536

THE ECONOMICS OF RECYCLING WASTE MATERIALS

HEARINGS

BEFORE THE

SUBCOMMITTEE ON FISCAL POLICY

OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

NINETY-SECOND CONGRESS

FIRST SESSION

NOVEMBER 8 AND 9, 1971

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE

70-422 O WASHINGTON : 1972

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 75 cents

JOINT ECONOMIC COMMITTEE

(Created pursuant to sec. 5(a) of Public Law 304, 79th Cong.)

WILLIAM PROXMIRE, Wisconsin, *Chairman*
WRIGHT PATMAN, Texas, *Vice Chairman*

SENATE	HOUSE OF REPRESENTATIVES
JOHN SPARKMAN, Alabama	RICHARD BOLLING, Missouri
J. W. FULBRIGHT, Arkansas	HALE BOGGS, Louisiana
ABRAHAM RIBICOFF, Connecticut	HENRY S. REUSS, Wisconsin
HUBERT H. HUMPHREY, Minnesota	MARTHA W. GRIFFITHS, Michigan
LLOYD M. BENTSEN, JR., Texas	WILLIAM S. MOORHEAD, Pennsylvania
JACOB K. JAVITS, New York	WILLIAM B. WIDNALL, New Jersey
JACK MILLER, Iowa	BARBER B. CONABLE, JR., New York
CHARLES H. PERCY, Illinois	CLARENCE J. BROWN, Ohio
JAMES B. PEARSON, Kansas	BEN B. BLACKBURN, Georgia

JOHN R. STARK, *Executive Director*
JAMES W. KNOWLES, *Director of Research*

ECONOMISTS

LUCY A. FALCONE	ROSS F. HAMACHEK	JERRY J. JASINOWSKI
JOHN R. KARLIK	RICHARD F. KAUFMAN	LOUGHLIN F. MCHUGH
	COURTENAY M. SLATER	

Minority: GEORGE D. KRUMBHAAR, Jr. (Counsel) WALTER B. LAESSIG LESLIE J. BANDER

SUBCOMMITTEE ON FISCAL POLICY

MARTHA W. GRIFFITHS, Michigan, *Chairman*

HOUSE OF REPRESENTATIVES	SENATE
HALE BOGGS, Louisiana	WILLIAM PROXMIRE, Wisconsin
WILLIAM S. MOORHEAD, Pennsylvania	ABRAHAM RIBICOFF, Connecticut
RICHARD BOLLING, Missouri	HUBERT H. HUMPHREY, Minnesota
WILLIAM B. WIDNALL, New Jersey	JACOB K. JAVITS, New York
BARBER B. CONABLE, JR., New York	JACK MILLER, Iowa
	CHARLES H. PERCY, Illinois

CONTENTS

WITNESSES AND STATEMENTS

MONDAY, NOVEMBER 8, 1971

TUESDAY, NOVEMBER 9, 1971

SUBMISSIONS FOR THE RECORD

MONDAY, NOVEMBER 8, 1971

SUBMISSIONS FOR THE RECORD—Continued

TUESDAY, NOVEMBER 9, 1971

THE ECONOMICS OF RECYCLING WASTE MATERIALS

MONDAY, NOVEMBER 8, 1971

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON FISCAL POLICY
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 1202, New Senate Office Building, Hon. Martha W. Griffiths (chairman of the subcommittee) presiding.

Present: Representative Griffiths.

Also present: James W. Knowles, director of research; Walter B. Laessig and Leslie J. Bander, economists for the minority.

OPENING STATEMENT OF CHAIRMAN GRIFFITHS

Chairman GRIFFITHS. This morning the Subcommittee on Fiscal Policy of the Joint Economic Committee holds the first of 2 days of hearings on the general subject of the economics of recycling waste materials. We shall hear from Members of Congress, some of the industries affected, government officials, and a private economist.

At the outset I think it is important to recognize that in this subject we have a merging of two serious concerns, both of which involve substantial economic issues.

First, in terms of the volume of recent debate, is the increasing concern with the effect of mounting amounts of waste products on the quality of the environment. This is not merely a question of industrial waste, but also involves functions of public authorities, particularly the disposals of waste that are generated by our urban environment. This is creating very substantial problems for local government.

The second source of concern which has been one of increasing significance in recent decades is the question of the adequacy of our sources of virgin materials to support our large and growing production machinery. It also involves questions about the feasiiblity of economically reusing materials contained in wornout or discarded products in order to prevent civilization from being choked by its waste.

We look forward to the testimony of our witnesses in suggesting further ways in which these problems can be dealt with.

Our opening witness this morning will be the Honorable Frank E. Moss, a Senator from the State of Utah, who has taken a deep interest in this subject.

We will have an additional witness not on the preliminary announcement: the Hon. John G. Dow, a Representative from the 27th district

of the great State of New York. We will then hear from witnesses from some of the industries affected.

We regret that Mr. Leon Coslov, president of the Institute of Scrap Iron and Steel, scheduled to appear today, will be unable to join us. His statement will be included in the record of the hearings.

There being no objections, we will put in the record the opening statement of Senator Javits and a prepared statement of Mr. Coslov for these hearings.

(The opening statement of Senator Javits and the prepared statement of Mr. Coslov follow:)

OPENING STATEMENT OF HON. JACOB K. JAVITS, RANKING REPUBLICAN SENATOR ON THE JOINT ECONOMIC COMMITTEE

We are a nation of consumers—and, too often, a nation of wasters.

We have turned from a tradition of pride in things which were well-made and made to last, to a new craving for things disposable: disposable bottles, disposable diapers, disposable everything. We go shopping and whatever we buy, no matter how small, is handed to us in a paper bag. We write a letter, and its recipient no longer routs it to interested parties—he sends each person a Xerox copy. We fill our wastebaskets daily with a flood of paper, our trash disposal containers with a flood of packaging material, our streets and yards with abandoned cars. And so we are creating a landscape of eyesores and leftovers, washed by rivers which are becoming hardly distinguishable from sewers, and the problem is expanding geometrically.

We desperately need to become a nation of conservers—of reusers, and recyclers.

For that reason, last June I introduced a group of 13 bills and 6 amendments, each with substantially the same text, which would require the Federal Government to insist upon the use of recycled materials in Government procurement contracts, to the maximum feasible extent. Joining me in cosponsoring these measures was a bipartisan coalition of 16 cosponsors: Seantors Bayh, Hatfield, Humphrey, Kennedy, Mathias, McGovern, Moss, Pearson, Percy, Proxmire, Randolph, Taft, Tower, Tunney, Schweiker and Weicker.

These bills—S. 2111 through S. 2123 and Amendments 218 through 223, would each provide that an agency administering a federal procurement or construction program must require, in any solicitation of bids and in any Federal contract, that all materials purchased pursuant to the contract be composed of recycled materials in such percentage as the Administrator of the Environmental Protection Agency determines to be *reasonable* and *economical.* The bill sets up a procedure whereby the agency head submits an estimate of the materials involved to EPA, and EPA issues an order setting the standard for each such material, fixing a percentage which could "feasibly and economically" be required to consist of recycled material. That standard—that percentage—would then become a term of the contract.

This field is filled with technical problems. To cite one, the term "recycled material," as used in these measures, would *exclude* "home scrap"—that is, scrap left over in the original production of the raw material, such as leftover steel in a steel mill, or leftover pulp in a paper mill. It is my understanding that, although the Administration has already adopted the recycling idea in instructions to GSA for the procurement of paper, the failure to exclude "home scrap" from the order has opened a loophole which may have greatly weakened the GSA program.

Obviously, in such a technical field, we need the advice of experts to insure that whatever program the government adopts is helpful to our environment without unnecessarily complicating procurement programs, and without developing unnecessary increased costs and increased bureaucracy.

I believe those objectives can be accomplished. Indeed, I have little doubt that, once we define a proper procedure, it could be put into effect without any legislation at all—simply by issuance of an Executive order.

I believe the plan outlined in the measures I and 16 cosponsors have introduced is the basis for a workable plan.

PREPARED STATEMENT OF LEON J. COSLOV

My name is Leon J. Coslov. I am President of Tube City Iron & Metal Co., a major scrap processing and brokerage firm headquartered in Glassport, Pennsylvania.

I appear this morning as President of the Institute of Scrap Iron & Steel, Inc., the national trade association representing approximately 1,300 processors, brokers and dealers of iron and steel scrap and related commodities, as well as industry suppliers. Institute members process, ship or otherwise handle approximately 90%–95% of the iron and steel scrap consumed in the United States.

Though most of my presentation will be concerned with iron and steel scrap, the Institute represents processors of both ferrous and non-ferrous secondary materials. Accordingly, I request your consideration of this statement in the broadest sense of the term "recycling".

Basic to my presentation is the absolutely critical need to develop viable markets for the sale of secondary materials. If there is a market for a recyclable commodity and that market offers a price over collection, processing and transportation costs, and also yields a reasonable return on investment, the secondary product will be recycled. The recent history in this country and in other countries in the world proves beyond any doubt that the key to a satisfactory environment is a functioning market for the secondary or waste products that, in the absence of such a market, become pollutants.

The ferrous scrap processing industry is not here to request a subsidy; this industry feels any incentive or subsidy which would foster increased recycling should not be paid to, or received by, it. The ferrous scrap industry firmly believes that processing of secondary materials does not require Government assistance for it in any form; what is required is assistance to other than processors to stimulate the collection effort and assistance in assuring economically sound markets for consumption of the processed material. The scrap processor does not want to receive tax or cash assistance to promote the transport function or to create or stimulate markets. The scrap processor, however, believes that the transporter and consumer should be aided if the recycling effort is to succeed.

Reviewing the many possible methods of assistance to the collector or consumer yields a series of three broad potential stimuli. These three categories are:

1. An incentive to the consumer for using scrap—some form of aid, either a tax deduction or a tax credit, for the preservation of natural resources through utilization of secondary materials,
2. Some form of credit for stimulating exports to foster a favorable balance of payments possibly combined with a penalty for stimulating actions leading to an unfavorable balance of payments,
3. Some form of subsidy or credit to overcome collection and transportation difficulties facing the shippers and carriers of secondary materials.

It is the obvious goal of these three broad suggestions to explore wider, more receptive market for recyclable secondary materials.

This industry recognizes that many public policies are involved, unfortunately some of them in conflict with another—either theoretically or practically. Thus, the scrap processing industry suggests that where public goals seem to be contradictory—for example, the need for low rates on secondary materials versus the need for revenue for the carriers involved—a solution protecting both interests must be developed. Such a third level solution would be most acceptable so long as it does not yield a total cost (to the private sector and to society as a whole) higher than that already in being as a result of the existing situation.

Thus, whether the potential answer resides in some form of penalty not presently in existence or a new tax or other incentive not now in the law, the key factor in deciding whether to implement the change or not must be the lowest possible cost to the nation as a whole. Such a goal must certainly encompass the removal and recycling of secondary materials instead of the exploitation of limited natural resources.

The matter of incentives to stimulate recycling or penalties to terminate pollutive or other objectionable actions is indeed complex. The institute does not have the capacity to undertake the necessary research and analysis into the intricacies of the tax code and other relevant statutes to establish how, when and under what conditions such incentives or penalties could or should be undertaken. The

Institute has, however, researched the inequity of certain results of poor economic practice, such as the impact of unfair and unreasonable freight rates, and these data are available to you in assisting your consideration of the problem and possible solutions.

The ferrous scrap processing industry does not endorse any particular form of assistance at this time but repeats again that it does not need or want the assistance directly. Rather, what is required is the provision, protection or creation for the processed product—the presence of viable, functioning markets there is no recycling problem. It is either the consumer or the carrier who must be given the incentive for it is the consumer in the end—either directly, or indirectly by lowered transport cost—who makes the market viable and acceptable. Accordingly, we respectfully request your consideration of the concept of aid to create or stimulate markets for secondary materials such that recycling can become a way of life in this nation.

Thank you for permitting us to present this brief outline of the many problems facing the ferrous scrap processing industry.

GRIFFITHS. Because of time limitations, we ask that everyone proceed as expeditiously as possible.

Senator Moss, we are delighted to have you with us this morning, and you may proceed in your own way.

STATEMENT OF HON. FRANK E. MOSS, A U.S. SENATOR FROM THE STATE OF UTAH

Senator Moss. Thank you very much, Madam Chairman. I certainly am pleased with this opportunity to appear before the Joint Economic Committee to talk about economic incentives for recycling. I appreciate your courtesy in giving me this opportunity, and I will try to proceed expeditiously.

I am familiar with this subject through my chairmanship of the Subcommittee on Minerals, Materials, and Fuels of the Senate Interior Committee, which considers the Nation's raw materials policies. I am also vice chairman of the Environment Subcommittee of the Senate Commerce Committee, which examines the environmental aspects of interstate commerce. Recycling is a central and growing concern in both of these committees.

I have a special interest in the area of recycling of paper. Earlier in the year I introduced S. 2266 and S. 2267, to encourage the use of recycled paper by Congress. Hearings have been held in the Senate, and similar legislation has been introduced in the House.

Insofar as the paper industry is typical of many other industries when it comes to recycling, I will confine my topic this morning to the economics of paper recycling. However, my comments have broad applicability to the situation found in other industries.

The most basic fact about recycling is, of course, that recycled materials are directly competing in the market with primary, or raw materials. The competitiveness of recycled products is affected by at least three economic factors. One is incentives for extraction. The second is the cost of transportation. The third is the market for the end product. In each case, the Federal Government is operating directly and decisively to favor virgin materials over recycled materials.

Take the economics of extraction, using the paper industry as an example.

First of all, the Federal Government makes available to industry a major source of its raw materials, our national forests. Comprising nearly 200 million acres, they represent 20 percent of the timberland in the United States. About 25 percent of the annual timber harvest comes from national forests. Through tax dollars and Federal stewardship, the American public is paying to help the timber industry maintain its source of raw materials.

The economics of extraction also involves tax breaks for the timber industry. Income derived from timber is, in general, treated as capital gains. The rationale is that a tree is an item of capital that increases in value until cut. The reasoning may be sound, but the practical results are an estimated loss to the Treasury of one-eighth of a billion dollars a year. This is really a subsidy by the U.S. taxpayer for the timber industry.

Large, integrated paper producers who own their own forest lands can, by juggling prices among their subsidiaries, shift most of their profits into the capital gains category. This is yet another advantage over producers of recycled paper products.

In comparison, what kinds of incentives are available to reclaim wastepaper and reuse it?

We as a nation spend between $4 and $5 billion to collect and dispose of solid waste, half of which is paper. One would think that we would offer some incentives to industries who would take this scrap off our hands. But we do not. We are willing to subsidize the logging of trees in our national forests, but we will not assist in the salvage of valuable materials from our city dumps.

A second area of discrimination is transportation costs. Although the Interstate Commerce Commission has authority to review freight rates to assure nondiscrimination between competing products, it has not chosen to go so with respect to recycled materials. In many areas of the country the cost of transporting paper waste is more than twice the cost of transporting pulpwood.

For instance, in the South it costs $2.59 to send a ton of pulpwood 205 miles. It costs $5.40 to send paper waste the same distance. In the East the figures are 18.6 cents per hundredweight and 40 cents per hundredweight. As much as 80 percent of the cost of producing recycled paper is the cost of collection and transportation of waste paper. Thus discrimination in freight rates seriously undermines the competitive position of recycled paper.

I have proposed an amendment to S. 1729, the Fast Freight Car bill, which would prohibit railroads from setting discriminatory rates on recycled materials, but the best way to change the situation would be for the ICC to do its job.

A final area of concern for recycled products generally is consumer acceptance—that is, to supply a market for the product made from recycled material. Until recently the general public looked askance at products made from waste paper—they were "dirty" or generally inferior.

A remarkable change has taken place over the last 2 years, however. Companies report zooming sales of their newly marketed recycled paper products—writing paper, industrial packaging, household paper, even greeting cards. Recycled paper has finally gained widespread consumer acceptance.

The Federal Government seems determined to be the last holdout. The Goverment Printing Office is the largest publisher in the world, using more than 200 million pounds of paper a year. Regrettably and inexcusably, not a single sheet of it was recycled paper. The General Services Administration is at last authorizing a certain limited number of items purchased by the Government to contain small percentages of post-consumer solid waste. It is moving to rewrite other specifications, but the progress is painfully slow. No printing papers now used by the Federal Government are allowed to contain recycled materials.

Why is Federal policy important here?

First of all, because Federal purchases are so large. Even minimal Federal purchases would greatly stimulate the recycling industries.

Second, private industry looks to Government specifications as models for their own. Those specifications presently excluded most recycled materials. The result is that potential markets are closed to recycled paper in both the Government and private sector.

Third, it is the Federal Government that bears the responsibility for setting national priorities. We are running out of raw materials. We are running out of places to put our garbage. The recovery and reuse of materials in our waste stream must become a national priority. The Federal Government ought to be leading the way. Yet at every turn of the road, Federal Government policies—tax, regulatory, and procurement policies—discourage recycling.

As we in Congress realize this, we look around for what we can do to redress this imbalance. But the favoritism is ingrained in many areas which cut across committee jurisdictions. The thrust must be to look at the total picture. That is why I welcome hearings like these, in which a broad perspective can be taken.

I commend the committee for calling these hearings. I hope that they will stimulate a broad rethinking of our policies with respect to recycled materials. The national interest demands no less.

Thank you.

Chairman GRIFFITHS. Thank you very much, Senator.

I think it is always a shame that Congress has to be educated one by one on the really necessary things to be done.

It seems to me that the House of Representatives does buy recycled paper. I believe that some of the Senators asked if they could not buy it, because the House was buying recycled paper.

Senator MOSS. That is true. However, this paper is purchased through the House and Senate stationery rooms. They do not buy through the GSA, and therefore do not have to adhere to the standards set forth by the Government Printing Office.

As you know, however, this is the exception rather than the rule in the Federal Government. None of the paper used by any other Federal agency, and none of the paper used by the Congress outside of special purchases of the stationery rooms, can presently be recycled paper. Of course these uses dwarf the amount used by Senators and Congressmen in their offices.

I now use recycled paper in my office, but when I first attempted to do this, I was told that there was none in stock, and there was no way I could get it except by purchase out of my own pocket, which I did to get it started. Now I can get some recycled paper.

One of my recycling bills would require that the Congressional Record, for example, be printed in part on recycled paper products. That has not been accomplished yet, and the run on that each day is a large item. In fact, I made a computation of how many million trees we could save if we could just do that on recycled paper.

Chairman GRIFFITHS. Do you have any suggestions on how we could in some way either subsidize or assist in the gathering of the materials?

Senator Moss. Yes; I have some ideas. I was pointing out, just on this matter of transportation alone, we discriminate against recycled materials rather than give them any kind of incentive or subsidy.

We also could provide financial assistance in the collection system to make it profitable to do this rather than make it difficult to separate and segregate and use recycled materials.

Of course, in my testimony I used only paper. I realize, of course, that all of our materials have to go through this reclamation system, because we are simply depleting our resources too rapidly.

Chairman GRIFFITHS. What would be your suggestion for some assistance in the gathering of these products, any product, iron, glass, paper, or whatever?

Senator Moss. I would give some incentive to the cities, who generally have the problem of gathering waste materials and taking them to a dump, for installing the system, the machinery for separating and sending these products back into the system of recycling. It should be to their interest to do that rather than simply find a bigger hole to dump all the things in and perhaps cover it up with land fill. I think this is a principal area we ought to move on quickly.

Chairman GRIFFITHS. I would agree with you.

Thank you, Senator, very much. That was a very good statement.

Senator Moss. Thank you.

Chairman GRIFFITHS. Our next witness is Representative John G. Dow.

Representative Dow, we are happy to have you here. You may proceed in your own way.

STATEMENT OF HON. JOHN G. DOW, A REPRESENTATIVE IN CONGRESS FROM THE 27TH CONGRESSIONAL DISTRICT OF THE STATE OF NEW YORK

Representative Dow. Good morning, Madam Chairman.

I want to thank the committee for giving me this opportunity to testify this morning. The demonstrated interest in the House in using recycled paper highlights the feeling that recycling can help solve a growing problem of solid waste. A market has been created.

A principal concern when recycling is discussed is an understanding of the definition itself. I think the real question that must be addressed in the definition is what I like to call post-consumptive waste. In discussions since my original bill was introduced, and that bill was the first recycling bill in the Congress, I have learned of the flexibility in a definition which fails to address the concept directly.

My definition of recycled paper which I set out in H.R. 10034 is:

> The term "recycled paper" means any paper which after sale to, and use by, a consumer of that paper has been (1) discarded or collected as an element of solid waste; and (2) has been recovered in whole or in part and reprocessed into a new raw material for use in the manufacturing process of new papers,

except that such term shall not include any waste materials generated by the paper manufacturing process and reused as part of such process.

