⁷³Ibid.

⁷⁴Ibid.

⁷⁵Cyrus Adler, "Ocean Pollution Problems," Science & Technology, (October, 1969), 18.

⁷⁶"Ocean Pollution and Marine Waste Disposal," Chemical Engineering, LXXVIII (February 8, 1971), 60.

of slurries of high concentration for long distances is a recent development.⁷⁷

Experiments . . . show that ground-up municipal refuse could be mixed with a small amount of water from the city sewer system and pumped out of the city. Pipelines would only have to be 2 inches in diameter to easily carry the wastes of a town with a population of 10,000 or 15,000.⁷⁸

The University of Pennsylvania and the Franklin Institute are studying the "underground transport of solid wastes in pneumatic/hydraulic pipelines."⁷⁹ The Franklin Institute is considering the possibility of a pipeline which would dump the refuse into the Atlantic beyond the continental shelf. Such a project, though questionable, possibly would be the lesser of two evils since some of the wastes which this project would divert is presently being dumped into the Delaware River.⁸⁰

The pipeline concept the Franklin Institute group has developed envisions collection of all suitable wastes within 25 miles of Philadelphia and piping them from a location near Camden, N.J., across the state to a site near Atlantic City. From there an 80 mile undersea pipeline would lead to an outfall 1200 feet below the ocean surface on the slope of the continental shelf, where preliminary studies show existing currents would provide rapid, adequate dilution and dispersion of the wastes.⁸¹

⁷⁷"The Flow of Solid Wastes in Pipelines," Compost Science, VIII (Autumn, 1967-Winter, 1968), 11.

⁷⁸Ibid.

⁷⁹"Will Industry Sell Recycling?" Modern Packaging, XLIII (September, 1970), 48.

⁸⁰Stockton, op. cit.

⁸¹"Solid Wastes," Environmental Science & Technology, IV (May, 1970), 388.

Since the Atlantic Ocean has a wide continental shelf, any dumping of wastes in these relatively shallow waters disproportionately increases the local contamination of the sea. The Pacific Ocean has a fairly narrow continental shelf and better water movement, carrying wastes into the deeper parts of the ocean.⁸²

Life on earth is dependent upon the oceans for its very existence. The ocean can, in all likelihood, handle all of our industrial society's wastes if the amounts, types and locations are carefully controlled, and if sufficient consideration is given to the direct and indirect effects of waste discharges.⁸³

Another type of pipeline system uses a vacuum to collect household garbage and transport it to a central compaction station.⁸⁴

⁸²Adler, op. cit., 19.

⁸³"Ocean Pollution and Marine Waste Disposal," op. cit., 67.

⁸⁴"Will Industry Sell Recycling?" op. cit.

CHAPTER VII

LEGISLATION

Some cities have passed statutes in an attempt to alleviate their solid waste problems. For example, the Bowie, Maryland, City Council has outlawed the sale of materials in no deposit-no return (one way) bottles.¹ In another response, the State Department of Health of the Commonwealth of Pennsylvania must approve all new waste disposal projects, according to state law.² As discussed earlier, several cities felt laws were necessary to get residents to separate newspapers from other refuse.

The Resource Recovery Act of 1970 (Public Law 91-512) is the Federal Government's response to the growing solid waste problem. It makes available over \$461,250,000³ to promote research, demonstration projects, to assist state and local governments in planning disposal systems and to help train people in occupations related to solid waste disposal.⁴

¹Bill Stockton, "Trash Crisis: Recycling Ideas Encourage Disposing of Disposables," The Dallas Times Herald, November 13, 1970, Sec. B, p. 28.

²"Landfill Site Wears Diaper," Public Works, CII (February, 1971), 102.

³Resource Recovery Act of 1970, Public Law 91-512, 91st Congress, H.R. 11833 (Washington, October 26, 1970), p. 7.

⁴Ibid., p. 1.

The law allows \$50,250,000 for the fiscal year ending June 30, 1971, \$172,000,000 for the fiscal year ending June 30, 1972, and \$238,500,000 for the fiscal year ending June 30, 1973.⁵ Most of this money is appropriated to the Department of Health, Education and Welfare, while a portion goes to the Department of the Interior.

The training clause gives attention to a needed area. Many cities have difficulty in keeping their garbage collection routes manned. Garbage collection is a thankless, dirty job. It is considered a very low job status, so workers are hard to find, although the current general unemployment rate is high. The use of plastic or paper garbage bags makes the work somewhat cleaner. The high accident rate of refuse collectors probably contributes to the personnel problem.

The Resource Recovery Act, section 210, provides for the following training programs with the Federal Government paying up to 100 per cent of the costs:

- (A) to develop, expand, or carry out a program (which may combine training, education, and employment) for training persons for occupations involving the management, supervision, design, operation, or maintenance of solid waste disposal and resource recovery equipment and facilities; or
- (B) to train instructors and supervisory personnel to train or supervise persons in occupations involving the design, operation, and maintenance of solid waste disposal and resource recovery equipment and facilities.⁶

⁵Ibid., p. 7.