I am emphasizing post sale because of the solid waste problems we are facing in this country and the direct effect that our domestic paper consumption plays in this area. Fifty percent of our solid waste is composed of paper. The solid waste and disposal business is a major national problem. It now costs an estimated $5 billion per year and is still growing. Our urban areas generate tremendous amounts of waste paper or urban forest material which could be recovered and reused.

I do not feel that the percentage of recycled material should include items that would be allowed under my earlier definition which I worked on with the legislative counsel as these ideas were taking shape.

There are some shortfalls with that definition. It was written to exclude mill broke, that is, those cuttings and wastes generated up to the placing of the manufactured paper on the winder.

The updated definition would not allow the percentage to be computed from subsequent cuttings and other wastes which come from coating the paper. At the time we thought that these cuttings would qualify under the defiinition of the paper manufacturing process, but this is, I have learned, subject to debate.

To be safe, to really spell it out, I have opted for the post sale concept and feel that it offers less chance of maneuvering and hedging than the previous definitions.

Governmental policy must be given new direction in several areas which involve recycling and which impact directly on the solid waste problems and the utilization of natural resources.

Governmental procurement must be redirected toward the purchase of materials with increasing qualities of recycled content. To get this effort underway, I have introduced H.R. 8005 which establishes a national policy on the procurement of recycled materials and directs the Administrator of the General Services Administration and the Secretary of Defense to initiate a joint study of this problem while, at the same time, initiating such changes as are conceivable pending the outcome of the procurement study. The procuring agencies themselves should be involved directly.

For example, it is DSA which handles our national purchasing of refined oil products, and which should have, I feel, already promulgated regulations for the recycling of oils.

The creation of new markets for recycled products will have a very positive effect on reducing our national problems with solid waste disposal. As a former systems analyst in business firms, perhaps I am inclined to first look at the basics and then establish their interrelationship. When I learned that a high percentage of the 58 million tons of wood fiber products we consume each year ends up as solid waste, I became convinced that we cannot continue to discard these resources; they must be recovered and reused.

In the New York region alone, it has been estimated that the cost of waste management by the year 2000 will be some $300 million with a 20-percent paper reuse rate, and $120 million with an 80-percent paper reuse rate. These management costs include charges for incineration, wet scrubbing, and a settling basin, plus land fill of the incinerator residues.

In a recent article which appeared in the Wall Street Journal by William R. Galeota, entitled "Leftover Newspapers Seem Turning

Scarce to Peril of Recyclers," those interrelated problems are underlined. The demand for building materials made from old newspapers and the boost in demand of recycled products has caused a shortage in the East of used newspapers. With the wage-price freeze in effect, prices paid for the papers cannot be increased. Garden State Paper Co. of New Jersey is quoted as saying "We find ourselves with a consumption which exceeds the collection of newspapers."

This leads me to suggest that the Interstate Commerce Commission must act immediately to lower freight rates for waste materials. These materials should enjoy the same point-to-point rates as those given for virgin commodities rather than continue to move on a scale of rates for processed commodities. Recognition must also be given to the distance that wastes may be required to move until new plants and facilities are built in urban areas, the source of supply.

Investment in new plants using postconsumptive materials should be encouraged. New processes for the separation of wood fibers or of sorting of resources "at the dump" would stimulate our economy and reduce the present solid waste dilemma.

Mr. Chairman, I welcome the opportunity to testify and commend this committee for its initiative in examining the broad problems that must be considered in the economics of recycling.

It is my sincere hope that the prejudice which previously existed in the public's mind about recycled products does not linger in the law after the public mind has been changed.

Thank you.

Chairman GRIFFITHS. Thank you very much, Representative.

I take it that the railroads are not asking to lower the rates on the wastepaper.

Representative Dow. I do not think the railroads, very frequently, are asked to lower rates.

Chairman GRIFFITHS. So that you have an adversary situation occurring, would that not be true?

Representative Dow. I would expect so. In all frankness, I have not explored that area too deeply, so I do not want to condemn them out of hand, but I suspect that they are not very eager to lower the rates.

Chairman GRIFFITHS. Why does not the ICC initiate the action on their own?

Representative Dow. Well, Madam Chairman, I will make this comment: I think the ICC, like a good many of our public institutions, has a hardening of the arteries now and then, and that they do not have that type of initiative which we need in these new situations.

Chairman GRIFFITHS. Have you brought this to the attention of the ICC?

Representative Dow. No; I understand that other Members have done so but I, for one, have not.

Chairman GRIFFITHS. How can we get around it?

Representative Dow. I expect, Madam Chairman, that we should approach them.

Chairman GRIFFITHS. Thank you very much. Thank you for a very interesting and constructive statement, too.

Representative Dow. I am very happy to be here.

Chairman GRIFFITHS. Mr. Mighdoll and the accompanying witnesses.

STATEMENT OF M. J. MIGHDOLL, EXECUTIVE VICE PRESIDENT, NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, INC., NEW YORK, N.Y., ACCOMPANIED BY EDWARD L. MERRIGAN, SMATHERS & MERRIGAN, WASHINGTON, D.C.; THOMAS A. DAVIS, SMATHERS & MERRIGAN, TAX COUNSEL; JOHN VACCARO, TRANSPORTATION ADVISER TO THE ASSOCIATION; HASKELL STOVROFF, CHAIRMAN OF THE BOARD, CONSOLIDATED FIBERS, BUFFALO, N.Y.; RICHARD H. FRANKEL, VICE PRESIDENT, FRANKEL BROS. & CO., INC., ROCHESTER, N.Y.; ALBERT J. WEIN, EXECUTIVE VICE PRESIDENT, STEELMET, INC., PITTSBURGH, PA.; M. D. SCHWARTZ, PRESIDENT, PACIFIC SMELTING CO., TORRANCE, CALIF.; EDWARD BERGMAN, PRESIDENT, U.S. REDUCTION CO., EAST CHICAGO, IND.; BERT ROMBERG, VICE PRESIDENT, COMMERCIAL METALS CO., DALLAS, TEX.; AND RICHARD SCUDDER, CHAIRMAN OF THE BOARD, GARDEN STATE PAPER CO., GARFIELD, N.J.

Mr. MERRIGAN. My name, Madam Chairman, is Edward L. Merrigan. And I am a member of the law firm of Smathers & Merrigan.

I would like to just introduce briefly, if I could, for the benefit of the committee, Mr. Haskell Stovroff, who is the chairman of the board of Consolidated Fibers, of Buffalo, N.Y., and one of the industry witnesses present today.

Also with us today is Mr. Richard H. Frankel, of Frankel Bros. & Co., Inc., of Rochester, N.Y.; Mr. Albert J. Wein, executive vice president of Steelmet, Inc., of Pittsburgh, Pa.; Mr. M. D. Schwartz, president of the Pacific Smelting Co., of Torrance, Calif.; Mr. Edward Bergman, president of the U.S. Reduction Co., East Chicago, Ind.; Mr. Bert Romberg, vice president of Commercial Metals Co., Dallas, Tex.; and Mr. Richard Scudder, chairman of the board of the Garden State Paper Co., of Garfield, N.J.

All of these gentlemen are at the table, Madam Chairman, and prepared to answer questions of the committee. All of them are in the recycling industry.

Chairman GRIFFITHS. Thank you very much.

Mr. MERRIGAN. I would like to present to the committee Mr. M. J. Mighdoll, who will give the statement on behalf of the industry.

Chairman GRIFFITHS. Thank you very much, Mr. Merrigan.

Mr. Mighdoll, we are very happy to have you here.

Mr. MIGHDOLL. Thank you, Madam Chairman. And I thank the committee for holding these very important hearings to consider this vital subject.

The committee is to be commended for focusing, as its hearing announcement said, on the environmental problems created by solid wastes, the drain on our precious natural resources, and the necessity for a vast national recycling and resource recovery effort.

We have submitted, Madam Chairman, a prepared statement and we would appreciate it being included in your official record.

Chairman GRIFFITHS. It certainly will be.

Mr. MIGHDOLL. And if it would be all right with you, we would like to depart from that text, in order to maximize the limited time available today, and focus on some of the key problems and issues that are before us.

Chairman GRIFFITHS. It is quite all right. The prepared statement will appear in the record and you may proceed in any way you wish.

Mr. MIGHDOLL. Thank you.

Our association represents a wide range of business firms which share one common economic purpose and interest: the recycling of solid waste materials into new raw materials and products. Our members—over 700 corporations located througout the country—and the industries they comprise relate to practically every major commodity element of the economy and to a diverse range of operational activities. They are concerned with the collection, recovery, processing, refining, converting, and manufacturing of all metals, paper, textiles, rubber, plastics, and other materials and products.

In other words, our membership includes firms which recover and process waste materials, others which refine and convert them into new raw materials, and still others which manufacture products made from these recycled resources.

The industry ranges from small individual type businesses to large corporations employing hundreds of workers in multiplant operations. However, the foundation of the industry consists of small businesses, whose principal activities relate to the basic first step in recycling—the collection and processing of the various reclaimed materials and their conversion into new raw materials capable of being used in myriad end-products by hundreds of segments of the American economy.

They currently recycle over 3 million tons of nonferrous metals each year and 11 million tons of wastepaper.

Many of the members of our industry date back into the last century. Our association itself was founded in 1913.

Certainly the record of this industry during past wartime emergencies is part of our proud national history and heritage.

In recent years, recycled materials have become both a more complex and more important element of the industrial production of the United States. This has resulted in a more sophisticated recycling industry. What began with a scattering of small, self-owned, and operated businesses has since matured in this century to become a major element in our economy.

Additional industry background is provided to the committee in exhibit A of our prepared statement. Unfortunately, until very recently we had to work almost alone in our recycling efforts. Seemingly, Federal, State, and local governments were oblivious to our role. Indeed, their economic policies and programs actually were aimed in a direct direction that made our task constantly more difficult.

Full consideration must be given now to changing these adverse policies. Clearly the Federal Government must take the lead. Only through the adoption of a comprehensive national fiscal policy and economic programs will we see a reversal of the present disastrous trends.

Today it is most important for us to examine why recycling is important to the United States, and why it now requires new Federal policies to permit its successful continuation and healthy role.

We are dealing with both a dynamic and crucial factor in our society today. Recycling is the most constructive response that has been developed to answer the challenge of environmental management, to cope with the mounting piles of solid waste building at the rate of over $300 million tons each year in the United States. The overwhelming percentage of this solid waste is presently being transported to open dumps—to the point that open dumping has become a national environmental issue and an increasingly dangerous health hazard.

Some solid waste is transported to land fills, but the available land fills of this country are rapidly disappearing. Major cities, such as New York City, now face the alarming reality that in just a few years there will be no more land to fill. Some solid waste is incinerated, but the Environmental Protection Agency has recorded that more than 90 percent of the Nation's incinerators do not meet adequate air pollution standards.

As we face the future—with its growing population, its expanding industrial production, and a more complex society—we must contemplate a solid waste problem of almost immeasurable scope and seriousness. Already the Council on Environmental Quality projects that 1975 pollution control costs for solid waste will be $7.8 billion, as compared to $5.8 billion for water pollution and $4.7 billion for air pollution.

Recycling does represent a direct means of conserving our limited natural resources. For many years our great Nation has lived in an aura of seemingly unlimited raw material wealth. We encouraged the exploitation of our mines and the harvesting of our forests, and perhaps rightly so, for this Nation was growing and required the development of industries capable of supporting our material needs.

However, we now face new conditions and new urgencies. Our tremendous economy and its industrial demands must now cause us to seriously concern ourselves with the limitations of our land and with our dwindling ore supplies forcing us to look to other nations for critical raw materials. While our paper industry has vastly improved its techniques for growing and cutting trees, we still find a potential inadequacy of virgin woodpulp in the near future.

Finally, recycling is synonymous with astute environmental management. Every ton of waste that can be utilized instead of burned or otherwise destroyed represents a potential profit or saving to our cities and States, rather than a drastically growing cost factor.

In my home town of New York, for example, it now costs $36 a ton just to get rid of solid waste.

It was in 1970 that the Federal Government finally awakened to the fact that we are putting an impossible strain on our national resources, and at the same time the mountains of solid waste grow. In its 1970 environmental report, President Nixon's Council on the Environment stated:

> Population growth threatens the nation's store of natural resources. Currently, the United States, with about six percent of the world's population, uses more than 40 percent of the world's scarce or nonreplaceable resources

and a like ratio of its energy output. Assuming a fixed or nearly fixed resource base, continued population growth embodies profound implications for the United States and for the world.

The Council on Environmental Quality accordingly advised the Congress in 1970 that the Federal Government simply had to attack these two crucial problems head on, at once, and without delay—that is:

(1) It had to reduce the mounting solid waste volume, and,

(2) It had to pursue every possible means to encourage and increase the reuse and recycling of our precious natural resources—metals, trees and the like. But, most importantly, with reference to the very vital problems before this committee today, the Council's report stated at pages 114, 121:

In his February 10 Message on the Environment, the President announced the Federal Government's goal to reduce solid waste volume and encourage reuse and recycling. Recycling waste materials into the economy has not been widely applied in the United States. Economic considerations and the abundance of virgin resources have forestalled the development of recycling technology and markets. Primary materials producers, often with the help of tax concessions, have developed remarkably efficient technologies for removing metals and other substances from their virgin state. But meanwhile, techniques for separating and recovering waste materials remain primitive and expensive. * * *

Methods must be developed to reuse a greater percentage of products and to develop new products from and new uses for solid waste. * * *

The report continues:

Industry, private research organizations, and all levels of government must be enlisted to maximize the recycling of solid wastes.

In its 1971 report to the Congress, the President's Council on the Environment was even more specific regarding these bars against recycling and the need for immediate action to reverse the trends of recent years. In this regard, the President's Council stated, at page 228 of its 1971 report:

We now have the technology to recycle much of the material that is treated as waste and thereby return it to useful purposes. However, market and other incentives in recent years have tended to work against recycling. As a result, we reuse less and less as population, per capita consumption, and changes in production processes add increasingly more and more to the amount of material which must be disposed of.

Congress of course responded and passed the Resource Recovery Act. In Senate Report 91–1034, submitted in support of the act by Senator Muskie and his subcommittee, it is stated on pages 1 and 2:

This Nation has always enjoyed resource abundance and has acted as though that abundance would last forever. Studies prepared for the Senate Committee on Public Works, testimony before the Subcommittee on Air and Water Pollution, and information generally available suggest that anticipation of continued resource abundance is not only unwise—it is folly * * *.

So the Nation has no choice. Consumption increases at a greater rate than population growth. Exhaustion of the Nation's resource base is a very real possibility. Already some industries see recycled waste as a more economic source of materials than primary sources * * *.

This legislation is therefore designed to develop systems which will change the present method of dealing with solid waste problems. * * * The intent of this bill is to stimulate the development of resource recovery methods which will provide for more economic use of wastes.

The 1970 act did not attempt to legislate definitively to remove the road blocks to expanded recycling or to provide effective incentives to

promote recycling. Instead, at section 205 of the act, it directed the Environmental Protection Agency to carry out an investigation and study to determine new methods of recovery and new uses and markets.

Finally, with direct pertinence to the economic problems under discussion here today, the Resource Recovery Act of 1970 went on to instruct the Environmental Protection Agency to determine:

(i) How Federal procurement might be utilized to develop market demand for recovered resources;

(ii) How existing public policies, including subsidies and economic incentives and disincentives, percentage depletion allowances, capital gains treatment and other tax incentives and disincentives impede and restrict or unfairly discriminate against the recycling, reuse, and conservation of materials;

(iii) How Congress should proceed to eliminate disincentives to recycling; and

(iv) What incentives, including Federal grants, loans, tax relief, or other assistance, should be provided to accelerate the reclamation of recycling of materials from solid wastes.

The vital relationship that recycling of materials has to the economic, environmental, and conservation well-being of the country can only underscore the urgency of establishing a favorable national climate under which the recycling concept can attain the economic viability that is essential to its expansion.

In at least five metals—copper, lead, steel, silver, and gold—the use of recycled materials is presently equal to or in excess of that of virgin materials. Even so, we still have in many commodity areas, a large dependence on materials from foreign sources.

In other commodities—in paper, textiles, and such metallics as aluminum and zinc—we find a relatively low recycling rate. In spite of a growing U.S. demand for all these materials, we have failed to establish the kind of economic conditions that will enable more of our domestically available recycled materials to move from solid waste pile to raw material cycle.

In some cases, recycled materials are actually losing their previously established portion of the market. This is well illustrated, Madam Chairman, by the situation in the paper industry, where new production records have been set during the past decade. Yet, in spite of that, we are using proportionately less recycled paper. We declined from a 35 percent recycling rate in the mid-1940's to almost half that rate in the late 1960's. This is most significant in view of the fact that paper constitutes one-half of this country's municipal solid waste.

We are in a packaging-oriented society that has developed a paperboard industry of record proportions, but has permitted the use of recycled materials by that industry to sink from a 42 percent raw material furnish factor to a 28 percent level in just 10 years.

For instance, it is estimated that the total production in the United States will almost double by 1985, less than 15 years from now. Yet, U.S. papermills presently contemplate only a 7-percent increase in recycled paper usage.

Recycled materials must compete in the same markets served by domestic virgin materials. They must meet the same qualitative standards and enable the consumers of these materials to utilize them with at least the same economic advantages.

The fact is, however, that far from having a favorable economic climate, far from having policies to encourage the utilization of recycled materials, we have Federal policies and national philosophies which serve as economic obstacles to the use of these valuable and needed materials. Present industrial habits, government policies, public apathy, prejudicial and discriminatory regulations put the Nation on a path of virgin material preference and direct it away from economically viable recycling. Permit me to quickly examine several of these economic restraints to recycling and to focus on the most critical situations which deserve urgent attention and action by the Congress.

1. FEDERAL TAX POLICIES

Through the years the Congress established tax policies designed to encourage the development of our natural resources. In a different era, with different needs and objectives for the Nation, certain tax policies were evolved which have had the effect of providing economic advantages for the marketing of primary or virgin materials.

Depletion allowances for virgin metals and capital gains tax treatment—as opposed to higher ordinary tax rates—for profits derived from the utilization of trees in the paper industry simply made it economically disadvantageous for many manufacturers to use recycled materials.

Since recycled materials must compete directly with comparable virgin materials, the net result of current tax policies is to provide economic encouragement to the continued and expanded use of domestic ores and virgin woodpulp, to the direct economic disadvantage of recycled materials. A continuation of this present tax policy represents an adverse market force for recycled materials with serious impact, since it creates a direct economic advantage for those who produce or utilize virgin materials. It discourages any new orientation to expanded use of recycled materials.

As a result, capital investments and technological improvements have been made in equipment, facilities, and techniques related to virgin materials utilization.

Mr. "Tad" Davis, of the law firm of Smathers and Merrigan, will present a more detailed analysis of this tax problem and submit proposals which will have the effect of removing present economic roadblocks by (*a*) providing a realistic incentive factor for the utilization of more recycled materials, (*b*) encouraging new plant investments in recycling equipment, and (*c*) providing a basis for expanding research and development activities by industrial firms capable of recovering recycled materials.

2. DISCRIMINATORY TRANSPORTATION RATES

A significant cost factor in the recovery and utilization of recycled materials is that related to transporting the material to its natural and most economical market. Through past years, the transportation rates established by the Nation's railroads and steamship companies have discriminated against recycled materials as compared to their virgin counterparts, in spite of urgent appeals by the Council on Environmental Quality, the Environmental Protection Agency, and the De-

partment of Commerce, who have asked the ICC to eliminate such discrimination.

There are numerous examples to illustrate the inequitable rate structure that exists between a virgin commodity and the same or comparable commodity in a solid waste or recycled form. Exhibit D attached to our prepared statement gives ample illustration of this discriminatory policy that has been applied by railroad and steamship conference ratemaking in recent years.

Since the transportation cost element is a significant proportion of the total costs involved in marketing materials or products, any inequitable or discriminatory rate must have an immediate and direct effect on the consumption of those materials and products. So it has been in the case of many recycled materials, which as has been illustrated previously, must compete directly with virgin commodities. Many freight rates are as much as 50 percent higher for the recycled material that can be used by a manufacturer instead of, or in addition to, comparable virgin materials.

Many virgin commodities enjoy point-to-point rate bases, calculated on a mileage scale. Most recycled materials must move on a commodity scale of rates. The net result is a distinct ton-per-mile advantage for virgin commodities. Furthermore, most recycled materials move longer distances to their points of consumption. For instance, in the eastern part of the United States, pulp wood is transported from forest to mill on the average of 136 miles, whereas wastepaper averages a distance of 434 miles from recovery point to consumption point.

The incidence of inequities is astounding, and it is reflected in ocean freight rates as well as in domestic rail rates. Many recycled materials represent surpluses to our domestic needs, but they are commercially prohibited from being exported to potential consumers abroad by steamship lines which impose excessive rates and unrealistic shipping conditions. At the very time when this country's balance-of-payment situation is such a critical problem, we are losing established markets for surplus recycled materials and are noncompetitive in others—largely because ocean carriers have been permitted to charge inequitable and unjustified rates, sometimes double those for virgin commodities.

In addition to establishing inequitable rates which directly produce a market imbalance to the disadvantages of recycling materials, many rates on low-value commodities are not established with any relevancy to the nature or value of the material. This is significant since a large proportion of solid waste is comprised of low-value materials.

In short, transportation rates and policies have not been adequately related to the recycling objectives that have been pronounced by the Federal Government as essential to the economic and environmental goals of the Nation. Pleas to the Interstate Commerce Commission for corrective measures on numerous occasions have been to no avail and recycling companies continue to be the victims of blatant discrimination by the Nation's railroads. There is urgent need for the establishment of freight rates and policies which will at least remove the restraints these conditions directly impose on the flow of recycled materials compared to competitive virgin materials.

Opportunities for the creation of such new policies and for the elimination of existing rate discrimination now clearly exists as the

railroad and maritime industries seek more Federal subsidies and billions of dollars in new support programs from the Congress.

3. NATIONAL PROCUREMENT POLICIES

The Federal Government represents one of the largest single sellers of waste materials to the various segments of the recycling industry. Yet, Federal procurement policies and specifications have tended to discriminate against products utilizing recycled materials in favor of those manufactured with virgin materials. At best, the Government procurement policies have failed to provide any incentive factor relating the desire to recover and utilize solid waste materials with the market applications of these materials as a part of product procurement.

In February, President Nixon recognized the need for Federal leadership in expanding the market opportunities for recycled materials. He stated there was a need to reverse the trend relative to the use of recycled materials. He ordered the General Services Administration to revise its standards and specifications so as to remove any biases or restraints to the purchasing of products made with recycled materials and to install such incentives as would provide a national leadership thrust to expanding the markets for these materials. Unfortunately, the progress of this program has been interminably slow. Although 9 months have passed since this Presidential announcement, the GSA has only recently been able to develop effective terminology for relating postconsumer waste recycling to its procurement specifications. The GSA still relates only a small percentage of its purchases to any meaningful recycled material content, and these have been only in the paper product area.

Section 205(a) of the Resource Recovery Act directed the Government to determine how Federal procurement programs can be utilized to develop market demand for recycled materials. The Senate report supporting the act called for an energetic recycling purchasing policy."

In the meantime, other branches of Government have moved at an even slower pace, and we must be candid in expressing our opinion that there has been no effective action to parallel the pronounced policy objectives. Efforts by Members of the Congress itself to have paper made with recycled fibers used alongside paper made with virgin fibers have met with resistance. Statements filed by our association with the General Services Administration, Joint Committee on Printing, and the Government Printing Office clearly indicate the commercial availability of a wide range of paper products made with recycled fibers which can fully meet present qualitative standards of the various Government purchasing agencies.

Madam Chairman, I have brought some samples of just a few of the companies in the United States which provide commercially available paper products of all types and I will invite the committee staff to examine the quality of these products.

Chairman GRIFFITHS. Thank you very much.

Mr. MIGHDOLL. As a result, several congressional bills have been introduced in an attempt to implore agencies of Government to initiate progressive and imaginative programs capable of using the Federal

procurement arm as a means of providing national leadership to recycled materials utilization. We urge positive and ongoing action to have the Federal procurement mechanism effectively promote expanded recycling, particularly to those post-consumer solid wastes currently not being utilized.

4. NATIONAL POLICIES AND OBJECTIVES

In addition to the unfavorable direct market influences that have been noted, study after study has cited the absence of any positive Federal program to provide the Nation with an objective understanding of the relationship of recycling to the solid waste problem. These reports stress that this condition and the failure to focus on consumer purchasing opportunities have contributed significantly to an apathetic attitude on the part of the American public.

The American consumer little understands the economic significance of recycling or its relationship to the solid waste problem. However, with each passing day the American taxpayer is increasingly burdened with costs directly related to our inability to expand recycling and reduce solid waste pollution. Many municipalities and States are considering the imposition of punitive taxes or restrictive regulations in their attempt to either minimize solid waste accumulation or to direct consumer purchasing toward recycled or recyclable material products. Chaotic conditions are now an imminent possibility, largely because of the absence of a strong Federal commitment to a positive program.

The country and the American consumer want for national leadership, and the failure to achieve this is the omission of public incentive which can directly benefit the national interest in its immediate economic and environmental challenges. American consumers do not know fact from myth; many have been led erroneously to believe—by such legislative policies as the Wool Labeling Act—that products made with recycled materials are inherently inferior to those made with virgin materials.

This act struck the single greatest blow ever against textile recyclers. Urged on Congress by the virgin wool industry, this legislation guarantees consumer rejection of reprocessed textiles.

5. LEADERSHIP TO MUNICIPAL AND STATE GOVERNMENTS

Even as municipal and State governments seek to cope with the solid waste problem and to employ constructively-oriented recycling programs, these same local and State governments foster discriminatory policies and regulatory actions which impede the recycling activity. Many municipal and State governments still enforce antiquated licensing, zoning, recordkeeping and other discriminatory policies which adversely affect companies in the recycling industries.

Often a company processing or utilizing recycled material does not enjoy the same zoning privileges as do other industrial companies. Many cities and States license and tax recycling companies on a different basis than other raw material and manufacturing companies. One State during this past year sought to bring the recycling industry under the domination of public utility laws as it sought to "do something" about the solid waste problem.

These discriminatory policies directly affect market factors. They add additional cost burdens to many companies and, in other cases, actually bring about the dislocation of entire business activities. A study our association recently conducted vividly indicated that recycling industry plants had been forced out of the very municipalities that were seeking to cope with the solid waste problem more efficiently through recycling. This incongruity of policies is drastically in need of Federal leadership. A continued trend of dislocation of recycling industry plants and the imposition of economic hardships which force others out of business completely only reduces the potential for recycling and increases the magnitude of the solid waste problem. Positive Federal leadership is seriously needed.

6. NEED FOR EXPANDED FEDERAL RESEARCH AND DEVELOPMENT

Since the recycling industry principally consists of small, highly competitive business interests, with low profit margins, there has been little opportunity for technical research and development activities.

Until very recently when such agencies as the Environmental Protection Agency and the Bureau of Mines of the Department of the Interior began resarch efforts in the resource recovery field, there was little attention devoted to the technology for recycling. The current Federal efforts directed toward recycling are still minimal and there is an urgent need for directing more Federal research to specific economic and technologically oriented programs designed to improve the opportunities for marketing more recyclable solid waste into a wider range of products.

We also feel that the private sector, which has had 2 years of technological expertise in the recycling, and which must ultimately carry the burden of recycling, should receive some direct attention to its research needs. At a time when much of the recycling industry is undergoing economic and regulatory difficulties, it simply cannot find the massive sums necessary to provide new and innovative ways to produce and utilize recycled materials.

If such assistance cannot immediately be provided, we hope that Congress can at least explore new ways in which the private sector can work more closely with the public sector in solving these important research and development problems.

In summary, we find that far from having any specific incentive or broadbased encouragement for the expansion of recycling, the Nation has condoned economic policies which amount to a disincentive factor and which restrain recycled materials from fulfilling their potential as an economic, conservation and environmental force. As exhibit C clearly indicates, there are millions of additional tons of recyclable material available. They must be part of our plans in relating this country's total raw material resources to the production requirements of an expanding national future.

Madam Chairman, there is a pressing need for bold and imaginative policies. It is a time calling for creativity. We are at a point in our history demanding the objective and constructive reorientation of our policies. No nation which uses half of the world's material resources can afford the luxury of status quo policies which create economic barriers and obstacles to recycling. They certainly cannot be

condoned on the basis of sound economic, nor can they be accepted in the light of our conservation and environmental goals.

We ask that the Congress initiate the kind of imaginative and contemporary economic and fiscal policies that will attack the solid waste pile through expanded recycled materials utilization . . . that will discourage needless depletion of natural resources by giving equal opportunity to recycled resources . . . that will encourage not only domestic use of recycled materials, but open new horizons for exporting surplus materials.

We respectfully urge that this committee now initiate the Federal leadership toward the development of new policies that will directly attack the economic roadblocks and the market imbalances that prevent recycling from expanding. Without such new policies, there will be no increased utilization of solid waste; instead there will only be increased volumes of solid waste. Without such new policies, there will be no increased recycling at the very time our natural resources face a grave and questionable fate because of unprecedented production demands. Without such new policies, there will be no expanded availability of economical and qualitatively sound recycled materials—at the very time we face severe cost pressures in producing consumer products and remaining competitive in the international marketplace.

The problem is this basic: recycling will grow only where it is economically viable. We ask the Congress to provide the recycling industries with the economic opportunity which will enable us to accomplish the President's objective of "reversing the trend," will enable us to go beyond the present limitations of industrial utilization of recycling materials, will enable us to fulfill a new promise and a new potential for our great nation.

Thank you.

(The prepared statement of Mr. Mighdoll follows:)

PREPARED STATEMENT OF M. J. MIGHDOLL

My name is M. J. Mighdoll and I am Executive Vice President of the National Association of Secondary Material Industries (NASMI) which has its main offices in New York City.

Before proceeding with our statement regarding the "Economics of Recycling Waste Materials", I want to thank and congratulate the Joint Economic Committee, particularly its Chairman, Senator Proxmire, and the Chairman of the Fiscal Policy Subcommittee, Representative Griffiths, and the Committee staff for setting aside time in the course of your crowded agendas to consider this vitally important subject.

As the Committee's hearing announcement of November 1, 1971, stated, the Congress and our Nation as a whole have recently become gravely concerned about (1) the crucial environmental problems created throughout the United States by the ever increasing "mountains of solid waste", (2) the simultaneous drains on and evaporation of our precious natural resources, and (3) the necessity for a vast national recycling and resource recovery effort aimed at solving both of the last mentioned critical problems without further delay.

Our Association, NASMI, and its member companies, have been vitally occupied with these very same problems for more than 50 years. Unfortunately, until just a very short time ago, we have had to work almost alone in our efforts. Seemingly, federal, state and local governments were totally oblivious to the ever-increasing dangers involved. Indeed, their economic policies and programs actually seemed to be aimed at making our task constantly more difficult.

Accordingly, we know from actual and hard experience that if the problems of recycling and resource recovery are to be dealt with effectively, full consideration must be given *now* to changing these adverse economic policies and pro-

grams; and the economic roadblocks blindly established by federal, state and local governments must be removed at once. Clearly, the Federal Government must take the lead. In some areas, as our statement will indicate, certain of the more enlightened local agencies are already far ahead of the Federal Government. But, sporadic economic solutions are not enough. Only through the adoption of comprehensive national fiscal policies and programs such as those under discussion here today will we live to see a reversal of the present disastrous trend.

THE NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES—ITS MEMBER COMPANIES AND THEIR ROLE IN RECYCLING AND RESOURCE RECOVERY

By way of introduction, please permit me to say a word about our Association, NASMI, and the industry it represents. NASMI, now in its 58th year, is the leading trade association in the recycling industry. It represents 700 companies throughout the United States all of which share one common economic purpose and interest: the recycling of solid wastes into new raw materials and products.

Our members are the prime recyclers of metals, paper, textiles, rubber, plastics and other materials. In non-ferrous metals, for example, our membership includes firms which collect scrap metals from solid waste; firms which recover, process, refine and convert the scrap metals into new raw materials; and finally, manufacturers who purchase these recycled metals for utilization in their products here in the United States and for export overseas.

Similarly, in the paper industry, NASMI's membership includes all segments of paper recycling. Some of our members collect paper solid wastes from various sources. Others sort, grade and process the waste paper into new raw materials for paper manufacturers; while finally, NASMI's membership includes the consumers (paper mills) and exporters of these recycled materials.

The recycling activities of these companies are in no sense new. Many of the members of our industry date back to the last century, and in war and other national emergencies, they have contributed an essential service, to wit, the supply of recycled materials whose virgin counterparts had become critically scarce. From the standpoint of size, our industry members are a heterogeneous mix. They range from small, individual-type businesses to large corporations employing hundreds of workers in multi-plant operations. However, the foundation of our recycling industry is the small, local business concerns which take the first crucial recycling steps—the collection and processing of various solid wastes so that these discarded commodities may be converted into new raw materials for use in the manufactured products of the American economy. In this connection, I direct the Committee's attention to Exhibit A to my statement which contains a *Profile of Companies in the Recycling Industry*. It shows (a) that the average plant and equipment investment for companies in our industry is presently approximately $1,500,000, (b) that the average company employs 71 employees, and (c) that the average company had gross sales in 1969 of only about $7.5 million.

STATE OF THE INDUSTRY'S RECYCLING ART

As an industry, however, recycling concerns presently process over 3,000,000 tons of non-ferrous scrap metals each year, including 1,500,000 tons of copper and brass scrap, 700,000 tons of lead scrap, 700,000 tons of aluminum scrap, 225,000 tons of zinc scrap, and 25,000 tons of nickel base scrap, not to mention large quantities of ferrous metals (iron and steel). In addition, scrap dealers and brokers handle substantial scrap metal which enters our international export trade. The export of non-ferrous scrap metal alone in 1964 amounted to about 225,000 tons with a dollar value of approximately $100,000,000.

The paper recycling segment of the industry recovers over 11,000,000 tons of paper solid wastes, which are then processed and reused by the nation's paper, paperboard and building material mills.

It is obvious that, as a result of these major recycling efforts, very significant quantities of our country's discarded solid waste materials are already being reutilized, but of equal importance is the fact that those recycled materials are conserving and replacing equally substantial quantities of our dwindling virgin natural resources. This, we submit, is "Conservation In Action"—and the results are truly fantastic. For example—

(1) approximately 45% of our country's total available copper is now recovered from scrap produced by the recycling industry;

(2) about 30% of all aluminum, 18% of of all zinc, and more than 50% of the total domestic lead supplies are derived from scrap; and

(3) almost 25% of the raw material supply of the paperboard segment of the paper industry is obtained from recycled paper wastes.

What does this mean to our Nation in terms of conservation? Even with the existing economic impediments to recycling, the answer is startling. Today's meager recycling of only 11,000,000 tons of paper stock each year (20% of the Nation's *total* paper raw material needs) actually results in the conservation or saving of 200,000,000 trees annually.

And, without fear of contraction, NASMI believes that if Congress would remove the debilitating economic roadblocks under discussion here, the paper industry would soon increase its utilization of recycled paper stock from the present 20% to at least 50% of their raw material furnish and would thus increase the annual conservation of trees from 200,000,000 a year to 500,000,000.[1]

By way of further explanation, I direct the Committee's attention to the various charts attached to this Statement as Exhibit B. The first chart deals with the "Recycling of Nonferrous Scrap Metals"; the second with what these recycled metals contribute to our total national metal supplies; the third with "Paper Stock: A Vital Recycled Resource"; and the last with the "Conservation in Action" role played and to be played in the future by recycled paper wastes. (See also Exhibit C).

Before we move on from this brief discussion of the persent "state of the recycling art" here in the United States, we would like to add these comments regarding the high quality of recycled materials. In the metals industry, the recovery of copper, lead, zinc, aluminum, etc., from post-consumer solid wastes and industrial wastes is often referred to as "mining above the ground". In other words, the metals obtained from recycled solid wastes are usually equal in quality to their virgin counterparts in copper, lead, zinc, aluminum, etc. and they are used by American metal manufacturers in essentially the same manner as the virgin materials.

In the paper industry, the facts are substantially the same. On August 3, 1971, and officer of the Garden State Paper Co., Inc. appeared before the Senate Rules and Administration Committee, which was conducting hearings on legislation that would require the public printer to furnish recycled paper products for the official use of the Senate and House of Representatives and which would require the use of recycled paper in the printing of the Congressional Record, and he testified that newsprint manufactured from 100% old, deinked newspapers "ranks well above the national and regional averages (for virgin newsprint) in printability, opacity and tearing strength, the latter being recognized by the newspaper industry as the most critical strength property" required of newsprint.

Senator Frank E. Moss, who introduced the aforementioned bills, also testified before the Senate Rules Committee and stated, at page 9 of the hearing record:

"Already, over 200 newspapers use recycled paper for part of their production, and these include many of the large and prestigious papers in the country: the Baltimore Sun, the Washington Post, the Philadelphia Inquirer, the Boston Globe, the Boston Herald Traveler, the Chicago Sun-Times, the Chicago Daily News, the Louisville Courier-Journal, the New York Post, the New York Daily News, the San Francisco Examiner, the Oakland Tribune, Newsday and the Gannett chain. Tests by the American Newspaper Publishers Association Research Institute, a respected independent laboratory, show that recycled newsprint has better printability and printing opacity and greater tear strength than the average virgin newsprint manufactured in the Northeast; not only that, recycled newsprint is cheaper. There is no reason why at least part of the Congressional Record could not be printed on recycled paper."

Recycled paper containing a minimum of 25% post-consumer solid waste materials is now absolutely required by New York City and many other leading local and State government agencies in their procurement of stationery and other paper products. In the private sector, corporations such as American Telephone & Telegraph, Bank of America, Canada Dry, Coca Cola and scores of others are now printing their annual reports and intra-corporate reports on recycled paper,

[1] The reclamation and use of each ton of recycled paper stock spares 17 full grown trees. Every ton of recycled paper stock frees 2⅔ acres of forest land for some other productive use for 1 year.

and they are requiring the inclusion of recycled materials in their other paper procurements.

In the textile industry, recycling has been crippled and almost destroyed by government labeling requirements and economic policies and programs, but for years recycled textile fibers have been recognized as equal to or better in some cases than virgin fibers for the manufacture of certain textile products. Recycled textiles also constitute the principal raw material for industries such as the industrial wiping cloth manufacturers.

Perhaps the only effective way to make it absolutely clear that, even in today's restricted, impeded state of the recycling art, recycled materials are unquestionably high quality products capable of the same usages as virgin materials, is to introduce into the record at this point with the Committee's permission, specimens of only some of the recycled products presently available and marketed here in the United States and overseas on a broad scale. (Specimens described and introduced.)

THE MOUNTING SOLID WASTE PROBLEM—ITS ECONOMICS AND THE URGENT NEED FOR CRASH PROGRAMS IN RECYCLING

While the recycling industry has been recovering 3,000,000 tons of non-ferrous scrap metals each year and 11,000,000 tons of paper solid wastes, the President's Council on Environmental Quality reported to Congress in August 1970 that total solid wastes have been piling up here in the United States at the alarming rate of 4.3 billion tons a year, including agricultural wastes.

Industrial solid wastes alone account for 110 million tons of generated waste, of which more than 15 million tons are scrap metal; 30 million tons are paper and paper product wastes; while the balance consists of waste plastics, bales of rags and other textiles and assorted wastes. These solid wastes are expected to double by 1980.

In addition, in 1969, Americans threw away more than 250 million tons of *residential, commercial and institutional solid wastes. Collected solid waste alone* in this category included 30 million tons of paper and paper products; 60 billion cans; 30 billion bottles; 4 million tons of plastics; 100 million tires; and millions of discarded automobiles and major appliances. Again, these wastes are expected to double by 1980.

Only about 190 million tons of this last mentioned *residential-commercial* type of solid waste was actually collected by public agencies and private refuse firms. The remainder was abandoned, dumped, disposed of at the point of origin, or hauled away by the waste-producer to a disposal site. About $3.5 billion was spent in 1969 handling the 190 million tons of *collected solid wastes* alone—an average of $18 per ton. Collected accounted for 80% of the cost ($14 per ton), disposal the rest. And, in its 1970 Environmental Report to Congress, the President's Council stated:

"A considerably higher rate of spending would be needed to upgrade existing systems to acceptable levels of operation."

In truth and in fact, 94% of existing open dumping systems were found to be inadequate, and 75% of municipal incinerators were not only inadequate—they were among the worst air pollution offenders. And indeed, while collection costs nationally were $18 a ton, by 1971, they had risen to $36 a ton in my hometown, New York City.

While these unmanageable "mountains of solid waste" continued to accumulate and grow, the Federal Government finally awakened to the fact that we are simultaneously putting an impossible strain on our natural resources. In its 1970 Environmental Report, President Nixon's Council on the Environment stated:

"Population growth threatens the Nation's store of natural resources. Currently, the United States with about 6% of the world's population, uses more than 40% of the world's scarce or nonreplaceable resources and a like ratio of its energy output. Assuming a fixed or nearly fixed resource base, continued population growth embodies profound implications for the United States and for the world."