⁶Ibid., p. 6. [Sec. 210(b)(1)].

Title II of this same law is entitled the "National Materials Policy Act of 1970."⁷ This part creates a National Commission on Materials Policy of seven members from government and industry, to be appointed by the President, with Senate approval. The commission is to study national and international resource requirements, relationship of these requirements to population and the environment. It is also to make recommendations for recycling, self-destruction, disposal, etc., of materials, and to make recommendations on which Federal agencies will be responsible for implementation of their policies. In addition, the commission is instructed to determine "the feasibility and desirability of establishing computer inventories of national and international materials requirements, supplies, and alternatives . . ."⁸ A sum of \$2,000,000 was appropriated for this title.⁹

Under the Resource Recovery Act, the Federal Government will pay for up to $66 \frac{2}{3}$ per cent of the cost of an approved project involving only one municipality, and up to 75 per cent of certain other projects such as regional ones and those dealing with disposal of abandoned automobiles.¹⁰

⁷Ibid., p. 8.

⁸Ibid.

⁹Ibid., p. 9.

¹⁰Ibid., p. 3.

The predecessor of the Resource Recovery Act of 1970 was the Solid Waste Disposal Act of 1965. Before that, the Federal Government was hardly involved in the solid waste area.¹¹

The individual municipalities were traditionally responsible for waste disposal.

There has been some discussion of a disposal tax at the point of sale on every item which will eventually be refuse.¹² Opponents point out that weight alone is not an adequate indication of the difficulty of disposal.¹³

¹¹Richard D. Vaughn, "The Scope of the Solid Waste Problem and Promising Solutions," Compost Science: Journal of Solid Wastes and Soil, XI (May-June, 1970), 8.

¹²Stockton, "Trash Crisis: Recycling Ideas Encourage Disposing of Disposables," op. cit.

¹³Bill Stockton, "Trash Crisis-II: Garbage May Yield New Assets," The Dallas Times Herald, November 12, 1970, Sec. A, p.31.

CHAPTER VIII

CONCLUSION

The technical journals, as well as many popular magazines, are full of articles on pollution, many of them dealing with solid waste. Although some authors have called for new technology to save man from his waste, it is the consensus of most writers and public speakers involved in this field that we already have the necessary technology to get the job done. Certainly in some areas new ideas and refinements will be very helpful, but the technologies of papermaking, mining, and aerospace, among others, can lend solutions to most of the problems. Undersecretary of the Interior Hollis Dole made the interesting observation, "Trash is our only growing resource."¹

The problem is not the lack of technology; it is one of public awakening, politics, and economics. It is also one of coordinating industry and government (especially local governments). If recycling becomes more economically attractive to industry, industry will do more recycling. This could come about via subsidies from local governments to secondary fiber mills in exchange for public savings realized by municipalities' not having to dispose of so much refuse. It could come about

¹Hollis Dole cited in Alvin R. Jacobson, "Environmental Wastes Control Digest," Public Works, CII (February, 1971), 104.

by companies realizing the advertising and public relations advantages involved in recycling wastes. The problem will yield to present technology. The innovations most needed are organizational rather than technological.

One writer has called for the government to exercise its prerogative as a gigantic purchaser by stipulating materials made in whole or part from recycled materials. The government has applied its pressure as a consumer before: it requires companies with which it has contracts to refrain from racial discrimination. So there is a precedent. "To encourage the collection and reuse of more waste paper, several purchasers (including Rodale Press) have begun to specify that their book paper must be made from at least 20 percent of de-inked (already printed) paper."²

As mentioned near the end of Chapter IV, the subject of recycling newsprint presupposes the continued existence of newspapers in their present form. Likewise, the recycling of paper in general assumes the future use of paper in its present form (made from chemical and/or mechanical wood pulp). There are three basic functions of paper: (1) for communication; (2) for packaging; and (3) for records.³ It has

²Jerome Goldstein, "Wisconsin Develops 'Intermediate Composting,'" Compost Science: Journal of Solid Wastes and Soil, XI (November-December, 1970), 13.

³J. Grant, "Fibrous Raw Materials for the Paper Industry: Past, Present and Future," Paper Technology, XI (June, 1970), 192.

been predicted that paper may one day be virtually obsolete because of the respective uses of radio, plastics, and computers for the above functions.⁴ One small foreign newspaper, as a novelty, is printed on an opaque plastic sheet.

Another assumption is that paper will continue to be made of natural materials; synthetic fibers can be made into paper, but they are much more expensive at the present time. One interesting development which may have greater future significance is reusable paper. By using a specially coated paper and a marker containing a special ink, students learning by programmed instruction do not permanently mark the answers; the ink disappears after use.⁵ The printed material can thus be used by a large number of students.⁶ Perhaps other uses will be found based on this process. The paper could then be reused; or, if necessary, it could be repulped without deinking.

In discussing pollution problems, especially the inter-relationship of the various types of pollution, one soon gets involved in the question of priorities. For example, is the solid waste disposal problem caused by the use of disposable paper towels more serious than the stream pollution caused by

⁴Ibid.