The Council on Environmental Quality accordingly advised the Congress in 1970 that the Federal Government simply had to attack these two crucial problems head-on, at once and without delay—that is (1) it had to reduce the mounting solid waste volume and (2) it had to pursue every possible means to

encourage and increase the reuse and recycling of our precious natural resources—metals, trees and the like. But, most importantly, with reference to the very vital problems before this Committee today, the Council's Report stated, at pages 114, 121:

"In his February 10 Message on the Environment, the President announced the Federal Government's goal to reduce solid waste volume and encourage reuse and recycling. *Recycling waste materials into the economy has not been widely applied in the United States. Economic considerations and the abundance of virgin resources have forestalled the development of recycling technology and markets. Primary materials producers, often with the help of tax concessions, have developed remarkably efficient technologies for removing metals and other substances from their virgin state. But meanwhile, techniques for separating and recovering waste materials remain primative and expensive. . . .*

"*Methods must be developed to reuse a greater percentage of products and to develop new products from and new uses of solid waste. . . .*

"The Council is working with a number of Federal agencies to develop *a recycle strategy* and is studying a variety of special disposal problems. Industry, private research organizations, and all levels of government must be enlisted to maximize the recycling of solid wastes."

In its 1971 Report to the Congress, the President's Council on the Environment was even more specific regarding these bars against recycling and the need for immediate action to reverse the trends of recent years. In this regard, the President's Council stated, at page 228 of its 1971 Report:

"We now have the technology to recycle much of the material that is treated as waste and thereby return it to useful purposes. *However, market and other incentives in recent years have tended to work against recycling. As a result we reuse less and less as population, per capita consumption, and changes in production processes add increasingly more and more to the amount of material which must be disposed.* Figure 7 indicates the steadily decreasing reliance on recycled materials in the manufacture of paper.[2] The trends in many other major industries are similar. The use of scrap in making aluminum, copper, zinc, and lead increased between 1963 and 1965, reached 40.9% of material used in 1965, and then declined to 38.6% in 1967, the last year analyzed. Retreaded tires used as a percentage of total tire consumption declined from 27.3% in 1958 to 18.5% in 1969."

In late 1970, Congress, of course, responded and passed the Resource Recovery Act (P.L. 91–512). In Senate Report 91–1034 submitted in support of the Act by Senator Muskie and his subcommittee, it is stated at pages 1, 2:

"This Nation has always enjoyed resource abundance and has acted as though that abundance would last forever. Studies prepared for the Senate Committee on Public Works, testimony before the Subcommittee on Air and Water Pollution, and information generally available suggest that anticipation of of continued resource abundance is not only unwise—it is folly. . . .

"So the Nation has no choice. Consumption increases at a greater rate than population growth. Exhaustion of the Nation's resource base in a very real possibility. Already some industries see recycled waste as a more economic source of materials than primary sources. . . .

"This legislation is therefore designed to develop systems which will change the present method of dealing with solid waste problems. . . . The intent of this bill is to stimulate the development of resource recovery methods which will provide for more economic use of wastes."

The 1970 Act did not attempt to legislate definitively to remove the roadblocks to expanded recycling or to provide effective incentives to promote recycling. Instead, at Section 205 of the Act, it directed the Environmental Protection Agency to carry out an investigation and study to determine—

(1) what new means might be employed to recover materials from solid waste;

(2) what new uses and markets might be developed for recovered resources; and

(3) what new, improved methods of collection and separation might be utilized to encourage recycling.

Finally, with direct pertinence to the economic problems under discussion here today, the Resource Recovery Act of 1970 went on to instruct the Environmental Protection Agency to determine—

---

[2] See graph entitled "Trends in Composition of Paper," p. 228, 1971 Report of the Council on Environmental Quality.

(i) how Federal procurement might be utilized to develop market demand for recovered resources;

(ii) how existing public policies, including subsidies and economic incentives and disincentives, percentage depletion allowances, capital gains treatment and other tax incentives and disincentives impede and restrict or unfairly discriminate against the recycling, reuse and conservation of materials;

(iii) how Congress should proceed to eliminate disincentives to recycling; and

(iv) what incentives, including Federal grants, loans, tax relief or other assistance, should be provided to accelerate the reclamation or recycling of materials from solid wastes.

FEDERAL ECONOMIC ROADBLOCKS AND DISINCENTIVES TO RECYCLING—SUGGESTIONS FOR THEIR EARLY REMOVAL

1. Federal Tax Policies

Over the years, Congress has created various tax policies designed to stimulate and encourage increased production, utilization and depletion of certain of our natural resources. In different eras, and in order to satisfy national objectives far different from those now before Congress for solution, those tax policies were devised actually to reward and benefit the gradual exhaustion of both renewable and nonrenewable virgin resources; and while accomplishing that goal, those policies simultaneously stifled and discouraged broader use of recycled materials. Depletion allowances for virgin metals; capital gains tax treatment (as opposed to higher ordinary tax rates) for profits derived from the utilization of trees in the paper industry have simply made it economically disadvantageous for many manufacturers to use recycled materials which have never enjoyed any similar favorable federal tax treatment.

While these virgin resource tax benefits have created very substantial competitive advantages for virgin materials over recycled materials in the past, it is not the purpose of the recycling industry to question the wisdom and value of those tax policies at this time. The need for affirmative recycling solutions is too urgent and too vital to our national economy and welfare to permit those solutions to be put off indefinitely by lengthy struggles involving the pros and cons of the depletion allowance etc. Rather, since the future of expanded recycling depends almost entirely on the creation of new markets for reclaimed solid wastes and upon the ability of recycled materials to compete evenly with comparable virgin materials, we urge this Committee to devise a new Resource Recovery or Recycling Tax Program which will—

(i) give manufacturers who increase their utilization of recycled materials in the future a recycling tax deduction or credit which will result in an effective tax rate for them substantially equivalent to that enjoyed by users of virgin materials; and which will

(ii) stimulate and encourage the construction of new and enlarged recycling plant facilities by allowing the recycler rapidly to amortize or write off his investments in such plants and equipment in the manner now provided in the Internal Revenue Code for air and water pollution control facilities.

I will not discuss these tax proposals in further detail at this time because when I complete my statement, I intend to ask Mr. Thomas A. Davis of Smathers & Merrigan, our tax counsel, to present a more detailed analysis.

There is one additional comment I would like to make, however. The recycling industry believes that a tax program can be devised in this area which will result in relatively little, if any, loss of revenues to the Treasury. Properly devised and administered, the type of program we envisage would cause many virgin users, who now enjoy the present virgin product tax benefits described above, to switch, in part at least, to recycled materials and thus, to that extent there would simply be a reallocation of existing tax benefits from virgin to recycled material usage. Moreover, as the recycling industry assumes more and more of the solid waste collection and disposal effort, those costs (now totaling more than $4.5 billion a year) will be shifted from government to industry.

2. Discriminatory Freight Rates

One of the most significant cost factors involved in the recovery and utilization of recycled materials is the rate paid to transport those materials on our

nation's railroads and in our steamships in the export trade. Historically, transportation rates established by the railroads and the steamship conferences have grossly and unfairly discriminated against recycled materials in favor of their virgin counterparts—and while the Department of Commerce, the Environmental Protection Agency and the President's Environmental Quality Council have urged the Interstate Commerce Commission, for example, to take effective action to eliminate this unjustifiable discrimination and to hold down the ever increasing rates charged for transporting recycled materials, nothing of any consequence has been done.

Exhibit D to this statement contains numerous examples to illustrate the inequities that presently exist in rates for shipment of materials in virgin form and in comparable recycled form.

Since the transportation cost element is such a significant proportion of the total costs involved in marketing materials or products, any inequitable or discriminatory rate has an immediate and unavoidable effect on the consumption of those materials and products. So it has been in the case of many recycled materials, which, as has been illustrated previously, must compete directly with virgin commodities. Many railroad freight rates are as much as 50% higher for the recycled material that can be used by a manufacturer instead of or in addition to comparable virgin materials. In the case of ocean freight rates subject to the jurisdiction of the Federal Maritime Commission, effective rates for virgin wood pulp which are 75% lower than those charged for recycled waste paper, have recently foreclosed export shipments of solid waste paper to Australia from the West Coast.

Many virgin commodities enjoy point-to-point rate bases, calculated on a mileage scale. Most recycled materials must move on a commodity scale of rates. The net result is a distinct ton-per-mile advantage for virgin commodities. Furthermore, most recycled materials move longer distances to their points of consumption. For instance, pulp wood is transported from forest to mill on the average of 136 miles, whereas waste paper averages a distance of 434 miles from recovery point to consumption point. Direct profit advantages to railroads as a result of these discriminatory rate practices are also illustrated in Exhibit D.

The incidence of inequities is astounding and as stated it is reflected in ocean freight rates as well as in domestic rail rates. Many recycled metal, paper and textile materials represent surpluses to our domestic needs, but they are commercially prohibited from being exported to consumers abroad by steamship lines which impose excessive rates and unrealistic shipping conditions. (See Exhibit D.)

In addition to establishing inequitable rates which directly produce a market imbalance to the disadvantage of recycled materials, many rates on low-value commodities are not established with any relevancy to the nature or value of the materials. This is significant since a large proportion of solid waste is comprised of low-value materials. We have numerous examples of recoverable and reusable materials which defy economic recycling inasmuch as the cost of collecting and transporting the material alone exceeds the potential market value of the material at the consumer delivery point.

In short, transportation rates, federal transportation policies and those of the federal regulatory agencies have not been adequately related to the recycling objectives adopted by the Federal Government as essential to the economy and environment of the nation. There is urgent need for new, effective economic policies and federal transportation programs which will at least remove the restraints these conditions directly impose on recycled materials in their struggle to compete with virgin materials. Opportunities for the creation of such new policies and programs and for the elimination of existing rate discriminations now clearly exist as the railroad and maritime industries seek more and more federal subsidies and billions of dollars of new federal support programs from the Congress.

3. Federal Procurement Policies

Section 205(a) of the Resource Recovery Act directs the Government to investigate and determine how Federal procurement programs can be utilized to develop market demand for recovered resources. The Senate Report in support of the Act specifically directed Federal agencies "not to await the results of such investigations before committing themselves to the recovered materials market, but to participate . . . by an energetic recycling purchasing policy".

The importance of a federal procurement reorientation cannot be overstated. The Federal Government for years has been one of the largest sellers of solid waste materials to the recycling industry. Yet, Federal procurement policies and specifications have flatly discriminated against products utilizing recycled materials in favor of those manufactured with virgin materials, and, of course, the Government is the largest single user of all materials in this country.

In February, President Nixon added his voice to the Resource Recovery Act. He stated in his Message on the Environment that there was a need to "reverse the trend" relative to the procurement of recycled materials. He ordered the General Services Administration to revise its standards and specifications so as to remove any biases or restraints against the procurement of products made with recycled materials and to install incentives which would accelerate the expansion of markets for these materials. Unfortunately, progress in this program has been impossibly slow. Although nine months have passed since the Presidential announcement, GSA only recently developed effective terminology for its procurement specifications which requires the procurement of products containing only a minute percentage of post-consumer solid wastes.

In the meantime, other branches of Government have moved at an even slower pace, and we must be candid in expressing our opinion that there has been no effective action to parallel the pronounced policy objectivs of the Resource Recovery Act. As a result, several Congressional bills have been introduced in an attempt to implore agencies of Government to initiate progressive and imaginative programs capable of using the Federal procurement arm as a means of providing national leadership to recycled materials, but so far without result. Indeed, the bills I referred to earlier which are pending before the Senate Rules Committee have never been acted upon by that Committee and there are signs that even the Joint Committee on Printing is not fully prepared to implement the Congressional purposes contained in the Resource Recovery Act.

LEGISLATIVE AND OTHER FEDERAL IMPEDIMENTS TO RECYCLING

Sometimes the recycling industry has had to fight a losing battle against obsolete Federal policies in order to recycle even minimal quantities of solid waste. Three vitally important Federal impediments to recycling are Textile Labeling Legislation, the over-regulation of the Wiping Cloth Industry, and foreign aid policies of the United States Government which have mitigated against the purchase of domestically produced recycled materials.

The Federal Government, with The Wool Products Labeling Act of 1939, struck the single greatest blow ever against the textile recyclers in this country—a blow which has virtually destroyed a once thriving industry. This legislation, which was urged on the Congress by the virgin wool industry, required that any recycled fibers be stigmatized with the label "reused" or "reprocessed". This labeling practice guaranteed consumer rejection of products containing recycled fibers. "Virgin" products were assumed to be better products while in actuality products made with recycled materials were of the finest quality and gave American consumers virtually the same products at lower costs.

In the last thirty years this country has seen the collapse of the New England economic community with the closing of almost all of the mills that bought woolens and cleaned, garnetted, respun, and rewove them for use in new clothing and other textile products. We simply must prevent further destruction of the textile recycling industry. Before the Wool Products Labeling Act, textile recyclers made up the largest segment of NASMI members. Today, they are steadily going out of business and constitute the smallest segment of our industry. Many mills are recycling only half as many textile products as they were just 5 years ago. Although some 5,000 tons of discarded textile wastes are recycled each week, some 1.2 million tons are generated as solid waste each year—a virtually hopeless battle.

We, therefore, urge the Congress to immediately study this matter. We realize that it is important to adequately inform and protect the textile consumer. But we believe that labeling of textile products must be carried out without unfairly stigmatizing the recycling industry.

One of the last surviving segments of the textile recycling industry is the wiping cloth industry. This small, but vitally important segment of the recycling industry collects and purchases some four million pounds of discarded textiles each week. These textiles are then washed, sterilized, stripped of buttons and other abrasives and cut into wiping cloths of various sizes and shapes.

Then, these cloths are packaged in cartons ranging in weight from approximately 5 pounds to 50 pounds, or in bales varying from approximately 25 to as high as 1,000 or more pounds. Historically, for more than 70 years, the industry's sale of wiping cloths has been on a gross weight basis, with a certain stated maximum percentage of tare. Now, a bureau of the Commerce Department unilaterally seeks to destroy this totally accepted industrial practice by forcing the industry to adopt a net weight system.

The penalty of adopting such a system would surely be the ultimate demise of one of the last remaining segments of the textile recycling industry. Even now, textile recyclers are going out of business because of prohibitive costs and dwindling markets. The exorbitant expense of restructuring the processing and weighing of recycled textiles and additional labor and equipment required, would simply destroy this industry.

We urge the Congress to eliminate such unnecessary regulations which benefit no one and threaten to destroy recycling.

Unfortunately, the many foreign aid and grant programs which the Federal Government has established have often had an adverse effect on stimulating domestic recycling. First, these aid programs have built up the underdeveloped world to such a point that many foreign markets which have historically purchased recycled raw materials have been virtually eliminated. Second, with the increased emphasis on multilateral aid rather than unilateral assistance, United States dollars are not being used to purchase United States products. Although we are not advocating that the clock be turned back to a time when the United States tied many of its aid programs to a strictly "buy American" policy, we feel that the Congress should study the export and foreign aid policies of our Government to determine what can be done to provide greater markets overseas for recycled products. With progress in this area we could help eliminate our balance of payments deficit and at the same time encourage recycling and solid waste disposal.

RECYCLING RESEARCH AND DEVELOPMENT

Under the Resource Recovery Act of 1970, appropriations ranging from $35 million in 1971 to $75 million in 1974 were authorized for research and development in recycling. Some of these funds went to on-going research programs in the Environmental Protection Agency while the remainder went to States, local agencies, and others.

The Senate Report on this legislation, however, stresses that the private sector has its research problems as well:

"Solutions to the solid wastes problems facing this Nation require application of the knowledge and expertise of people from both the public and private sector. *The Committee does not believe that capabilities of the private sector have been adequately utilized.*

Because the Resource Recovery Act specifically provides in Section 205 that no grants may be made to "profit making organizations" private industry research and development on the important question of recycling receives no assistance at all from the Federal Government. While we certainly appreciate some of the reasons behind this policy, we feel that the private sector, which has had years of technological expertise in recycling, and which must ultimately carry the burden of recycling, should receive some attention to its research needs. At a time when much of the recycling industry is undergoing economic and regulatory strangulation it simply cannot find the massive sums necessary to provide new and innovative ways of producing and utilizing recycled materials.

If such assistance cannot immediately be provided, we hope that the Congress can explore new ways the private sector can work more closely with the public sector in solving these important research and development problems which are common to both.

MUNICIPAL AND STATE IMPEDIMENTS TO RECYCLING

Often when municipal and state governments seek to cope with their solid waste problems, they foster discriminatory policies and take regulatory actions which impede recycling. Many municipal and state governments still enforce antiquated licensing, zoning, record-keeping and other discriminatory policies which adversely affect the recycling industry. Some companies processing or utilizing recycled material do not enjoy the same zoning privileges as do other

industrial companies. Many cities and states license and tax recycling companies on a different basis than other raw material and manufacturing companies. One state during this past year sought to bring the recycling industry under the domination of public utility laws as it sought to "do something" about the solid waste problem.

These discriminatory policies directly affect recycling. They add additional cost burdens to many companies and, in other cases, actually bring about the dislocation of entire business activities. A study our Association recently conducted vividly indicated that recycling plants had been forced out of the very municipalities that were seeking to encourage recycling.

We clearly need constructive Federal policies in this area to provide reasonable and uniform standards to municipalities and states so that they may truly encourage, not discourage recycling.

CONCLUSION

Madam Chairman, there is a pressing need for your Committee to adopt bold and imaginative economic policies. It is time for creativity. We are at a point in our history which demands re-orientation of our natural resource policies toward recycling. No nation which uses half of the world's material resources can afford the luxury of policies which create economic barriers and obstacles to recycling. These barriers cannot be condoned on the basis of sound economics, nor can they be accepted in the light of our national conservation and environmental goals.

Those of us who are truly concerned with the welfare of our country—and I am pleased to note that the list grows longer each day with those from Government, industrial, and public sectors of our society—ask that the Congress initiate the kind of imaginative and contemporary economic policies that will attack the solid waste pile through expanded recycling . . . that will discourage needless depletion of natural resources by giving equal opportunity to recycled resources . . . that will encourage not only the domestic use of recycled materials, but open new opportunities for exporting surplus materials.

The problem is this basic: recycling will grow only where it is made economically viable. Without new Congressional policies, who will collect the tens of millions of tons of solid waste . . . transport it to recovery plants . . . process it into the necessary grades and specifications required of raw materials . . . market it to the proper industrial channels . . . refine, convert and manufacture it into new end-products?

Therefore, we are here today to ask the Congress to provide the recycling industries with the economic opportunity to accomplish our National objective of "reversing the trend"—Now.

EXHIBIT A

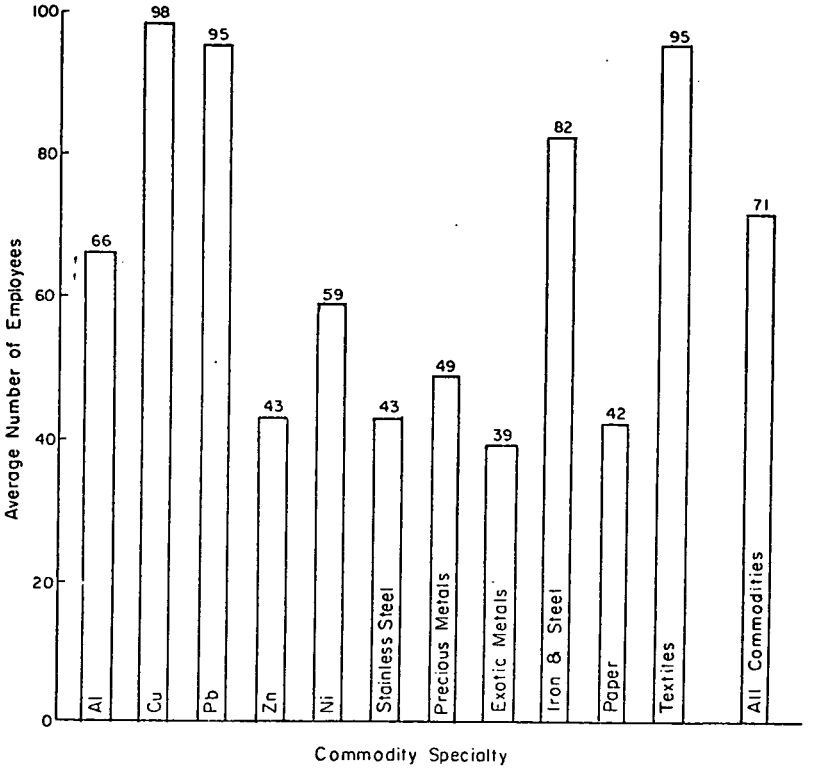
PROFILE OF COMPANIES IN THE SECONDARY MATERIAL INDUSTRIES

Business specialty	Average investment in plant and equipment	Average number of employees
Overall company average, all commodities	$1,480,000	71
Nonferrous scrap metal processor	844,000	44
Paper stock processor	783,000	43
Textile processor	695,000	97
Recycled metals utilizers (smelters, refiners, ingot makers, etc.)	3,134,000	91

PROFILE OF THE SECONDARY MATERIALS INDUSTRY—PERCENTAGE DISTRIBUTION OF RECYCLING INDUSTRY COMPANIES BY SIZE CLASS IN TERMS OF 1969 SALES
(OVERALL AVERAGE, $7,540,000)

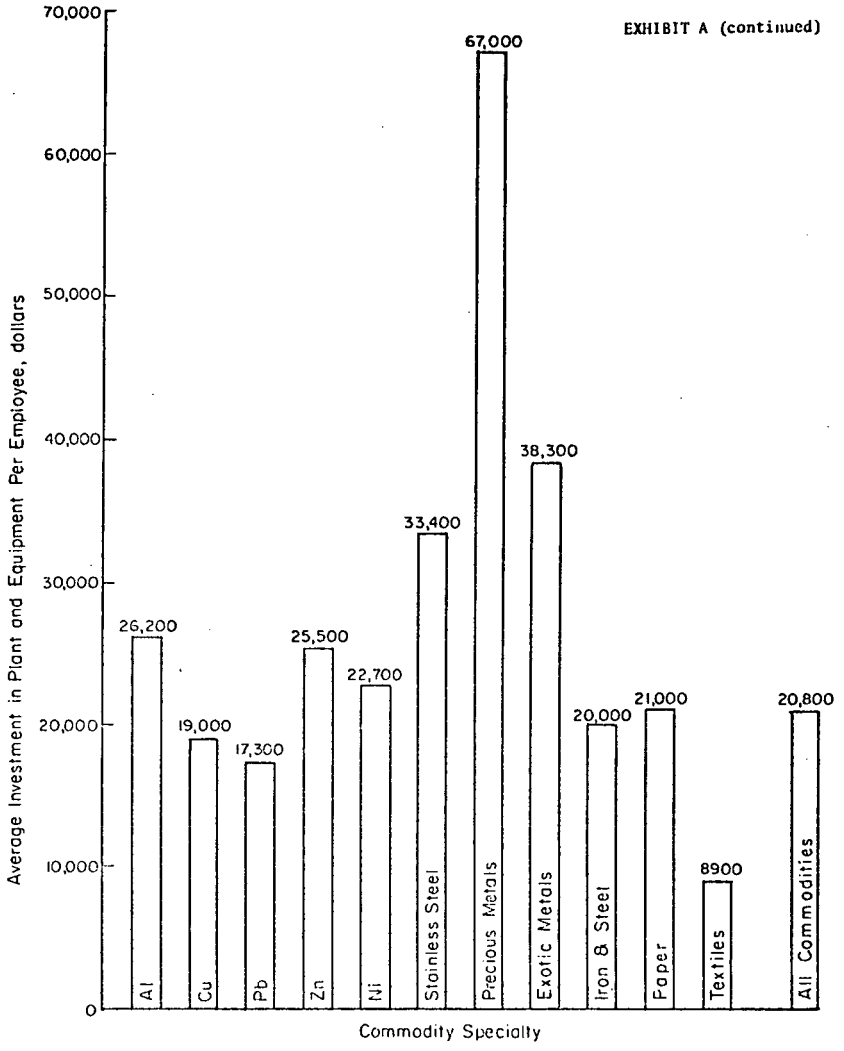
Type of operation	Total 1969 gross sales (million dollars)									
	Total	Under $1	$1 to $3	$3 to $5	$5 to $8	$8 to $12	$12 to $20	$20 to $30	$30 to $50	Over $50
All commodities	100	14.3	31.2	16.8	11.7	9.1	7.1	2.9	4.3	2.5
Nonferrous scrap D–P	100	18.6	28.7	19.9	12.9	5.7	7.9	1.9	2.8	1.6
Nonferrous metal broker	100	14.2	20.6	21.9	12.3	11.6	11.0	3.2	3.2	1.9
Smelter and refiner	100	10.5	22.8	16.7	14.9	5.3	11.4	4.4	7.9	6.1
Ingot maker	100	7.1	19.0	11.9	19.0	14.3	11.9	4.8	9.5	2.4
Brass mill	100	10.7	25.0	17.9	7.1	7.1	17.9	0	7.1	7.1
Scrap iron P. & B	100	16.1	30.3	20.6	12.9	7.7	4.5	1.9	3.2	2.6
Sweater	100	11.8	29.4	23.5	9.8	9.8	5.9	5.9	3.9	0
Importer and exporter	100	9.4	21.9	22.9	11.5	16.7	9.4	3.1	4.2	1.0
Paper stock D–P	100	29.3	43.9	9.8	6.1	6.1	2.4	0	2.4	0
Paper stock broker	100	21.3	42.7	12.0	12.0	8.0	2.7	0	1.3	0
Textile D–P	100	12.8	57.4	12.8	10.6	6.4	0	0	0	0
Textile broker	100	17.4	47.8	17.4	13.0	4.3	0	0	0	0
Textile garnetter	100	0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Other function	100	20.0	33.3	20.0	8.9	11.1	2.2	2.2	2.2	0

EXHIBIT A (continued)



AVERAGE NUMBER OF EMPLOYEES OF RECYCLING COMPANIES, BY COMMODITY

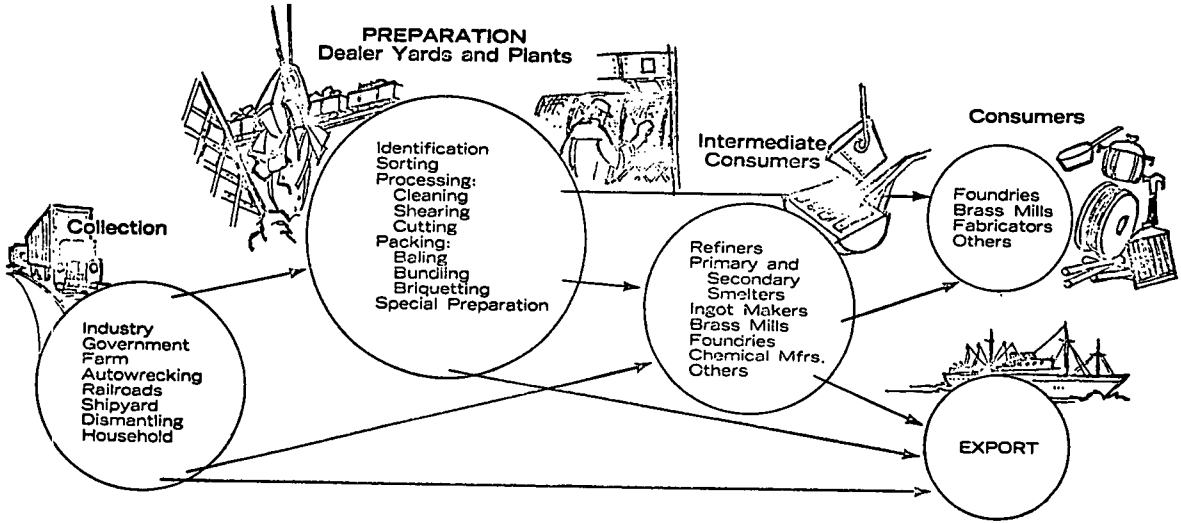
EXHIBIT A (continued)



AVERAGE INVESTMENT PER EMPLOYEE BY RECYCLING COMPANIES, BY COMMODITY

EXHIBIT B

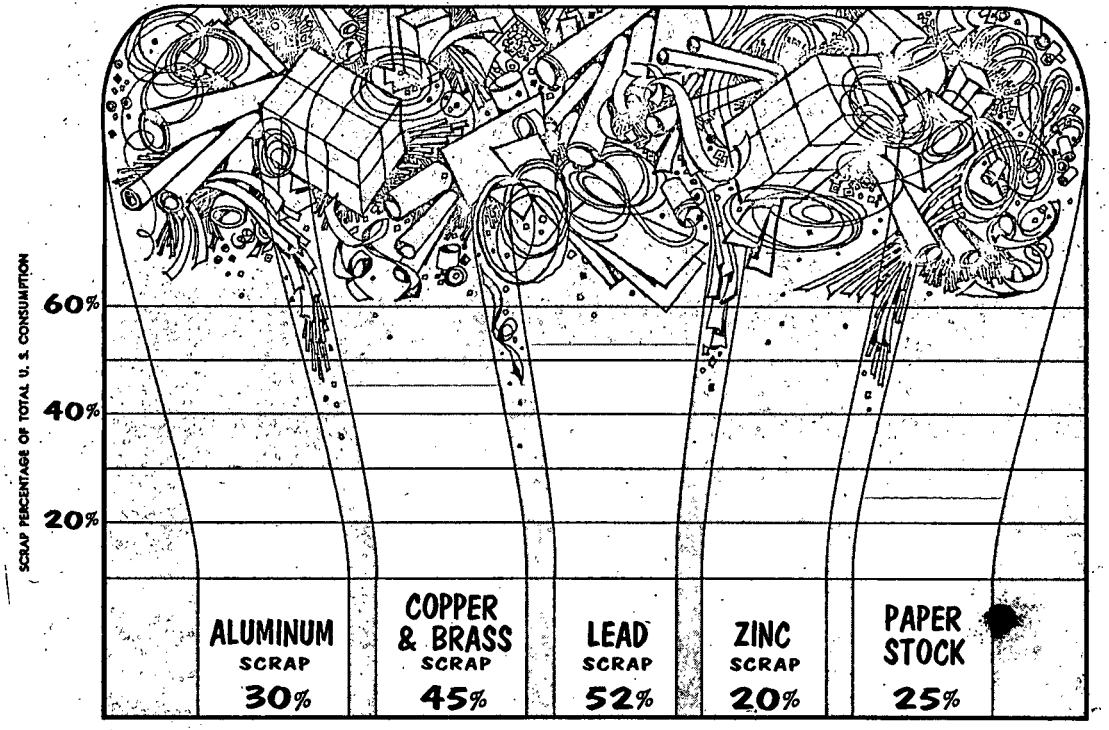
RECYCLING NONFERROUS SCRAP METALS



The recycling of metals conserves natural resources and eliminates mounting piles of solid waste

NASMI "RECYCLING RESOURCES"

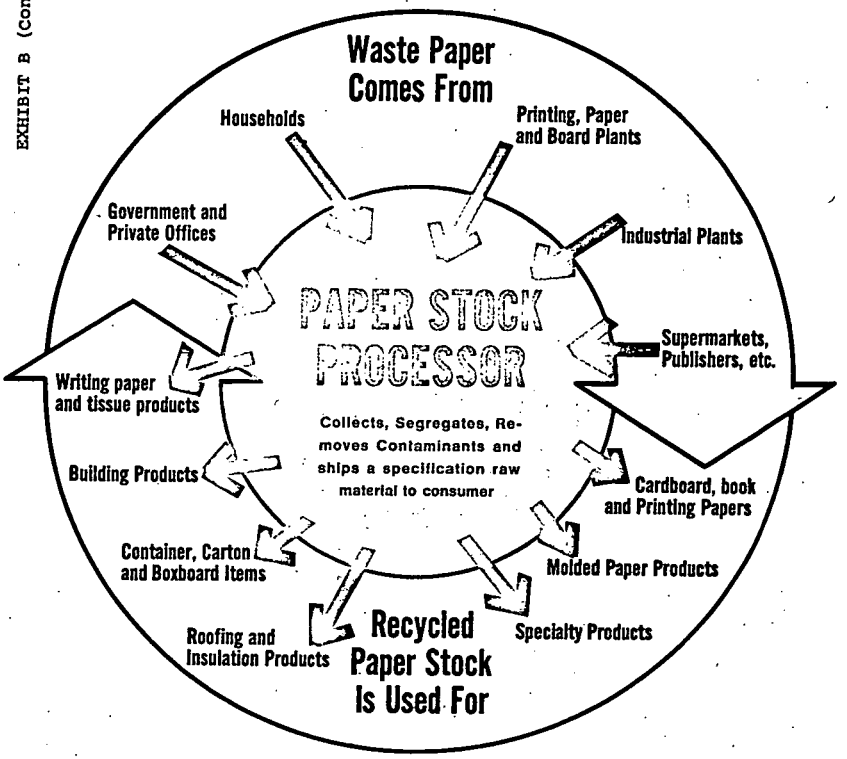
Secondary Production Accounts for a Major Portion of Raw Material Supply



NASMI "RECYCLING RESOURCES"
Page 2

EXHIBIT B (Continued)

PAPER STOCK: A VITAL RECYCLED RESOURCE

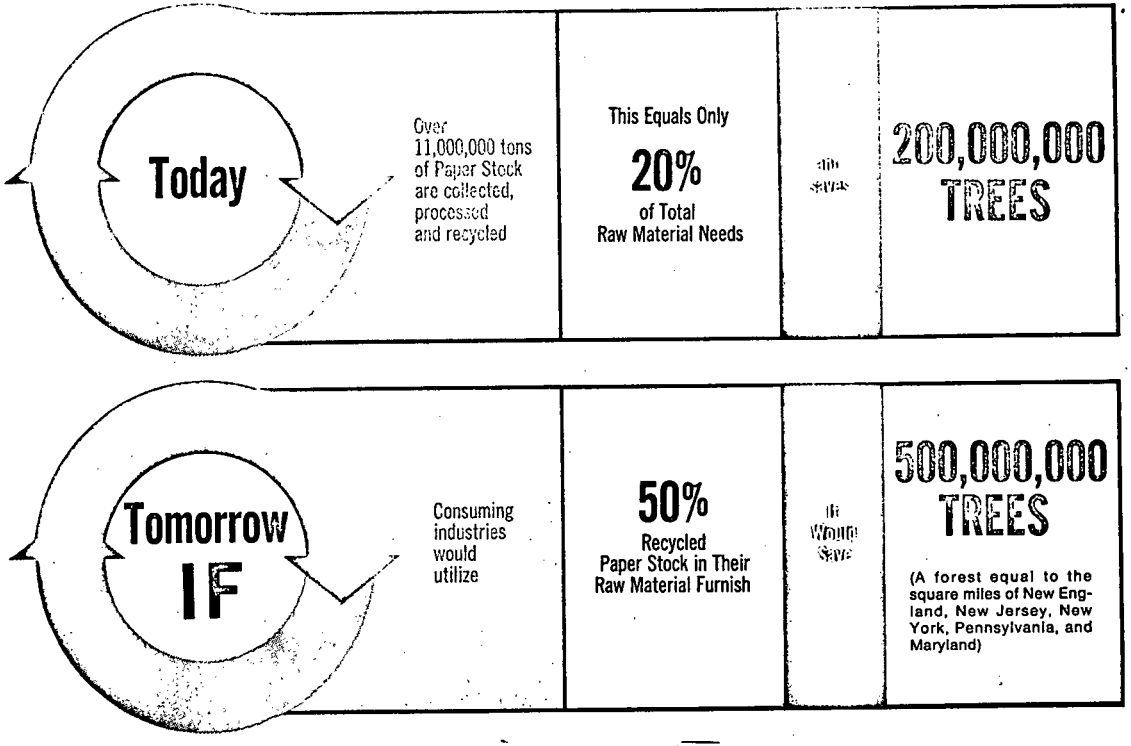


Each year Paper Stock – Recycled Material – Accounts for the equivalent of 200,000,000 trees

Recycling Paper Stock: The Nation's answer to Environmental Management and Conservation of Natural Resources

NASMI "RECYCLING RESOURCES"

PAPER STOCK: SOLID WASTE RECYCLING – CONSERVATION IN ACTION



Recycling Resources: America's answer to the Solid Waste Problem through UTILIZATION of our secondary materials – It all depends on creating Bigger Markets for Recyclable Materials.

EXHIBIT C

PROPORTION OF RECOVERABLE MATERIAL RESOURCES CURRENTLY BEING RECYCLED [1]

Material	Short tons available for recycling	Short tons recycled	Percent recycled
Aluminum	2,215,000	1,056,000	48
Copper	2,456,000	1,489,000	61
Lead	1,406,000	585,000	42
Zinc	1,271,000	182,000	14
Nickel	106,000	42,100	40
Steel	141,000,000	36,700,000	26
Stainless steel	429,000	378,000	88
Precious metals (troy ounces)	105,000,000	79,000,000	75
Paper	46,800,000	11,400,000	19
Textiles	4,700,000	800,000	17

[1] Based on statistics and estimates provided to NASMI by Battelle Memorial Institute for Environmental Protection Agency Study.

RAIL FREIGHT RATE COMPARISON, PULPWOOD VERSUS PAPER WASTE

[Rate: In cents per hundred pounds]

Territory	Miles	Pulpwood: Rate, M/W 23 cords or 103,500	Pulpwood: Revenue per car	Paper waste: Rate, M/W 80,000	Paper waste: Revenue per car
Eastern	95	14	$144.38	28	$224
	225	20¼	209.99	40	320
	298	24½	254.84	43	344
		M/W 21 cords or 105,000 [1]		M/W 80,000	
Southern	100	9.8	$102.90	18	$144
	168	12.0	126.00	22	176
	205	13.9	145.95	27	216
		M/W 55,000		M/W 50,000	
Western	150	16.8	$100.80	37	$185
	300	24.5	142.00	50	250
	500	31.3	172.15	63	315

Source: Item 6287–2, Supp. 262, Tarriff T/C 754; item 75660, Tarriff TL–TCRTB–E–2009–H; item 75660, Tarriff SFTB No. S–2011L; Item 3920, Tarriff W–2000J; Item 2005 SFA 777; WTL pulpwood scale.
[1] Cars move in multiples of 10.

OCEAN FREIGHT RATE COMPARISON, WOODPULP VERSUS PAPER WASTE

[Rates expressed in dollars per long ton]

	Paper waste	Woodpulp
TO JAPANESE PORTS		
From:		
Pacific Coast:		
Under 50′ S/T	32.00	[1] 19.00
75′ to 90′ S/T	37.75	23.00
Atlantic Coast:		
Under 60 cft	44.85	[1] 25.25
Over 75 cft	53.75	
TO NORTHERN EUROPEAN PORTS		
From: Atlantic Coast:		
Up to 50 cft	40.43	31.90
TO AUSTRALIAN AND NEW ZEALAND PORTS		
From: Pacific Coast:		
Prior to June 1, 1971	[2] 52.00	[3] 38.00
After June 1, 1971	[4]	[5]

[1] Open rate—rate negotiated with individual line.
[2] Per long ton; with excess cube penalty.
[3] No excess penalty.
[4] Penalty cube excess increased.
[5] No increase.

Source: Pacific Westbound Conference Tariff circular No. 75, Item 2188, Item 2230 and 2231. Far East Conference Tariff No. 25, FMC No. 5, North Atlantic Continental Freight Conference No. 28 FMC–3, PCAT B, Tariff No. 15 FMC No. 4.

COMPARISON OF RAIL FREIGHT RATES FOR NONFERROUS ORES AND NONFERROUS SCRAP

[Rates expressed in dollars per ton]

	Copper				Zinc			
	Ores and concentrates		Scrap		Ores and concentrates		Scrap	
	Rate M/W 110,000	Revenue per car	Rate M/W 100,000	Revenue per car	Rate M/W 100,000	Revenue per car	Rate M/W 60,000	Revenue per car
From Los Angeles to:								
Tacoma, Wash	17.05	937.75	26.80	1,340	28.83	1,191.50	38.60	1,158
Amarillo, Tex					27.70	1,385.00	38.60	1,158
Fort Smith, Kans								
El Paso, Tex								
Chicago, Ill.[1]								
From Boulder, Colo., to El Paso, Tex	[2]14.07	773.85	[3]17.60	704	[2]14.07	766.70	17.60	704
From Copperhill, Tenn., to:								
Laurel Hill, N.Y	17.86	982.30	22.60	904				
Chicago, Ill					[3]13.00	520.00	[3]20.00	800
From:								
Mobile, Ala.,[1] to Los Angeles, Calif								
New Orleans, La.,[1] to Los Angeles, Calif								
Gregory, Tex.,[1] to Los Angeles, Calif								

See footnotes at end of table, p. 39.

COMPARISON OF RAIL FREIGHT RATES FOR NONFERROUS ORES AND NONFERROUS SCRAP—Continued

[Rates expressed in dollars per ton]

	Lead				Aluminum			
	Ores and concentrates		Scrap		Alumina and bauxite		Scrap	
	Rate M/W 80,000	Revenue per car	Rate M/W 36,000	Revenue per car	Rate M/W 80,000	Revenue per car	Rate M/W 60,000	Revenue per car
From Los Angeles to:								
Tacoma, Wash								
Amarillo, Tex								
Fort Smith, Kans								
El Paso, Tex	9.48	379.20	63.00	1,134				
Chicago, Ill.[1]					35.00	1,430.20	38.00	1,152
From Boulder, Colo., to El Paso, Tex	[2] 14.07	773.85	17.60	704				
From Copperhill, Tenn., to:								
Laurel Hill, N.Y								
Chicago, Ill								
From:								
Mobile Ala.,[1] to Los Angeles, Calif					16.73	669.20	45.80	1,374
New Orleans, La.,[1] to Los Angeles, Calif					16.73	669.20	38.40	1,152
Gregory, Tex.,[1] to Los Angeles, Calif					16.73	669.20	38.40	1,152

[1] Rate: Subject to aggregate minimum of 1,545 net tons in not more than 15 cars, 1 shipper, 1 consignee, on same day bill of lading (alumina and bauxite).
[2] 90 percent marked capacity of car.
[3] M/W 80,000.