⁵"Use-It-Again Paper Expected to Open New Markets," Inland Printer/American Lithographer, CLXV (September, 1970), 76.

⁶Ibid.

the use of phosphate-containing detergents when the cloth towels are washed?⁷ Similarly, the recycling of newsprint requires a considerable electric power usage, much more than converting the newspapers to fertilizer.⁸ But, as Gunther Baldauf points out, recycling paper requires much less electric power than the conventional pulping of virgin fibers.⁹ Still, there is the nagging question: do we want to convert old newspapers into electricity, or electricity (in a sense, since it is necessary to the process) into newsprint? In view of this kind of dilemma, the National Materials Policy Act of 1970 sounds like just what we need to clarify the alternatives and priorities.

The cost of disposal varies considerably from place to place, but according to one article, sanitary landfill costs between \$1.50 and \$4.00 per ton, \$2.00 to \$8.00 for incineration and the estimate for plowing refuse into the land (garbage farming) is between \$2.51 and \$5.63 per ton.¹⁰

Some experts predict a paper fiber shortage in the next few years. "Authoritative sources have stated that a worldwide

⁷"Turning Junk and Trash into a Resource," Business Week, (October 10, 1970), 70.

⁸Ibid.

⁹Gunther H. Baldauf, "A Consultant Looks at Deinking," Paper Mill News, LXXXVIII (March 16, 1964), 15.

¹⁰S. A. Hart, W. J. Flocker and G. K. York, "The Garbage Farm," Mechanical Engineering, XCII (September, 1970), 29.

survey indicates that, sometime between 1983 and 1985, the demand for wood pulp will cross and exceed the possible supply of pulpwood."¹¹ According to Richard Scudder, the consensus of opinion among experts is that a fiber shortage will occur within the next fifteen years.¹² New developments in forestry keep improving the yield, but a fiber shortage still may come. If so, secondary wastepaper will become even more important as a pulp furnish.

It is technically possible to recycle old newspapers into newsprint, with the aid of Scudder's deinking formula and process. If such recycling were done on a much larger scale than it now is done, the solid waste problem would be helped considerably. Such an undertaking would require either elaborate and expensive separating devices or public cooperation in not mixing the refuse together in the first place.

Once wastes are collected together--the paper, the cans, the bottles, the plastic, the garbage--it takes a tremendous effort in money and machinery to separate for recycling. If papers could be collected separately (as Madison indicates); if cans and plastics and glass were also kept separate; and if the organic portion were in the third container,

¹¹Arthur U. Claghorn, "Focus On Pulpwood and Other Fiber Resources," American Paper Industry, LI (January, 1969), 30.

¹²Richard B. Scudder, "Recycling Waste Paper Into Newsprint," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970. See Appendix.

we would be on the way to the best kind of Solid Waste Management.¹³

Scudder's deinking process is the key to recycling 100 per cent newspaper into newsprint without adding virgin pulp. If he chooses to share it with the industry as he has implied, other mills could do the same. If not, there are a number of alternatives available for utilizing garbage, including old newspapers. These include the use of newspapers as partial furnish in newsprint mills, production of a type of crude oil, generation of electric power, and feeding animals, among other possibilities. Whatever method or combination of methods we utilize to advantageously use old newspapers, it is important that we derive the double benefit of eliminating the waste by creating a productive way to utilize it.

¹³Goldstein, op. cit.

APPENDIX

Letter¹

The Garden State Paper Co. Inc., a subsidiary of Media General Inc., is the only company in the world manufacturing newsprint entirely from old newspapers. The process was developed during the 1950's, and our first mill was opened in Garfield in 1961.

Since that time, a second paper machine has been installed in the Garfield mill, and two other machines have been built, one in Pomona, California and the other in Alsip, Illinois, just outside of Chicago. The Alsip facility is known as the FSC Paper Corporation, and is a joint venture with Field Enterprises, Inc.

Garden State does not purchase newspaper directly from the general public at this time, but depends on brokerage firms to supply its mills. In the east, we purchase our paper from Bruno & D'Elia of Hackensack, N. J., and Great Eastern Packing and Paper Stock Corporation of Roselle, N.J.

The Alsip mill purchases its paper from Pioneer Paper Stock Division, Container Corporation of America in Chicago, and on the West Coast, the Pomona mill deals with Garden State Fiber Company, Inc. of Pomona, California.

We purchase only newspaper. Magazines contain non-soluble glues in their bindings and a clay coating representing about 25% of its weight, that washes away during the repulping process. Since we buy paper by weight, the 25% weight loss is unacceptable.

In order to stimulate a reliable flow of newspaper to our mills, we have encouraged municipal leaders to consider the advantages to their communities of asking residents to keep old news out of the garbage. By separating newspaper from the trash, a municipality's garbage volume can be substantially reduced since newspaper can represent as much as 40% of a homeowners garbage yield. Local groups can then be organized to collect the paper using the proceeds as regular income.

¹Letter from William E. Hancock, Director of Paper Stock Procurement, Garden State Paper Company, Inc., January 4, 1971.

In addition, the salvage of old newspaper represents an important contribution to the nation's conservation effort. Each year we save in excess of 5 million trees.

Finally, there is no better way in our opinion for an organization to raise funds than through a well organized paper drive, primarily because no initial outlay of funds is necessary to guarantee success.

I sincerely hope this information will be useful to you. If you should desire any additional assistance, please do not hesitate to contact me.

Yours very truly,

GARDEN STATE PAPER COMPANY, INC.

William E. Hancock
Director of Paper Stock
Procurement

P. S. A mill costs in excess of \$20 million. Newsprint sells for \$145 per ton. We pay[\$]26 per ton delivered for old news.

Addresses

John H. Rich, before the Commonwealth
Club of California¹

Mr. Chairman, members of the Commonwealth Club and guests, it is an honor to have been invited to speak before this organization.

By now you have all heard numerous discussions of the volume of solid waste confronting our nation's municipalities, and the breakdown of its components. Personally, I feel that while the alarm was sounded none too soon, the continued clanging of the bell without dispatching the forces is pointless monotony. Unfortunately, too many are still discussing the problem instead of the potential solution.

Before the nation's interest in ecology reached a fervor pitch, we in the paper recycling business considered the ability to obtain a regular supply of our raw material at a reasonable price, our most elusive objective. Now, believe it or not, we are expending a tremendous effort, nationwide, explaining to individuals and organizations, such as yours, just why a sudden surge of cooperation by the general public would do far more harm than good to the future of reclamation.

The reason is simple. As an industry, the nation's paper stock consuming mills can only use a tonnage that relates directly to its sales of finished goods - and the sales of finished goods in America today do not coincide with the terrific volume of raw material the public is willing and able to generate. If, as we say in the industry, we were to "turn on" the City of New York and pour tens of thousands of tons of old newspaper into the market place, the following would result:

First, the price of paper would plummet. That is, waste paper, or paper stock dealers, as they are known in the industry, and mills, experiencing a sudden surge of additional tonnage, would begin reducing the price they pay for it, knowing that the volume would outweigh the risk of losing [sic] customers who participate in salvage solely for financial gain. You should understand that before the word "ecology" took the spotlight a year ago, nothing short of a world war has galvanized the public's interest in salvage. Nothing,

¹John H. Rich, President of Garden State Paper Company, address before the Commonwealth Club of California, October 12, 1970, San Francisco, California.

that is, except the price paid by scrap dealers. And the dealers' and mills set their prices in accordance with the volume of paper available to them at any given period.

The second reaction would be chaos in the secondary materials industry. Dealers, handling an inordinate amount of paper stock, would soon run out of mills able to consume it. Last year America's paper and related products mills consumed about 24 per cent of the available paper and paper-board in this country. To consume 50 per cent this year would be well beyond their capacity, not only to sell the increased product yield, but to physically manufacture a tonnage equivalent to double last year's production.

Accordingly, the paper stock dealers would further reduce the price they pay to the public and in order to discourage the flow of paper, if people persisted in salvaging paper, ignoring the price reductions, the dealer would eventually have to close his doors to all but that paper which he could be assured of selling to a mill.

And once he closes his door, what happens to the paper? It does to the dump - the very place it is going to today.

There is, however, a difference and the difference is this- History has shown us that once the public has had its fingers burned salvaging paper, once an individual or group expends time and physical energy to save paper only to find their efforts were in vain, it takes a highly disproportionate amount of incentive to recapture his cooperation. It is therefore, our contention that while our industry must move with dispatch to expand its capacity to consume greater volumes of raw materials, it must move with greater caution when discussing salvage programs with people who are not currently involved in them.

Our approach at Garden State, after encouraging various types of salvage programs in order to determine which were best suited to the concept of steady supply at a reasonable price, is to ask the public in certain sections of the country to understand the potential dangers, and then move slowly and await the expansion of the consumption capacity by mills in their specific areas.

In California we are currently involved in this very dilemma. In the south, where our mill is located at Pomona, we are engaged in developing municipal-wide salvage programs that will insure a steady supply of old newspapers to our machine which consumes 300 tons each day. In the north, however, the San Francisco project - initiated by the San

Francisco Examiner and supported 100 per cent by Garden State, which rented warehouse space for the old paper- has generated a tremendous amount of enthusiasm in neighboring communities. And to them we have had to say: "Go Slow!!" There are no mills in the west currently able to guarantee that they will purchase all of the paper a full-scale project could produce, even though we did this on a limited basis in San Francisco.

An expanded consumption capacity could take about two years to complete. What would happen to the old newspaper market in the meantime if the Bay Area were "turned on" tomorrow? By the time the consumption capacity was expanded, the public could be considerably disenchanted. Responding to the lure of reclamation in 1970, only to see the paper trucked off to the dumps in 1971 before it could be used in 1972, could extinguish the fires of enthusiasm for reclamation in the Bay Area for many years.