SOURCES

Copper: Item No. 8865-8890, SFA 817-E; item No. 8597-A, tariff No. PSFB 1-S; item No. 7275, tariff No. PSFB 1-S; item No. 5400-A, tariff No. SW/W-2006 I; item No. 13750, tariff No. SWL-270-F; item No. 5750-21901, E/S 2008-J, E/S 1008.

Zinc: Item No. 2635, tariff No. TCFB 6-E; item No. 63920, tariff No. SFA 817-E; item No. 7173-61190, tariff No. I/S-20030; item No. 5400A, tariff No. SW/W 2006-I; item No. 13750, tariff No. SWL-270-F.

Lead: Item No. 1980E, tariff No. Supp. 183, PSFB-335; item No. 8420, tariff No. PSFB 26-Y; item No. 5400A, tariff No. SW/W-2006I; item No. 13750, tariff No. SWL-270-F.

Aluminum: Tariff No. TCFB 1T; tariff No. TCFB 2J.

CHRONOLOGICAL SUMMATION OF GENERAL RAIL RATE INCREASES AND THEIR EFFECT ON CURRENT RATES

[Rates in cents per hundred pounds]

The following table indicates the basic discriminatory and inequitable rates applied to recyclable materials as compared to virgin materials and shows how recent freight rate increases have pyramided the disparity and made recyclable materials less competitive in the marketplace:

General increases	Paper					Nonferrous metal				
	Pulpwood		Scrap			Ores and concentrates		Scrap		
	Ex parte increase per hundredweight	Average rate per hundredweight	Ex parte increase per hundredweight	Average rate per hundredweight	Net difference in rate	Ex parte increase per hundredweight	Average rate per hundredweight	Ex parte increase per hundredweight	Average rate per hundredweight	Net difference in rate
Average rates prior to Ex parte 223		17.4		31.3	13.9		51.7		65.1	13.3
Ex parte 223 (Oct. 24, 1960)	½ cent	17.9	1 cent	32.3	14.4	½ cent	52.2	1 cent	65.5	13.3
Ex parte 256 (Aug. 19, 1967)	3 percent	18.6	3 percent	33.3	14.7	2 cents	53.3	3 percent	67.5	14.2
Ex parte 259 (Nov. 28, 1968)	5 percent	19.5	5 percent	35.0	15.5	5 percent	55.0	5 percent	71.0	15.0
Ex parte 262 (Nov. 18, 1969)	6 percent	20.7	6 percent	37.0	16.3	6 percent	59.0	6 percent	75.0	16.0
Ex parte 265 (Nov. 20, 1970)	do	21.9	do	39.0	17.1	do	62.8	do	79.0	16.2
Ex parte 267 (Nov. 12, 1971)	12 percent	24.4	11 percent	43.0	18.6	12 percent	70.3	11 percent	88.0	17.7

Note: Pulpwood: Converted from cords (4,500 lbs. per cord) to hundredweight. Ores and concentrates: Converted from net tons to hundredweight. Scrap in hundredweight.

Source: Ores and concentrates—item 13750, Tariff SWL 270-F nonferrous scrap—item 5400A, Tariff SW/W 2006-I pulpwood—item 6287.2, Tariff T/C—754, Sup. 262, paper scrap—item 75660 Tariff TL-TCR-2009-H; increase tables—Ex parte 223, 256, 259, 262, 265, 267.

Chairman GRIFFITHS. Thank you very much.

Without objection the prepared statements of the other members will be put in the record and I would like to ask a few questions.

Mr. MIGHDOLL. Madam Chairman, Mr. Davis has the specific tax proposals.

Chairman GRIFFITHS. I am going to ask that all of the prepared statements be simply put in the record.

(The prepared statements of Messrs. Davis, Stovroff, Frankel, Wein, Schwartz, Bergman, Romberg, and Scudder follow:)

PREPARED STATEMENT OF THOMAS A. DAVIS

I am Thomas A. Davis, tax attorney with the law firm of Smathers & Merrigan. My purpose here today is to briefly outline the present tax laws which favor the utilization of virgin resources over the utilization of recycled material and to suggest a tax benefit for utilization of recycled material in order to equalize the competitive advantage virgin materials now have due to preferred tax treatment.

The tax advantages derived from the utilization of natural resources stem primarily from two tax provisions: (1) capital gain treatment on income derived from the increase in value of timber, and (2) the percentage depletion allowance applicable to the extractive industries.

CAPITAL GAIN TREATMENT FOR TIMBER

The Internal Revenue Code provides that the owner of standing timber can elect to treat the difference between the cost of the trees and their fair market value at the beginning of the year such trees are cut.[1] Under this provision, a paper company which cuts its own timber for use in the production of paper can elect capital gain treatment on the appreciated value of those trees which are cut. The owner of timber who sells such timber under a contract in which he retains an economic interest, such as a so-called pay-as-cut contract, can also elect capital gain treatment.[2]

For example, a paper corporation which purchases a tract of timber for $1,000 and several years later cuts the trees then valued at $2,000 for pulp can treat the $1,000 increase in value of the trees as a capital gain subject to the 30 percent tax rate.

As a result of this capital gain treatment, paper companies using trees as a source of raw material have an overall effective tax rate that is less than a company which utilizes recycled material. Based on information contained in the Treasury Department Studies and Proposal of 1969, paper companies paid an effective tax rate of about 5 percent less than other types of manufacturing industries.[3] Looking at more current information contained in the 1968 Corporation Statistics of Income compiled by the Internal Revenue Service, it appears that the differential continues to be at least as great even after applying the new 30 percent capital gain rate provided under the 1969 Tax Reform Act. A company which produces or utilizes only recycled material would fall into the category of other manufacturing and thus has the higher effective tax rate.

The lower effective tax rate resulting from the use of trees obviously results in higher after-tax profits. Management necessarily must turn to the utilization of trees rather than purchasing recycled materials.

By bringing this capital gain provision to your attention, we do not mean to imply that such tax treatment should be changed. The provision was enacted in the Revenue Act of 1943 as an incentive device for conservation, reforestation and good forest management. It was discussed in the hearings during the enactment of the 1969 Tax Reform Act. These hearings indicate that capital gain treatment for timber has been effective toward the intended purpose.[4] There is

[1] Internal Revenue Code § 631(a).
[2] Internal Revenue Code § 631(b).
[3] Tax Reform Studies and Proposals, U.S. Treasury Department, Part 3, p. 434 (Feb. 5, 1969).
[4] Hearings before the Committee on Ways and Means, House of Representatives, 91st Cong., first sess., on the subject of Tax Reform, 1969; Part 8, beginning on p. 2823.

and will be a continuing need to conserve and manage our forest lands. Recycled material can obviously not substitute for timber.

PERCENTAGE DEPLETION FOR MINERALS

In the case of metals, percentage depletion allowed under the tax laws places metal ores in a more advantageous competitive position than recycled metals. Percentage depletion for iron and copper is 15% of gross income and percentage depletion for most other major metals is 22%.[5] In addition, there is a special tax provision, similar to the timber provision, which allows capital gain treatment on the disposal of domestic iron ore.[6]

Because of these special tax provisions, mining industries have a much lower effective tax rate than manufacturing industries. The 1969 Treasury Studies referred to previously show that the mining industries, excluding petroleum, have an effective tax rate of only 24.3% of net income as opposed to 43.3% for other manufacturing companies.[7] A company which recycles metals would fall into the manufacturing category.

Again, we are not advocating a change in the present tax treatment of the extractive industries. This subject was also thoroughly discussed in 1969 and was changed in the 1969 Tax Reform Act.

PROPOSED RECYCLING DEDUCTION

We do advocate extending a tax benefit to recycled material sufficient to overcome the competitive advantage which virgin materials now have over recycled materials because of favorable tax treatment. Toward this end, it is proposed that the manufacturer be given a tax benefit for utilizing recycled materials in the manufacturing process.

Under this proposal, the manufacturer would be entitled to a recycling tax deduction (or possibly a recycling tax credit) determined on the basis of the cost of recycled material purchased. However, because the purpose is to increase and stimulate recycling, the deduction would be applicable only to cost of recycle purchased which is in excess of the average amount annually purchased during a three-year base period consisting of the three years immediately preceding the year of the enactment of the new tax provision.

The recycling deduction would be computed as a percentage of the cost of recycled material which qualifies for the deduction. This percentage would vary according to the type of recycled material involved, depending upon what percentage is determined to be necessary to remove the competitive disadvantage a recycle material now has because of tax advantages given to the corresponding virgin material. The recycling deduction would apply to all materials designated under the Resource Recovery Act as certified solid waste material.

To illustrate how this proposal would operate, let us assume that it is determined after study that a deduction of 10 percent of the value of recycled fiber purchased is necessary to make recycled fiber generally competitive with wood pulp. A manufacturer would then be allowed to deduct 10 percent of the cost of recycled fiber purchased in excess of the base period amount. This is in addition to the deduction for the actual cost of the recycled fiber. In other words, it would be the same as allowing a 110 percent deduction for cost of goods purchased.

The percentage applicable to iron, copper, aluminum and other metals would each be determined on the basis of what is necessary to generally equalize the competitive position of each recycled material with that of the virgin material.

Present tax provisions relating to natural resources would be retained.

The suggested equalization approach will allow a company now using virgin material to turn to the use of recycled materials without adversely affecting the overall after-tax earnings of the company. Because tax consequences will be generally the same, a paper company which now satisfies its pulp requirements almost totally from cutting trees can fulfill a substantial part of its pulp requirement from recycled material without adverse tax effects and thus leave more trees to satisfy future pulp and timber requirements.

---

[5] Internal Revenue Code § 613(b).
[6] Internal Revenue Code § 631(c).
[7] Tax Reform Studies, *supra* Note 5, Part I, p. 100.

NO SUBSTANTIAL REVENUE LOSSES

The proposal we have made should not result in substantial revenue losses to the Government. The theory of this proposal is to shift a portion of the tax benefits now received from the utilization of virgin materials to the utilization of recycled materials. Assuming a fixed total requirement of raw material to be supplied from either virgin or recycled sources, the tax benefits derived from the use of recycled materials will tend to be matched by corresponding reduction in the tax benefits which would otherwise result from the utilization of virgin materials. In essence, the proposal attempts to reallocate the tax benefits derived from virgin materials to recycling materials.

In addition, the recycling industry, which has the higher overall effective tax rate, will produce additional revenues for the Government as its business expands from the tax benefits given to the users of recycled materials.

It is noteworthy that the proposal does not jeopardize the tremendous investment that many companies now have in virgin resources. Obviously, the continued use of these virgin materials will result in the same tax treatment as presently provided. Hopefully, because of equal tax consequences, integrated companies will be able to deplete their own natural resources at a slower pace since they can use recycled materials with generally the same after-tax profit.

There would be some revenue losses involved because companies can turn to recyled material to satisfy a requirement which was previously supplied from sources outside of the company and from which minimal or no tax benefits were derived. The revenue losses from this situation probably would not create an overall revenue loss, although data was not available to substantiate this.

You will note that the above proposal is directed toward the user of the recycled raw material. The purpose is to increase the market for recycled materials since, as others have explained, this is a basic problem in the recycling industry. The one actually doing the recycling does not receive any direct tax benefit under this approach.

5-YEAR AMORTIZATION FOR RECYCLING FACILITIES

In order to increase recycling facilities and to keep recycling technologically advanced, a tax benefit should be given to the recycler in the form of a rapid write-off of plant and equipment. It is therefore suggested that taxpayers be given an election to amortize a certified recycling facility over a 5-year period. This corresponds to the 5-year amortization provided by the 1969 Tax Reform Act for pollution control facilities.[8]

CONCLUSION

The proposals outlined above are directed toward solving this country's tremendous solid waste problem and toward conserving our natural resources. The recommendation to give a tax deduction for uitilization of recycled material in the manufacturing process will increase the market for recycled material by removing the competitive inequality that now exists for recycled matreial because of preferred tax treatment of virgin material. The 5-year amortization of recycle facilities will offer an incentive to improve recycling equipment and to increase capacity.

The proposals will act to alleviate the increased depletion of our natural resources. When one considers that it takes more than 80,000 trees to supply the paper for *one* Sunday edition of the *New York Times*, or more than 4.1 million trees per year, it is easy to understand why there is an urgent need to promote recycling.

If there is in fact a loss of revenue by reason of the tax proposals recommended, the revenue loss should be minimal, especially when compared to the cost of collecting and disposing of the country's solid waste now estimated to be $4.5 billion annually.

We recognize that our proposal represents only one approach toward solving the solid waste problem and does raise certain questions which need further study. There may be a better approach. In this regard, we will be most happy to work with the Committee and the Executive Agencies in developing the best possible solution.

Thank you very much for allowing me the opportunity to appear before you.

---

[8] Internal Revenue Code § 169.

PREPARED STATEMENT OF HASKELL STOVROFF

Madam Chairman, I am very pleased to have this opportunity to appear before the distinguished members of the Fiscal Policy Subcommittee. My name is Haskell Stovroff—I am Chairman of the Board of Directors and Chief Executive Officer of Consolidated Fibers—one of the oldest and the largest independently owned domestic and export marketers of secondary fibers in the United States.

Our company, with 247 employees, operates ten waste paper processing plants within New York, California, Arizona, and Oregon. We collect secondary fibers from paper converters, industrial producers, and others in order to divert these raw materials from becoming solid waste. We then sort, process and bale these secondary fibers to transform them into valuable raw material for manufacturers of such paper products as printing papers, tissue, toweling, combination boxboard (used in production of folding cartons), liner board and corrugated medium for production of shipping cases, building board, roofing and insulation, as well as many other paper specialty products. Several of these plants divert from solid waste and recover over 5,000 tons of secondary fiber per month.

There are a number of inequities present today in Federal tax regulations, purchasing specifications and freight rates which are serious impediments to reducing the 38 to 40 million tons of paper and paperboard that were disposed of by being buried or incinerated in this country last year. If our projections are accurate, this amount will double in less than fifteen years unless the Congress provides increased economic incentives for the collection, processing and recycling of our nation's solid waste.

The Internal Revenue Code of 1954 allows a deduction in computing taxable income for depletion of timber. This tax provision gives an unmistakable competitive advantage to producers of paper and paperboard who have "integrated" woodland operations within their corporate tax structure or who buy pulpwood to manufacture pulp. This depletion provision has also impeded the increased use of waste paper as a raw material for the manufacture of paper and paperboard at a time when the virgin paper industry has undergone spectacular growth.

Manufacturers of paper and paperboard who produce their produces from reclaimed waste fibers do not enjoy such tax allowances and Exhibit A dramatically illustrates the decline in the share of the market for these mills.

Likewise there is a sharp drop in the number of paper machines in operation to produce paper and paperboard which generally use waste paper as their raw material furnish. These are called cylinder machines. Exhibit B is an illustration of this decline.

Please do not misinterpret my position. I do not prescribe a repeal of the timber depletion allowance. In order, however, to increase the reutilization of waste materials, we mush give equal tax treatment to paper manufacturers who harvest our landfills and incinerators instead of, or in addition to, our shrinking timber supply.

This equal tax treatment is not only a matter of fundamental fairness, it is the most practical way to eliminate our nation's solid waste problem. Perhaps you have heard that one ton of reused waste paper saves so many trees. There is, I feel, a better comparison to be made. Experts have said that municipal refuse is disposed of today at an average cost of $25 to $30 per ton. These estimates would lead one to conclude that the secondary fibers industry therefore saved our taxpayers upwards of $250 million.

To collect, sort and process the 40 million tons of scrap paper we can recover in the future will require enormous capital investments. It is for these reasons that we need economic incentives to recycle solid waste.

Finally, there are gross inequities between government regulated freight rates for waste paper and "virgin" pulp. Exhibit C vividly points out these discrepancies in domestic shipments.

What is inequitable is not only the 20 cents per ton difference, but the fact that the product we are shipping has a selling price of about $40 per ton. That makes the cost of transportation 75% of the cost of the material. Pulp, on the other hand, travelling at 20 cents per ton less has an announced selling price of around $175 per ton. These freight costs are only 17% of the cost of the product. This incredible situation is truly unfair.

My last exhibit, Exhibit D, reflects the similar inequities in ocean freight rates between "virgin" pulp and waste paper. Inasmuch as these rates are subject to government regulation as well, I believe Congress can and should take immediate action to remedy these discriminations.

Exports of waste paper from the United States are growing at the rate of nearly 50 percent a year. 1970 export shipments of waste paper amounted to over $23 million. In view of this country's growing trade deficit, I think we should welcome the opportunity to expand our exports. And as suggested earlier, the 409,000 tons of waste paper exported last year are 409,000 tons of waste paper which America's cities and towns did not have to burn or bury.

Are all these not good reasons to press for immediate changes in attitudes and policies? As a nation we can no longer continue to so voraciously consume the earth's raw materials and then so rudely discard them without paying a severe penalty. Our millions of new voters and the onlooking developing countries will simply not tolerate it. In my humble opinion, the time for redirection is past due.

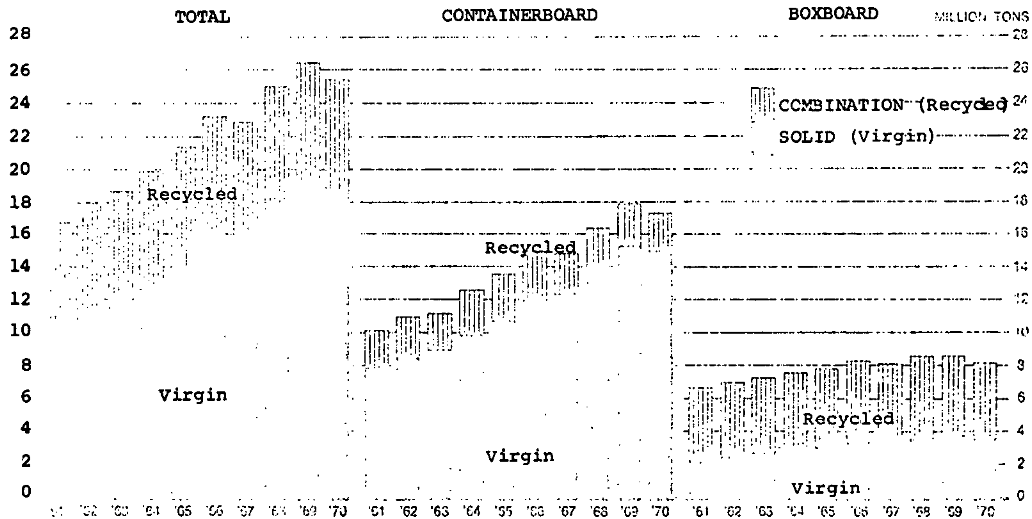
In summary, our company strongly supports the NASMI program of tax and other incentives. With it our company could expand our recovery and recycling of solid waste by perhaps 50%. Without it we will be buried by our nation's own lack of economically sound resource management.