At Garden State we have played a role in the initiation and operation of practically every significant newspaper salvage program in the United States during the past three years. To support a project a mill must not only be prepared to place a floor on the price it will pay for paper stock, but be willing to purchase all of the tonnage the project generates. We were one of the original three mills which guaranteed to purchase one third of the paper generated from the Madison, Wisconsin plan. Residents in the eastern half of Madison were asked to bundle their old newspaper and the city garbage collectors picked it up separately. During the first two years we purchased all of the paper from that successful project. We were joined in buying the paper during the past year, following the project's expansion to the west side of the city, by an insulation manufacturing mill.

In San Diego, where more than 200 drop boxes are scattered in shopping areas throughout the city, the public has responded to promotion from the local Kiwanis Clubs which are aiding youth activities from the sale of paper donated freely by the public. Five, eight and eleven are the by-words in San Diego. Each full box represents five dollars for the city's youth, eight dollars of the sanitation department's budget saved, and 11 trees spared from the woodsman's axe.

In Irvington, New Jersey, the town government is pleased with the operation of salvage as required by ordinance. That community felt the best way to enforce separation of space-filling newspaper was by passing a law. The old paper is now placed on the curb by residents and collected, either by charitable and civic groups, signing up for a section of the town, or by the town sanitation department in areas where no group has indicated a desire to participate.

The Madison, San Francisco, San Diego and Irvington programs are four different approaches to the same problem. In some areas, the public, given the proper incentive, will cooperate with dramatic results. In other areas, enforcement is the answer. It may be of interest at this point to note that Madison, concerned with the poor cooperation by apartment house dwellers, is considering adoption of an ordinance similar to the one in force in Irvington.

But what of the large cities still unorganized from a salvage viewpoint? Los Angeles has more than 600 private scavengers where San Francisco has but two. Getting cooperation from an appreciable number would be a difficult task, especially when one considers that in a recent mayoral election the elimination of garbage separation was considered a major campaign issue.

In New York City, the situation is somewhat different. There, the city collects the garbage and so the problem is faced and dealt with on a daily basis by the local government. In addition, the Environmental Action Coalition, EAC, has mustered considerable support from various groups throughout the city and that momentum has been channeled by EAC, working with Garden State, into a test program in a section of Brooklyn, slated to begin this month.

While this may appear at first to be a contradiction of the "go slow" policy, we feel we have a duty to support programs in certain areas where the interest is particularly high and where the volunteers are organized. But the way to do it, under today's limiting conditions, is to convince the leadership of the dangers of a full-scale program and then channel their energies into a test area where problems can be ironed out while not generating too much paper each month. Of course, it would be unfair to encourage these limited projects if we were unwilling to seek a solution to the longer range problem of marketing. Eventually, the New York people will want to expand to the entire city and the paper industry will have to be ready to consume the additional tonnage.

To this end, we have been encouraged by the American Paper Institute's decision to create a marketing committee to develop new markets and products for the certain increase of reusable fiber. In addition to this, the National Association of Secondary Materials Industry has received a grant from the Federal Government, and is devoting a considerable amount of its project to this serious question. At Garden State we have retained the services of a professional in this field, who is working full time on our corporate staff in search of a solution to the marketing problem.

We have involved ourselves in these ways because the waste paper market in America is, in large part, our market. As the largest single consumer of old newspaper in the world, we have a financial stake in its availability and the solvency of those who prepare it for our use. As a result, we have more than a passing interest in the plight of the paper stock dealer and have formally announced a floor price on both east and west coasts beneath which we will not drop our prices to these packers. This we are sure will insure their ability to continue paying the public a reasonable price for the paper it collects.

Beyond this we have committed ourselves to a program of warehousing the paper that is generated by the dealers who serve us, so as to minimize the problem of a heavy flow on one hand and no outlet on the other.

To this end, we have increased our inventory at our Pomona mill from approximately 4,000 tons two years ago to over 16,000 this year, although our consumption has not increased appreciably by comparison. And in the east, where consumption has also not jumped in relation to our increased inventory, our normal 7,000 ton inventory of 1967 has swollen to more than 24,000 this fall.

This is a costly road to follow, but one we feel will strengthen the paper stock market in the long run.

The acquisition of raw material at a reasonable price has always been a problem to industry. During the past year, however, the emphasis has shifted away from the problem of lack to abundance.

The experts tell us that within 15 years our demand for fiber will exceed our capacity to produce it, even though new growing methods continue to increase timber yields. Nevertheless, a strong voice is being heard today supporting incineration as the best solution to the solid waste crisis. As you know, incinerators are designed, based on the make-up of the solid waste to be burned. Any material change in these components can render an incinerator ineffective. Once a municipality spends millions on an incinerator, it will be very reluctant to permit anyone to recover the fiber from the solid waste, since fiber represents a major fuel component. Incineration represents perhaps the greatest threat to recycling in the next decade and should be discouraged.

The conservationists of America have done the first part of their enormous job well. They have sounded a shrill alarm that has been heard in every hamlet in the countryside and in the halls of government of every level.

Now the emphasis must change to solutions. We have personally proposed to the U.S. Department of Commerce a series of plans which, if enacted, may play a vital role in meeting this new objective. We have recommended an assessment on each ton of paper (or pulp) from virgin trees to be put into a pool. The Federal Government to allocate an equal amount to be put into the pool from which an incentive would be paid for each ton of secondary fiber used in any kind of manufacturing in which that fiber becomes an integral part of the product.

We have proposed that joint monies be made available from the Federal Government to be matched by either trade associations or individual companies, for the research and development of new processes, cleaning of "contraries" from the fiber system and new products. This money could be repaid on a royalty basis on successful development.

In addition, federal money could be made available at low interest cost to encourage the building of facilities which could consume additional amounts of secondary fibers.

We have further proposed that an incentive be offered all commercial users of paper products from reused fiber. For each ton used, a credit would be allowed against income tax. This would unite the Federal Government, the manufacturer and the user in promoting recycling of fiber.

Also, we have called for an acceleration in the writeoff of investment on all facilities installed primarily for the reuse of fiber.

These views, like our vigorous opposition [sic.] to incineration, are not shared by everyone in our industry. However, we feel that as an industry we must face the reality that additional fiber must be recovered, to reduce the volume of solid waste and provide the fiber needs of our country.

In closing, I would like to mention that there is significance in my speaking to you on this subject in this particular city. For years, the people involved in recycling have told us that you cannot turn the flow of paper on and off like a faucet. And, when we had to raise our prices by as much as 25 per cent to get the waste paper we needed, we believed what they told us.

But that was all before the April Sunday just a few months ago when San Franciscans picked up their Examiner and read the page one editorial about recycling. The response to the new appeal was sudden, and dramatic. Not the appeal of

big prices paid for old paper, but the relationship of old paper to conservation. It destroyed the belief that the flow of paper could not be turned on like a faucet.

Conservationists, and we who are involved in recycling are riding a tremendous wave of public support as we move into the decade of the 70's. But it will not be enough just to hang on - we will have to give it direction as well. This and the counterattack on incineration are our major challenges in the 70's.

I am confident we will be as successful in meeting that challenge together as we were in bringing about the existing swell of awareness and enthusiasm.

Recycling Waste Paper Into Newsprint²

I come to you ladies and gentlemen as an amateur in a room full of professionals. We've been in the paper business somewhat less than 9 years, and as an amateur you can expect me to be a little less realistic than Mr. Van der Eb. As a matter of fact, the birth of our company, in 1961, was accompanied by derisive laughter in the newsprint industry, bad jokes in the trade press about who was going to buy all that secondhand equipment in a few months, and even our own engineer, hired to build the mill-Rodrick Donohue - bless him, had hired a Chicago expert in de-inking to come and save us when the whole thing collapsed.

We built our first machine 10 miles from Manhattan, in Garfield, New Jersey. It was designed to produce 45,000 tons of paper and it had as its customers the most prestigious publishers in America, some of whom by good fortune had been my classmates in college. We built our second machine there three years later. We built a third in California in 1967. That one we built adjacent to a sewer plant, planning eventually to use effluent water to run the mill when the public was prepared for a step of this sort, and when our competition might not take some rather obvious advantages of it. The fact is that the water from that plant is better in every respect than the water in the Passiac River which supplies the Garfield plant, and the water in the river which furnishes the Chicago mill which we built in 1968, in joint venture with Marshall Field.

From our point of view, we feel as though in a few eventful years we've accomplished a lot. From an ecological point of view, of course, the problem was: where could you get enough waste paper to support a mill? I have publishers still who told me they would buy more paper from us if not for the fact that they think the waste paper supply is going to run out.

At that time, too, it was clear that the only markets that could support a newsprint mill were New York, Chicago and Los Angeles. To be economic, a newsprint mill, a reused fiber mill, has to produce close to 300 tons a day. And this in spite of the fact that we enjoy the same advantages to do

²Richard B. Scudder, "Recycling Waste Paper Into Newsprint," from proceedings of seminar on recycling waste paper held by American Paper Institute, Washington, D. C., October 16, 1970.

with capital costs as does the board industry. It costs us about \$60,000 per daily ton to build a mill. Caution in expanding has been impressed on us many times. There have been times when our New York mill had to go to Texas to get paper, and there have been times when we used magazines and other substances that we did not really want to use.

Today we sell 350,000 tons of paper all at a discount. Our pattern is one of truck delivery to newspapers, and the trucks return full of waste paper for the mill. Our paper is adequately competitive with standard Canadian newsprint. In some respects it may be less so; in some respects it may be more. We feel in any case that we can be confident in our product, and we are particularly confident that we can improve it as fast as anybody else can improve their products.

We use by preference nothing but old newspapers. Our three mills have been completely sold at all times. We have, I think, a superb staff. It's small, but we have important innovations in mind. They bear on the character of used fibers, and what you may do with them; and they also bear on collection methods.

In 1970, we'll buy about 400,000 tons of waste. This will save millions of trees. It is that much paper taken off the back of city collection systems. The mill will save about three million dollars to newspapers directing in their production costs, and it will save \$40 million in the United States balance of payments. I think that is important. This summer we merged the "Newark News" into Media General, which is a small but excellent conglomerate in the communication field, and we feel that this will give the company more muscle for the tasks ahead.