70-422 O—72——4

(RELATIVE SHARE OF PRODUCTION BETWEEN THE VIRGIN AND RECYCLED PAPERBOARD INDUSTRIES)

EXHIBIT A

COMBINATION PAPERBOARD AND SOLID WOODPULP BOARD PRODUCTION 1961-1970 BY TYPE



TONS

YEAR	TOTAL PAPERBOARD			CONTAINERBOARD TYPE			BOXBOARD TYPE		
	Total	Combination	Solid	Total	Combination	Solid	Total	Combination	Solid
1961	[illegible]	[illegible]	[illegible]	10,138,000	[illegible]	[illegible]	[illegible]	[illegible]	2,219,000
1962	17,[illegible]7,100	6,901,[illegible]	10,9[illegible]2,800	10,939,700	2,418,500	8,491,[illegible]	6,907,700	[illegible]	2,451,[illegible]
1963	18,[illegible]	7,090,[illegible]	11,502,900	11,465,300	2,507,600	8,957,800	7,124,200	4,493,100	2,631,100
1964	19,9[illegible],800	7,205,[illegible]	12,747,100	12,532,700	2,594,600	9,938,100	7,421,100	4,612,100	[illegible]
1965	21,331,500	7,531,[illegible]	13,799,900	13,535,200	2,747,900	10,787,300	7,796,300	4,773,700	3,012,600
1966	23,179,600	7,853,200	15,325,400	14,910,500	2,866,200	12,044,300	8,264,100	4,987,000	3,281,100
1967	22,819,[illegible]	7,216,600	15,602,700	14,757,500	2,135,790	[illegible]	[illegible]	4,780,900	[illegible]
1968	24,902,600	7,313,000	17,589,600	16,2[illegible],000	2,[illegible]27,200	13,361,800	8,511,600	4,915,800	3,594,800
1969	[illegible]	7,324,[illegible]	[illegible],400	17,832,900	2,571,400	15,281,500	8,519,[illegible]	4,750,700	3,791,900
1970	25,493,[illegible]	6,982,500	18,511,100	17,350,000	2,474,400	14,905,[illegible]	8,112,600	4,507,[illegible]	3,605,900

(Source: American Paper Institute)

EXHIBIT B

Paperboard Capacity by Region and Type 1969-1972 PRACTICAL MAXIMUM BASIS

M TONS

	1969	1970			1971			1972		
	Year End	New Machines	Changes	Year End	New Machines	Changes	Year End	New Machines	Changes	Year End
TOTAL CONTINENTAL UNITED STATES										
Total Paperboard	27,837	389	537	28,763	600	456	29,819	641	347	30,807
Unbleached Kraft Paperboard	12,009	266	347	12,622	298	158	13,078	350	177	13,605
*Solid Bleached Paperboard	3,557	-	62	3,619	-	16	3,636	154	20	3,810
Semichemical Paperboard	3,814	123	- 17	3,920	302	110	4,331	137	67	4,536
**Combination Paperboard	8,457	-	144	8,602	-	172	8,774	-	83	8,856
NORTH EASTERN REGION										
Total Paperboard	3,428	-	5	3,433	-	74	3,507	-	20	3,527
Unbleached Kraft Paperboard	7	-	-	7	-	-	7	-	-	7
*Solid Bleached Paperboard	33	-	4	38	-	-	37	-	-	37
Semichemical Paperboard	216	-	- 38	178	-	-	178	-	-	178
**Combination Paperboard	3,172	-	39	3,211	-	74	3,284	-	20	3,304
SOUTHERN REGION										
Total Paperboard	15,804	389	389	16,581	528	170	17,280	633	208	18,118
Unbleached Kraft Paperboard	9,715	266	284	10,295	299	87	10,681	350	144	11,174
*Solid Bleached Paperboard	2,980	-	56	3,041	-	6	3,048	154	20	3,222
Semichemical Paperboard	1,698	123	32	1,853	230	64	2,144	129	30	2,308
**Combination Paperboard	1,374	-	18	1,392	-	12	1,403	-	10	1,414
NORTH CENTRAL REGION										
Total Paperboard	4,502	-	61	4,563	-	92	4,654	-	75	4,729
Unbleached Kraft Paperboard	-	-	-	-	-	-	-	-	-	-
*Solid Bleached Paperboard	112	-	2	114	-	2	116	-	-	116
Semichemical Paperboard	1,387	-	30	1,418	-	12	1,429	-	28	1,457
**Combination Paperboard	3,002	-	29	3,031	-	78	3,110	-	47	3,156
PACIFIC COAST REGION										
Total Paperboard	4,103	-	62	4,186	72	120	4,378	8	46	4,433
Unbleached Kraft Paperboard	2,257	-	63	2,320	-	71	2,390	-	33	2,424
*Solid Bleached Paperboard	426	-	-	426	-	8	435	-	-	435
Semichemical Paperboard	312	-	- 41	471	72	34	576	8	9	593
**Combination Paperboard	909	-	59	968	-	8	977	-	5	982

* Contains 51% or more virgin woodpulp.
** Predominate proportion of furnish reworked fibres.
Note: Capacity obtained from responses to Survey, November, 1973. Announced changes since that time are not reflected.

(Source: American Paper Institute)

EXHIBIT C.—RATES, RAIL/100,000-LB. CARS, PULP AND WASTE PAPER

Origin	Destination	Woodpulp			Waste paper		
		Cost per ton	Selling price [1]	Percent transportation to selling price	Cost per ton	Selling price [2]	Percent transportation to selling price
Portland	Ft. Howard, Wis	$29.80	$150	20	$30.00	$19	157
Los Angeles	East coast	31.60	150	21	42.20	19	222
Phoenix	Denver, Colo	23.20	150	15	30.00	19	157
San Antonio	Santa Clara, Calif	27.80	150	18	30.80	19	162

[1] Unbleached Kraft.
[2] Corrugated containers.

EXHIBIT D

OCEAN FREIGHT RATES FOR PULP AND WASTE PAPER

Origin	Destination	Pulp			Waste paper		
		Dollar per ton	Selling price[1]	Percent transportation to selling price (percent)	Dollar per ton	Selling price[2]	Percent transportation to selling price (percent)
Pacific west coast	Korea (Inchon)	$30.00	$100.00	30	$40.20	$24.00	165
Do	Thailand	35.50	100.00	35	41.50	24.00	170
Do	South Vietnam	43.00	100.00	43	44.65	24.00	185
Do	Australia	34.00	100.00	34	46.50	24.00	190
Do	Colombia	36.00	100.00	36	79.00	24.00	310
East Coast and gulf	Japan—main ports	35.25	100.00	35	48.00	24.00	200
Do	Formosa	36.25	100.00	36	54.25	24.00	226
East coast (North Atlantic)	Spain	29.25	100.00	29	34.00	24.00	142
Do	United Kingdom	30.00	100.00	30	37.75	24.00	157

[1] Unbleached kraft.
[2] Corrugated containers.

PREPARED STATEMENT OF RICHARD H. FRANKEL

Madam Chairman, my name is Richard H. Frankel, and I am the Vice President of Frankel Bros. & Co., Inc. of Rochester, New York.

I am a recycler of secondary textiles. That is, my company buys textile waste of all varieties including cutting room scrap from all over the country. We then sort, grade, and bale this waste product which would otherwise have to be buried or burned, in order to create a new raw material for paper mills, roofing mills, floor covering industries, woolen mills and other consumers.

As a direct result of various governmental impediments and policies, my company, which approximately 5 years ago processed some 30 million pounds of textile waste per year, is now processing only 15 million pounds per year. I now have only half as many employees as I had 5 years ago.

Why is this so? First, the textile industry finds itself with many complex factors to cope with in the development of a more expansive recycling program. There are economic, technological, psychological and legal restraints which keep the recycling of textiles from similar growth patterns as those experienced by other industries. At the present time, greater and greater tonnages of textiles are finding their way to the solid waste pile, so hampered is the reprocessing of these materials. It seems that it is only in various local areas where textile wastes are generated, that the public becomes aware of the problem of disposing of this material. Some 10 million pounds of discarded textile wastes are sorted in this nation every week. About 40% of this tonnage is collected, processed, and reused as wiping rags by industry. Some of the balance finds its way into other uses. But this is only a small percentage of the nation's generation of textile wastes—some 1.2 million tons are in the solid waste stream each year—potential recycled fibers and material for new uses and product applications.

The greatest single setback the textile recycling industry has experienced was as a result of the labeling restrictions imposed through the Wool Products Labeling Act and the Textile Fiber Identification Act. The rules and regulations imposed by this legislation have led to the consumer's fear of reused and reprocessed products; it gave birth to and promoted consumer attitudes that precluded the acceptance of products containing recycled fibers. "Virgin" products were supposed to be better products under the labeling umbrella promoted by the wool growing interests. In actuality, products made with recycled materials were of the finest quality and gave American consumers fine products at lower costs. In the last thirty years this country has seen the collapse of the New England economic community with the closing of almost all the mills that bought woolens, cleansed, garnetted, respun, and rewove them for use into new clothing and other textile products. We all know that employees were hurt, considerable money was lost, and communities disappeared. We do not want that to happen again and economic incentives and changes in legislation regulating the labeling of textiles are essential to our survival.

Furthermore, freight charges average 20% to 30% of the total sales price of textile products. In simplest terms, as these ever-increasing freight rates have risen we have been forced to recycle less. In some instances, particularly the lower valued grades which are the high volume items, freight is as high as 60% to 70% of the sale price. For example, the freight rates for shipping Mixed Synthetics to Arrowhead, New York, are as follows:

	Per hundredweight delivered
Sale price	2.30
Average freight to my plant	.78
Average freight to a customer in Arrowhead, N.Y.	.33
Total	1.11

Freight equals 48% of sale.

Sweepings to Toronto sell for $1.75 cwt. delivered:

Average freight to my plant	$0.78
Average freight to a customer in Toronto	.59
Total	1.37

Freight equals 78% of sale price.

In addition, there is a very serious discrimination between domestic freight rates and export rates. As in other recycled commodities, domestic rates for recycled textiles are much higher than export rates. This means that when foreign buyers can purchase textile waste abroad at a lower cost than buying from us we must rely on sales to domestic markets. Because, however, the domestic freight rates are so much higher, we cannot sell our textile wastes at a price which is sufficient to cover what it costs to collect, process and ship this textile waste.

Finally, incentives are particularly necessary for research and development in the textile segment of the recycling industry because of the advent of an increased use of synthetics which cannot be used for the same purposes as 100% Cotton (Cellulose fiber). The value of the 100% Cotton after sorting simply is not high enough to pay for the cost of sorting out the synthetic blends. With economic incentives to encourage further research and technological development we are convinced that more and more of these blends and synthetic wastes can be recycled.

Therefore, we urge this Committee and the Congress to support the NASMI proposals for tax and other incentives to recycle textile wastes. If such a package of incentives were adopted my company could surely recycle 100% more textile wastes.

Thank you very much for this opportunity to appear before your Committee.

PREPARED STATEMENT OF ALBERT J. WEIN

My name is Albert J. Wein, and I am the Executive Vice President of Steelmet, Inc. I wish to thank the Committee for the privilege of appearing here today on this subject of such importance to my company.

Steelmet is a major recycler of stainless steel, and both ferrous and nonferrous scrap. Steelmet's operations begin when we collect scrap metal from various industries, from automobile wreckers, and from scrap metal dealers. This scrap is then sorted, by our company, processed, and recycled into new raw material which is sold to manufacturers of metal products.

Our plants are located in Pennsylvania, Florida, Kentucky, Rhode Island, and Massachusetts, and our approximately 425 employees are engaged in the business of annually recovering and recycling hundreds of thousands of tons of metal scrap, including some 400,000 to 500,000 tons of ferrous scrap, into new raw materials.

In our industry, I am deeply concerned with two basic problems, inequitable freight rates and unequal tax treatment.

Freight rates for secondary metals do not reflect the value of the commodities shipped. During the past several years, for example, freight rates have steadily increased while the value of the metal shipped has steadily decreased. This disasterous trend along with all of the increased costs of collecting and processing scrap has worked to prevent the recycling of more cans, automobiles and other scrap metal products which clutter our countryside.

Besides the discrimination in freight rates between recycled commodities and their virgin counterparts, I am deeply concerned about the unfair discrimination in freight rates between domestic and foreign rates. For example, the freight rates on metal scrap shipped from New England to such domestic consumption points as Pittsburgh and Cleveland range from $11.00 to $17.00 per gross ton. On the other hand, ocean freight rates from the same points to foreign consumers range between $3.50 to $7.00 per gross ton. Because the commodity which we ship is very low in value (approximately $20 to $30 per ton), we have no choice but to ship to foreign markets. Then, when foreign markets dry up because of changing price considerations, these discriminatory freight rates prevent domestic recycling of metal scrap such as that in automobiles and tin cans.

If there were equal freight rates for domestic and ocean shipments, we could ship our products to more domestic consumers and thus collect and process more scrap metal. Furthermore, our customers would have a continuous source of supply at stable prices and some of the wide price fluctuations which exist in the metal markets would be eliminated.

Madam Chairman, my second major concern is the unequal tax treatment for recycled metals compared to virgin metals. Those who mine primary metals receive a substantial depletion allowance which, of course, has no counterpart in the secondary metals industry. Equal tax treatment would enable our industry to more rapidly beautify the scrap processing facilities which we operate, and, of course, allow us to collect, sort, and process more scrap metal which would enable us to reduce solid waste which is otherwise uneconomical to process.

I strongly support the NASMI program of tax and other incentives to recycling. Further I believe that such steps are necessary if this industry is to fairly compete with its virgin counterparts and make substantial progress toward the environmental goals so well stated by the Resource Recovery Act.

What impact would the incentives we are discussing today have on Steelmet? If the NASMI program were implemented, I could effectively increase by 50% to 100% the quantity of solid waste which my company is now recycling. We therefore urge your Committee to support such legislation.

PREPARED STATEMENT OF M. D. SCHWARTZ

Madam Chairman, my name is M. D. Schwartz, and I am the President of the Pacific Smelting Company of Torrance, California. Our company, with approximately 150 employees, is the largest independent secondary zinc smelter in the world. We buy zinc scrap from metal dealers, industries, and others and smelt this scrap into ingots which provide a new raw material for producing a full line of zinc products. Our current capacity is over one million pounds of zinc per week but due to several very important economic impediments to recycling which I wish to briefly discuss, we are presently operating at only ⅔ capacity.

The scrap metal which we consume is generally in the lowest value nonferrous metal handled by the recycling industry. Even so, our buying area consists of the entire Western half of the United States and we have spent in excess of two million dollars in the past five years to improve and expand our facilities.

Currently, our company could increase its recycling of scrap zinc by ⅓ to ½ if the freight rates for scrap zinc were not almost unbearably prohibitive. Where would this additional scrap come from? There are today between seventeen and twenty million abandoned automobiles in the United States that have not been brought to market. Most of this scrap is uneconomical to ship because of freight costs. The zinc-base metals in these automobiles alone represent approximately 500,000 tons of raw material which could be recycled except for prohibitive freight rates. Recently, scrap zinc worth approximately $130 per ton net, had a freight rate of approximately $25 per ton. Now this rate has skyrocketed to nearly $50 per ton. This problem has become so severe that it is not unusual for freight charges to constitute one half of the cost of this scrap metal when it arrives at our secondary smelting plant. In addition to the obvious impediment to recycling which these ever-rising freight rates provide, there is also severe discrimination in rates between the scrap or recycled form of zinc and zinc in its virgin form.

Furthermore, the processing of scrap metal is further hampered compared to primary metals because scrap is a heterogeneous commodity which requires special furnaces and other very high cost equipment for processing. This is particularly burdensome because most secondary plants are in urban areas which require more extensive pollution abatement equipment. We certainly support the necessity for pollution abatement, but zinc recyclers, because of their urban location, bear a far heavier burden in this regard than virgin producers. Finally, only the virgin producers of zinc have had the important economic advantage of the depletion allowance—even though their capital expenditures are used to procure the less expensive homogeneous feed equipment.

Our company supports the NASMI proposals for eliminating these economic restrictions on our operations. We ask only for a fair chance to compete. Our company, if such incentives were provided, would immediately move to expand the utilization of its facilities to recover and recycle more zinc scrap wherever its source—including wrecked automobiles. If the freight costs were equalized by providing rates equivalent to those for virgin producers, we could greatly expand the radius within which we collect and buy scrap and could begin to recover and reutilize the valuable zinc "mine above ground" which we—a have-not nation on the primary side—so badly need. It is simply a matter of economics. We cannot recycle more zinc regardless of demand, unless it is economically feasible to buy it in scrap form and pay the freight for its transport to our facilities.

We deeply appreciate this opportunity to appear before your Committee and we hope that steps can be taken *now*, to alleviate these economic hurdles to recycling.

PREPARED STATEMENT OF EDWARD BERGMAN

My name is Edward Bergman and I am the Chief Executive Officer of the U.S. Reduction Co., a leading secondary aluminum smelter. I am also President of the Aluminum Smelting & Recycling Institute, a trade association for the secondary aluminum industry.

Our company buys scrap aluminum, refines it into ingots and sells this recovered raw material to others for making aluminum castings and deoxidizing steel. Our company has over 1,000 employees, and we have offices and plants in Indiana, Illinois, Ohio, Alabama, and California. Last year we shipped over 220 million pounds of recycled aluminum.

While a few aluminum smelters are divisions of large corporations and a few are publicly owned corporations, for the most part the 50 or so aluminum smelters are small independently owned businesses. Secondary aluminum smelters have existed for almost 70 years, and the industry is now producing in excess of a billion pounds per year, or approximately 15 to 20% of the primary aluminum production.

The aluminum smelting industry produces secondary aluminum, aluminum produced from scrap, as opposed to primary aluminum which is made from ore which must be mined, usually in some distant country, refined into alumina and then elecrolytically reduced to aluminum. This then must be alloyed with other metals such as copper, silicon manganese, magnesium, chrome, titanium and zinc to produce a useable product. Secondary aluminum is used mainly in casting alloys and for the deoxidation of steel. The alloying ingredients for the most part are already in the aluminum scrap so recycling not only uses aluminum which has already been mined, shipped, refined and alloyed, but it also reuses the other metals which are present as alloying ingredients. We are producing a product in which the natural resources of labor, electrical energy and raw materials have already been expended, and in using this raw material we are helping to remove the waste which threatens to engulf our country.

Aluminum scrap consists of new scrap, the result of manufacturing processes (which is historically about 20% of primary aluminum production) and old scrap which is the obsolete product of our everyday living. In the past years the industry anticipated that 75 to 80% of the scrap would be new and 20 to 25% of the scrap would be old. Strangely enough this balance has not been maintained; for during the past 10 years, primary aluminum production has doubled from 4 billion pounds per year to 8 billion pounds per year. The amount of new scrap recovered has risen from 1 billion pounds per year to 2 billion pounds per year. But—the amount of old scrap moving to market has remained almost consistent at about 350 million pounds per year, in spite of the fact that more

and more aluminum has gone into products which have a rapid obsolescence rate and should rapidly reappear as scrap.

Examples of these items are the automobile, which is using an average of about 70 pounds per car, and the all aluminum can, which is using about 500 million pounds of aluminum per year as against only 62 million pounds in 1965. This is despite the fact that aluminum is a high-priced commodity and aluminum scrap commands prices many times that of scrap steel, plastics and many non-ferrous materials.

These figures, I believe, point out problems of our industry that Government must help us to solve. The major problem is that economic incentives are urgently needed to bring the 300 to 400 million pounds per year of aluminum scrap now going to dumps and becoming litter back into the economic stream.

While others have followed Reynolds Metals' lead in attempting to collect aluminum cans for reuse, this plan is uneconomical for nation-wide coverage in its present form. An already existing network of dealers and smelters is available, but there must be an incentive in some form to make it economical to collect, sort, recycle and ship the huge quantity of aluminum going into food and beverage packaging. The tremendous scrap mine above ground must be worked on a daily basis in order to keep our communities clean. This scrap must be shipped when it's ready and sometimes will have to be shipped to locations far distant from where the scrap originates. This means that the very heavy shipping rates and demurrage charges have perhaps the decisive influence on the ability of the aluminum smelters to handle and remelt recycled aluminum.

We feel that we are an industry progressive enough to lead the attack on these solid waste problems. However, we will need Federal help, since the problems are of such scope and so vital to our nation that Government assistance is essential to their solution. Freight rates will not become more equitable on their own accord, and other economic incentives are urgently needed now.

We are here to support the NASMI program which would allow us to recover additional hundreds of millions of pounds of scrap aluminum per year. We urge your Committee's assistance in solving this ever-growing solid waste problem.

PREPARED STATEMENT OF BERT ROMBERG

My name is Bert Romberg. I am Vice President in charge of Non-Ferrous Marketing for Commercial Metals Company. Please let me take this opportunity to thank you, Senator Proxmire and Congresswoman Griffiths for this opportunity to appear before your committee in connection with your review of the economics of recycling. Our Company, with headquarters in Dallas, Texas, is one of the largest in the recycling of scrap metal. Each year we supply over 1 million tons of raw material to major metal consuming industries in this country and throughout the world. Our 1,600 employees serve in operating twenty (20) scrap processing plants geographically spread from Florida to California. We also maintain five (5) domestic and nine (9) foreign offices which serve administrative and trading functions in support of our plant operations. In addition, we own an electric furnace steel mill manufacturing reinforcing bars and small shapes, and a copper tube mill which both consume secondary metals as their major source of raw materials. Traditionally, our business orientation has been approximately 60% toward the domestic market and 40% overseas, although this ratio is subject to wide variations depending on economic conditions around the world.

Our major business is to collect society's waste materials and turn them into useable raw materials. We have been ecologists all our industrial lives. To date we have done this without any governmental help, in fact, unfortunately, our operations have often suffered distinct governmental hindrances at all levels—Municipal, County, State and Federal. Therefore, we very much appreciate this opportunity to discuss with you some obvious economic hurdles with which our industry has had to struggle, so that your Committee can act effectively before it is too late, to stimulate the recycling of our dwindling natural resources.

Our company is vitally concerned with two economic problems which have severely limited our ability to recycle the vast quantity of scrap metal in this country. First, the inequitable freight rates which have discriminated against recycled materials, and second, the need for economic incentives to encourage investment in the very expensive, and short-lived equipment required for the processing of scrap metals.

Glaring examples of rank discrimination against recycled metals in terms of freight rates are available on every hand. When it comes to the steel business, ore, coal, limestone, and almost everything that goes into the maufacture of steel can move tremendous distances by rail, but Heavy Melting Steel Scrap generally doesn't move more than a relatively few miles to market. It is well known that if one anticipates a movement of steel scrap from the Southwest to the Pittsburgh district, the rail freight will probably equal the value of some grades of scrap, and might even exceed it.