What are these tasks as we see them? That of sopping up the amount of waste paper that is going to be available is obviously impossible. It is something, however, that we're going to try, to a degree, and perhaps, in comparison with the box industry, we have some advantages. We have no product disadvantages. We have consumer acceptance. Our company, not surprisingly, has always been newspaper-oriented, and the people who run the newspapers are friends of mine. We expect we'll double the capacity of Garden State in the next three years. This is not altogether a business decision. Perhaps you'll think this is naive, but papers in the Ohio Valley and papers in Texas, municipalities and other interested parties have come to us and have asked us to build mills in their neighborhoods. We think this has now become possible. We think that new collection methods will make it possible.

I said a moment ago that it would be impossible to mop up the amount of waste papers that the public and the cities seem about ready to produce for us. A look at the figures will show the enormity of the problem. There will be over 9 million tons of newsprint used in the United States in 1970. Collection and reuse average out at about 22 percent. Our own use has been about 5 percent. Our projections for doubling our capacity obviously would not even make a dent in that flow of paper. Say, another 300,000 tons, another 499,000 tons, out of 7 million tons of unused newspaper. If, as has been suggested, collections were increased to 35 percent from the current 22 percent, that would mean collection of another million tons of paper. I happen to believe that this could be done, that this rate of collection could be reached virtually by tomorrow.

I'll talk a little later about this. It took a waste paper drive in San Francisco this year only two days to get going, due to the vigorous support of the newspaper there. However, compared to this 35 percent, what could be collected if you could sort waste newspapers and corrugated paper out of the garbage flow? We haven't any idea of what can be collected, but we have a very firm idea that much can be done and that the paper can be used. In fact, I would say that we now know how to do this. What we face, therefore, is a revolution in collection methods. This has the most serious possible bearing on the waste market. Of course it is being brought about jointly by what may be a premature effort by conservationists and by immense economic pressures on the cities, particularly in the Northeast. The cities around Newark have had 50 to 75 percent increases in their garbage collection costs this year. They go farther and farther all the time to dispose of the refuse. Chicago is talking about having to go to Southern Illinois to dispose of its solid wastes. I think even here today there is not a full appreciation of how serious this problem is going to be, and what attitude the government is going to take about it.

Now, to digress for just a minute, it's all very well to collect and reuse paper fiber, but the government is going to say, and it's going to have to say, that you may not dispose of certain things which now are going into the solid waste mix. These are things like copper, nickel, things that don't grow. They're irreplaceable. Any country that uses 40 percent of the resources of the world can't support waste of that kind.

There is an appreciation of this in the government at very high levels. I was talking to a member of the Cabinet yesterday about it, and he appreciated the problem. He was more unrealistic than I may be in what he thinks the solutions might be.

Anyhow, today cities, newspapers, charities, girls in Fort Collins, Colorado, telephone us and write to us and they tell us the garage is full of papers, and what are we going to do about it. Well, we're going to do what we can. There is the matter of time and money it takes to build mills. These are serious considerations. We're a little company. We have borrowed \$60 million in our eight years of existence, and paid most of it back; but three new mills, an increase in capacity of two old ones in the next three years add up to a very serious problem. Not only that we may start today, but it will take us 30 months to build one.

Of course, the real problem is one of sales. It's wildly out of phase to think that huge amounts of repulped newspaper could be sold in the United States; and we don't even think that they should be. In light of all these considerations, it seems to me that the message of this meeting to government and to everybody else is that they must use extreme caution in stimulating the salvage and collection of waste paper. I just couldn't emphasize that too much.

Now it's true, and this may seem a contradiction to you, that Garden State Paper has stimulated a good deal of what's going on in this regard. We have either initiated or participated in every major salvage drive in the United States in the last three years, and this includes Madison, Wisconsin.

In general, these drives have taken four shapes. In San Francisco newspapers whipped up the enthusiasm of householders, asking them to put their papers on the curb separately from their other solid waste. The paper was then collected by professional scavengers, of which there are two in San Francisco. To our astonishment we were able to use the paper that was collected in the same way that we use any other supply. We didn't have to do anything else to it.

A second is that which has been used in Union, New Jersey, a voluntary program in which charities pick up the paper.

A third, and maybe the most interesting method is the compulsory program initiated in Irvington, New Jersey. Irvington passed a law which requires the householders must put their papers separately on the curb once a month. There has been no adverse reaction by the householders. This program has been, from our point of view, entirely successful. Charities pick up the paper. It provides an income for them; it reduces the city's refuse service cost by about 20 percent, and although some people dispute the city's contention that

the waste paper industries are saving trees, we think this saves trees. In a fourth method in San Diego, 200 drop boxes are set out by the Kiwanis Club, and for every full box the youth activities that the club sponsors get \$5, the city salvage operations gets \$8. This too, is a highly successful operation.

These are new things with us. They are mostly 1970 ventures. The Madison program is the oldest one. That's three years old now. From all of them we've learned a lot. We've learned that cities can make substantial money, or can save substantial money by waste drives. We've learned that a drive can be turned on almost overnight. We've learned that the people will cooperate. We've learned that scavengers can supply a clean flow of paper. And, we've learned that the waste paper market can be stabilized as to price by warehousing.

I said before that it may seem to be a contradiction for us to do all these things, and then for me to urge caution above all things in stimulating collection and salvage of waste paper. I would like to say here that where we start the drives we also make certain guarantees. We guarantee that we will buy all of the paper generated at the minimum price; and we guarantee that once a program starts we will stay with it. Our policy in the waste business has caused some grief in other quarters, but we felt our best interests would be served by having a strong dealer-broker structure. We have tried to stabilize the price of waste paper and we've tried to stabilize it at a level at which waste paper dealers can make a profit. We felt the past history of wild price fluctuations and the equally wild disappointments suffered by the people who collected the paper was a disaster - one which could in fact be translated into a disaster for us, and possibly for some of you too.

How much waste paper, what percentage of the waste newspaper flow could the newsprint industry really use; in other words, how much could be used in recycling to make newsprint? We figured, or I figured, that a maximum was probably 45 percent which would mean that about 40 percent of the newsprint in the given market would be reconstituted newsprint. Broken down to some extent, this would mean that the furnish for a mill like ours would be 60 percent new newsprint, 24 percent newsprint that had been reused once; 9.6 percent newsprint that had been reused twice; 3.8 percent 3 x 2, something and so on until it disappeared. It's our feeling that technically this is possible and that this kind of newsprint could survive and could compete.

I do not want the newsprint people in the room to commit suicide. This estimate is wildly impractical and doubly impossible. Nothing like this will ever happen. While Garden State plans to expand, it will do so with caution, and it will do so gradually, with respect for the industry and in full realization of the fact that the strength of the newsprint industry is vital to all of us.

Of course, it is from a sales standpoint that any such penetration of the market is really ridiculous. Of the over nine million tons of newsprint used annually in the United States, two million tons are made by mills that are owned by newspapers. Newspapers have long and continuing contracts with their suppliers, and short of some kind of government pressure, which I don't foresee, I think a 10 or 12 percent penetration of the market is about what this form of reuse might expect to attain. In other words, this flood of paper is going to have to be used, if it's used at all, in other products.

I feel that the government is much more likely to intervene than does Mr. Van der Eb. I think the pressures are going to be fantastic for it to do so. I don't look forward to this with any particular pleasure.

It is encouraging to find that the API is stimulating research for new uses and that the National Association of Secondary Materials Industries is doing the same. The outlook is a little bit discouraging in view of these enormous quantities involved, the amounts of board that Mr. Van der Eb mentioned and the amounts of newsprint which I have been talking about. The building industry is one obvious area in which a great deal of this material could be used. There are many others, and I'm sure that nine out of ten of you in this room are more sophisticated in what they are and where they are than I am.

We've suggested to the government various ways in which they could help. They're not particularly novel and they won't be surprising to you: federal money at low interest cost for plants using secondary fiber; tax rebates; an incentive for use; accelerated write-offs. Some consideration should be given to eliminating the contaminants in waste paper. You all know there is a flourishing business in deinking the higher grade waste papers than those we use. These are ledger papers, envelopes, tabulating cards, etc. These account for an awful lot of paper, and their problems with contaminants is great. One is pressure sensitive glues. They are a problem to us as well as everybody who is in the business. They are not necessary, we have developed a glue that is every bit as good. Other people have too. This is

the kind of thing competition should help with. We have not sold any of this adhesive because we don't have the energy and we do not have the staff. That's the kind of thing in which government can be helpful.

I think consideration has to be given to a sharing of technologies. In a situation of this kind, I could hardly see Garden State holding its secrets to its breast while the country smothered in waste paper. I think Garden State would cooperate with all kinds of people in this regard, and I hope that the rest of the industry would do the same.

To some people, the easy solution has been to burn the stuff. Oddly enough, some of the people who laughed the loudest when we started our mill are anguishing the loudest now that the thing to do is to burn all this waste paper.

I think you all know that there will be a fiber shortage. I don't know when it will be. Anson Brooks told the California publishers at their meeting this year that they will be looking for fiber in 1980. There certainly is an expert consensus that 15 years from now there's going to be a shortage of fiber.

I think it is important to realize that to some extent incineration is irreversible. When you build an incineration plant, and this is no small matter, it's built for a particular product mix. Incinerators are designed to burn so much paper, so much garbage, and so on. Once built, these things are going to be used; It might be naive to expect that once such incinerators are built fiber is going to be released for production again, shortage or no shortage.

Reuse can bring income to cities. The other day in "New York Magazine," Samuel Kearing, the former New York Sanitation Commissioner said that just to burn waste paper in a New York incinerator costs from six to eight dollars a ton. There are projects, of course, to burn it in the creation of power. We built such a plant, but somehow or other it didn't work. Economics, in any case, were not very attractive.

In conclusion, I hope that the consensus of this Seminar will be to go slow in stimulating the collection of waste paper, because right now there is nobody around to use it. Thank you.

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