In the non-ferrous metals field, we are faced with steadily rising freight rates for scrap, in many cases far higher than competing virgin metals are charged. Parenthetically, we should add that each time the railroads have succeeded in getting freight rate increases, their service to the shipper has become proportionately worse.

From the South, Southeast and Southwest to major consuming areas such as Midwest and Northeast points, freight rates for non-ferrous scrap are now between 1¢ and 1½¢ per pound. This means, in copper scrap, 2% to 5% of the delivered value; in aluminum scrap, 8% to 15%; in stainless steel scrap, 10% to 20%. Furthermore, the disparity between rates for virgin material compared to scrap gets continually larger. Some examples of these differences are:

	Per hundred weight
Refined copper:	
Hurley, N. Mex., to Detroit	$1.49
El Paso to New York	1.70
Copper scrap or copper-containing scrap:	
Dallas to Detroit	1.50
Dallas to New York	1.72

Please note that we pay equivalent or higher rates for hauls that are *600 miles shorter.*

	Per hundred weight
Aluminum ingots:	
Los Angeles to Cableton, Mich	$1.75
Los Angeles to Cleveland, Ohio	2.18
Aluminum scrap:	
Los Angeles to Cableton, Mich	2.29
Los Angeles to Cleveland, Ohio	2.42

Similar disparities exist in export rates. On a shipment of primary metal versus scrap metals from Atlantic and Gulf ports to Japan, the following rate relationship exists:

Prime copper per 2,000 pounds	$31.25	Scrap copper per 2,000 pounds	$44.00
Prime aluminum per 2,000 pounds	28.00	Scrap aluminum per 2,000 pounds	45.25
Prime lead per 2,240 pounds	31.50	Scrap lead per 2,000 pounds	46.00
Prime zinc per 2,250 pounds	31.50	Scrap zinc per 2,000 pounds	44.00

We could document hundreds of similar discriminatory rates, but these examples should prove the point. Surely, at a time when the recycling of discarded materials is to be encouraged, such discrimination should not be allowed to continue, especially not by United States subsidized carriers who, through "Conferences", need not even compete in rates for the traffic they carry.

For these reasons, we strongly support the NASMI program for economic and other incentives to recycling, especially equalization of freight rates. We also support the NASMI program of tax and other incentives to encourage the expansion of recycling because of the particular nature of capital plant and equipment required by the recycling industry.

The preparation of secondary materials for recycling is becoming a more sophisticated and investment-oriented business (in terms of money invested in machinery). Some of this machinery runs into the hundreds of thousands of dollars and in many cases a completely equipped processing center can run into the millions of dollars.

The cost of a complete plant for fragmentizing old automobile hulks can easily run into millions of dollars. In times of good business, net returns after taxes in our industry are in the range of 1% to 2% on sales volume. In times of poor

business as we presently have, margins, for all practical purposes, disappear. We therefore feel that incentives are vitally necessary to encourage the business man to make such investments which even in good times are extremely marginal.

Finally, consideration must be given to the unusually rapid rate of attrition involved in the operation of equipment required in recycling; particularly machines such as automobile shredders which, by their very nature rapidly destroy themselves in use and simply do not last as long as the machinery used in the production of virgin metals.

If these kinds of economic incentives we are discussing were implemented our company alone would be able to expand by 50% its own recovery of that valuable "metallic mine above ground" which is now lying idle as solid waste.

For all of these reasons we urge your Committee to give priority consideration to removing these economic hurdles to recycling metallic solid waste.

PREPARED STATEMENT OF RICHARD SCUDDER

Madam Chairman, my name is Richard B. Scudder, and I am Chairman of the Board of Garden State Paper Company with headquarters in Newark, New Jersey.

Garden State Paper Company began ten years ago to make newsprint out of waste paper and this is our only business. Our approximately 350 employees operate mills in New Jersey, Illinois, California and divert from solid waste and recycle over a thousand tons a day of old newspapers.

To support one of our mills, an annual supply of 120,000 tons of old newspapers is necessary. In most parts of the country, collection of such large amounts means long supply lines. To build a mill in Texas, for example, would require tapping the waste market along the Mississippi Valley, and even the West Coast. Freight rates on waste paper have been a major hindrance to a successful economic venture in Texas.

Normally, our mills pay from $26 to $28 a ton for waste paper. Our New Jersey mill, which is suffering a shortage of raw material at the moment, is forced to import from Montreal, Cleveland, and Detroit, at freight rates of $27.40 per ton from Montreal, $16.00 per ton from Cleveland and $16.60 per ton from Detroit. Normally, it costs us $3 or $4 a ton to bring paper from New York or Newark, each ten miles away, and considerably more from Philadelphia and Boston.

While there are huge amounts of waste paper in the New York metropolitan area, and while the city of New York describes itself as "suffocating in waste paper", we have not been able to achieve any economic means of separating it from the waste stream in adequate quantities given the overbearing freight rates which we must pay.

It is also difficult to sell large additional amounts of newsprint in today's market when most large newspapers are able to buy from Canadian firms at very large discounts.

Finally, Garden State has a tissue and toweling mill at Lititz, Pennsylvania, known as Morgan Mills, which has been losing money during the last two years because of inability to sell its product, although we believe the product to be competitive in quality and price. Government incentives are greatly needed to stimulate the sale of products made from waste.

We strongly support the NASMI program of providing tax and other incentives to encourage the reutilization of the vast mountains of paper solid waste which threaten our urban areas. Such a program is badly needed to stabilize the supply of waste paper, to hold down inequitable freight rates and to stimulate the sale of products made from waste.

If the NASMI program is adopted the Garden State Paper Company would eagerly move to substantially increase its diversion of waste paper from the solid waste stream to the recycling stream. We would be able to recycle thousands more tons per week of old newspapers and we could work even more effectively to recover the millions of tons of old newspapers and other secondary fibers which are of such serious environmental concern to America today.

I appreciate the opportunity to appear here today and I urge your Committee and the Congress to remedy these economic inequities now.

Chairman GRIFFITHS. The tax structure has to have some rationalization. What kind of rationalization equals capital gains and how?

Mr. DAVIS. Madam Chairman, the question you asked relates to equalization of capital gains treatment for recycled fiber versus wood pulp.

Obviously the effective tax rate of the paper company which is engaged in growing trees and cutting those trees at the capital gains rate, and producing paper, is lower than a company's effective tax rate which uses a recycled fiber. So, our proposal would really relate to equalization of that after-tax problem through, in essence, a program of giving the user of recycled material a recycling deduction and it would be a percentage based on what is determined after studies to be necessary to equalize that competitive demand advantage.

Chairman GRIFFITHS. What do your suggest it would be? Are you suggesting that if you use recycled materials, and you show this in tax returns, that we simply institute a higher tax on that person?

Mr. DAVIS. In essence it would be a deduction for the use of recycled materials in the marketing process.

Chairman GRIFFITHS. But, on what basis would you have the tax credit?

Mr. DAVIS. It would be based on the cost of recycled material purchased. For example, if you purchased recycled fiber at, say, $100, because you purchased recycled fiber we would assume that you would get an additional deduction.

Chairman GRIFFITHS. Like a tax credit, like the investment tax credit?

Mr. DAVIS. Like the investment tax credit, with the exception that it would be a deduction.

Chairman GRIFFITHS. What kind of a deduction would you give?

Mr. DAVIS. Let's say for paper it is determined at 10 percent, again an additional 10 percent deduction is needed to equalize it. So you would get 110 percent deduction for the cost of goods purchased, in essence.

Chairman GRIFFITHS. So that in reality what you are suggesting is that we meet the problem of the discrepancy in the tax structure by adding another subsidy? Why don't you suggest that we do away with the subsidies already given?

Mr. DAVIS. Well, in the capital gains area, I went through the hearings in 1969 on this subject, the capital gains treatment. And it was my conclusion that after that presentation that there was clear evidence, or the hearings indicated that the capital gains treatment had been effective toward the intended purpose of reforestation and forest management.

As you know, recycled paper or recycled fiber can never replace a tree for the purposes of timber and other uses.

Chairman GRIFFITHS. But it can replace the paper.

Mr. DAVIS. Yes, ma'am.

Chairman GRIFFITHS. And that is really what you are trying to make it do; isn't it? We are not trying to make it replace trees, but paper.

Mr. DAVIS. That is right, an emphasis on using recycled fiber instead of trees in the production of paper.

Chairman GRIFFITHS. How many times can paper be recycled?

Mr. MERRIGAN. Can we put that question to Mr. Scudder, Madam Chairman?

Chairman GRIFFITHS. All right.

Mr. SCUDDER. Depending on the technical methods used, it can be recycled four or five times, anyway, as a practical matter. You might say it can be recycled indefinitely, because as a practical matter it is inconceivable that the use of recycled paper would exceed, say, 40 percent of the total usage in an area. If it does make up 40 percent of the raw material in the area, the number of times that it would be used a third time or a fourth time drops to 1 percent or less, to an insignificant amount which it doesn't affect the strength of the overall finish at all.

Chairman GRIFFITHS. How many times can the materials in cars be recycled?

Mr. SCUDDER. I will have to plead ignorance on automobiles.

Chairman GRIFFITHS. Anybody else?

Mr. BERGMAN. I can speak on the aluminum in automobiles. It can be recycled indefinitely. Once it is remembered that there is no way of knowing recycled from any other type of aluminum, and there is no way of knowing how many times it has been recycled; it is just a question of analysis and proper treatment in the furnaces so that it can be used indefinitely.

Mr. MERRIGAN. Mr. Wein would like to add to that answer, I think.

Chairman GRIFFITHS. All right.

Mr. WEIN. Thank you.

I would like to state that with regard to the other materials the same is true, that metallurgically, secondary metal can be recycled an indefinite number of times provided it is economically feasible.

Chairman GRIFFITHS. Now, I would like to ask Mr. Davis, would you have to have a different type of tax credit, a different amount for each industry or would you have to have a different tax credit for each time it was recycled in each instance?

Would you have to have a different tax credit for each industry?

Mr. DAVIS. I would think that particularly in relation to paper versus metal, very definitely. In the case of the various metals involved that would probably be true also. The depletion allowance, as you know varies. In terms of recycling, you say how many times——

Chairman GRIFFITHS. Now, you have gone through the first recycling and you have given them some type of credit. Now, would they have to have a different credit for a second recycling?

Mr. DAVIS. It would seem so, because the economics of recycling involve the same opportunity for each individual.

Would that be true, do you think, Mr. Merrigan?

Mr. MERRIGAN. I would think that the material may be recycled by a totally different person the second time. You don't keep recycling the same material.

Chairman GRIFFITHS. That is true. But if you recycled it the first time and you got a 10 percent tax credit, does a second recycler get a 12 percent tax credit or can you do it on 10 percent?

Mr. MERRIGAN. No; it would be the same.

Chairman GRIFFITHS. It would be the same?

Mr. DAVIS. Yes, ma'am.

Mr. MERRIGAN. Could I add just one thing?

I think Mr. Scudder was a little bashful when he answered just a little bit ago, because I think you can dramatize the answer you are

trying to get. His company, Garden State, produces newsprint from 100 percent recycled old newspapers today. And the newsprint that his company produces is used today in the newspapers throughout the country: the Chicago Sunday Times, the Washington Post—I could go on and list many others—the San Francisco Examiner, the Newark papers, and so on. I think his business is a dramatic example of just what can be done by just taking old newspaper, deinking it and reusing it. The remarkable thing about it is that the newspaper industry itself finds his product to be superior to the virgin newsprint in many, many ways, and I just thought that he would be an expert to answer this question on reusability.

Chairman GRIFFITHS. Do you have somebody here who recycled oil?

Mr. MERRIGAN. No; we don't. This industry does not cover the recycling of oil.

Chairman GRIFFITHS. I see.

I would like to know how far you ship cars when you recycle cars?

Mr. WEIN. Are you speaking about automobiles?

Chairman GRIFFITHS. Yes.

Mr. WEIN. The scrap car itself is usually shipped, I would say, within a radius of 40, 50, maybe up to 100 miles. The economics would prevent the shipping of it any further. But once the scrap is processed it may then be shipped all the way around the world. As a matter of fact, I would say—I don't know the percentage, but a large percentage of the scrap reclaimed from secondary metals, reclaimed from the scrap cars is shipped to Japan, Europe, and parts of South America.

Chairman GRIFFITHS. Does Japan ship some scrap to the United States, scrap from cars?

Mr. WEIN. At the present time they do not. They do ship some scrap, I believe, into such countries as Taiwan. But most of it they consume themselves. They are a "have-not" nation.

Chairman GRIFFITHS. I was thinking in terms of the ocean freight rates. Are the ocean freight rates different for us on shipping to Japan than they would be in returning from Japan? If they aren't, it will be the only thing.

Mr. WEIN. I am trying to think. I am not really sure I know the answer to that. Maybe Mr. Romberg knows for sure.

Mr. ROMBERG. Madam Chairman, the nature of the project that Japan ships this way isn't really comparable to what we export in general. But, the realities of the situation are that foreign shippers shipping into this Nation enjoy favorable freight rate advantages over what we ship out of this Nation.

You can't compare the materials with metals as we are talking about, because very little scrap comes this way. But in terms of finished goods I am sure of it.

Chairman GRIFFITHS. May I ask if you could economically move a car 40 or 50 miles after it is wrecked; are there sufficient recyclers that are using completely the number of wrecked cars in this country?

Mr. ROMBERG. Madam Chairman, that is one of the big sore spots. There is a great deal of metallic raw material out in the field where the economics of transportation, and in some cases, preparation, will not permit its recovery.

Mr. Schwartz has an example where he is the closest home to some metallics that are located in Montana, and economics forbids his company from getting those metallics, and he needs them.

Chairman GRIFFITHS. Would you answer, Mr. Schwartz?

Mr. SCHWARTZ. It has been estimated that there are between 17 and 20 million abandoned automobiles in the United States. I am in the same business, and this represents 500,000 tons of raw material. And at that same time this material is unobtainable because of freight.

In our particular industry we are running at two-thirds capacity because of the lack of means of bringing this material to market. It is bulky and it has high freight costs. And in the West they will bring automobiles in on a break-even basis maybe 200 miles. Our roads are probably better and travel can be much faster out there but it is unfortunate that this material is lying above ground. We have the facilities and consumers who will buy it; it is a question of freight and economics strictly.

Chairman GRIFFITHS. Now, how could we go about correcting the freight rate as to make it feasible? Do you have a distinction between the freight rates on that or are those cars shipped at the same price than an automobile is shipped today out of Detroit?

Mr. SCHWARTZ. No; a new one is shipped at a different rate; however, if you consider an automobile as a very bulk object, and when it is wrecked you take out the cast aluminum parts, the motor, differential and so forth, you only have about one ton of weight. If cars are pressed as they are, it still is a bulky item, and you can't get very much weight on a truck or a freight car. So, you can't ship it very far.

So these just are constantly piling up, littering the scenery. The material contained can be used. We have a ready market for it. There are about 80 shredding operations in the United States and they are not running at capacity. The people that run them would like to buy more scrap. The nonferrous metal can be utilized. The capacity is there, but they can't be brought in. And it is strictly a freight basis.

Chairman GRIFFITHS. What would you have to do for freight rates to make it economically feasible?

Mr. SCHWARTZ. I would say you would probably have to have a special type of a freight rate. For example, there are freight rates now on returnable containers. We ship something in a drum, and we are able to bring these empty drums back at a differential freight, a preferential freight, if you will. And if the automobiles could be brought to market on a preferential rate, this would be an advantage.

Chairman GRIFFITHS. Have you ever asked the ICC for a proceeding on this?

Mr. SCHWARTZ. We haven't ourselves. I am not a purchaser of automobiles. Automobiles are purchased by the automobile shredders, who are generally people in the scrap iron business, because the bulk of the material is scrap iron.

Chairman GRIFFITHS. Has there ever been a proceeding instituted?

Mr. MERRIGAN. Yes; the industry trade association, NASMI, has been before the ICC on several different occasions. It is not only a matter of preferential freight rates; it is a matter of the shipment of the actual metals after they are recycled, of getting them to be the same as their virgin counterparts. We have been before the ICC several times and the President's Council on Environmental Quality has asked the ICC to act. The Commerce Department has asked them to act. The Interior Department has asked the ICC to act and the Environmental Protection Agency has asked them to act.

Chairman GRIFFITHS. What have they done?

Mr. MERRIGAN. They pleaded inability. I think the ICC is basically a railroad-oriented agency. And our suggestion in the statement would be two things: One, that the ICC reorient itself toward national policy considerations in the rate-fixing there. And the second, and perhaps more effective way to do it is, when the industries are before the Congress, the shipping industry and the railroad industry on these legislative proposals, that Congress put some price on the millions and millions, and I think billions of dollars, that are being asked to support those industries.

In other words, that they be asked to support public policy things as part of the quid pro quo for Government supports.

In other words, just equalize the rates.

Mr. MIGHDOLL. Madam Chairman, one of the tables that we have submitted with our prepared statement is very revealing. In 1960 we had a disparity between rates for recycled materials and virgin materials. The average difference between freight rates for virgin material versus recycled was approximately 13 cents per hundredweight difference. Since that period we have had several general freight rate increases which have had the effect of pyramiding that difference, so that now in 1971, we have closer to an 18- and 19-cent differential, whereas we started out with a 13-cent differential. So, general freight increases and general inattention to our pleas by the ICC have actually worsened the situation.

Chairman GRIFFITHS. It seems to me that those cars could be reclaimed even if the railroads did it as a sort of loss leader. They could give up the idea of demanding exactly the same amount when they are really abandoning a vast volume of business. Twenty million cars would be a tremendous amount of business for the railroads to carry. They are only selling about 10 million cars a year, and most of them are going out on trucks, not on the railroads. I think that would be a tremendous business.

Mr. MERRIGAN. It is not only that, Madam Chairman. The railroads are a very dramatic example of what happens in the export field such as on the west coast, where one of the leading recycling companies had a flourishing market in waste paper with Australia. In other words, there is another "have-not" nation that uses waste paper.

But, the effective shipping rate, the conference rate of wastepaper versus woodpulp is 75 percent higher. Of course, those rates are subject to the Federal Maritime Commission. So, here is a case where all you are trying to do is export it overseas to get rid of the solid waste from the United States to a country overseas which wants to utilize it, but the freight rate is the big problem.

Chairman GRIFFITHS. The Federal Maritime Commission is the real group before whom we should be holding the hearing.

Mr. MERRIGAN. That is correct. That problem really is before them. I think the reason these problems are brought to the Joint Economic Committee is that, first of all, those agencies are subject to congressional control; and second, I think the industries involved—as you remember, the Merchant Marine Act of 1970 created $10 million, I think, of new subsidies to the shipping industries. And similar proposals are sought by the other transportation industries. And I think that if Congress, as they said in the Resource Recovery Act, wants to get on with recycling as a national policy, just like air pollution control, that something has to be put in these types of legislation to make

the recipients of the Federal benefit, the shipping industry and so forth, do something as a quid pro quo for that type of Federal assistance. And this is an area where they should do it.

Chairman GRIFFITHS. I would like to ask about all these glass bottles around everywhere, what do we have to do to get rid of them? I brought my dog down a few weeks ago, and I took him to walk in just a big open field. It was very dangerous. The place was just loaded with glass. What do you do to get rid of the glass bottles?

Mr. BERGMAN. I can't speak for the glass bottle people, but it seems to me generally that this depletion allowance we talk about, in all these things the equivalent of depletion allowance for the use of scrap, and all of these things boils down to the economics of our glass bottles, cans, or whatever it is. If it would pay economically to reuse these things, they would be reused. And it seems to me that like moving the automobiles, that getting rid of the glass bottles, and any of these things, if we had economic markets for them, we would get them off the ground and get them back.

Chairman GRIFFITHS. I would assume that there is a large body of opinion in this country that if we wiped out the depletion allowance we might get more reusable items.

Mr. BERGMAN. That is quite possible. We are speaking from another angle. If there is going to be a depletion allowance, we have to be competitive.

Chairman GRIFFITHS. That is a touchy subject.

Mr. MERRIGAN. We could say just in conclusion—and I am not foreclosing any other questions—that the reason these hearings are so important, as we view it, in 1970 when the Resources Recovery Act was passed almost unanimously—I don't think any votes were cast against the Resources Recovery Act, either in the House or in the Senate—it gave the Economic Protection Administration a series of mandates to study the economic incentives and disincentives, to study the freight procurement problem, and to study freight data problems and all of these other problems we are talking about.

And what we thought is that the Joint Economic Committee, we hope in cooperation with that agency, can come up with the economic answers. The enabling legislation is there in the Resource Recovery Act, and I think the need now is to fill in the economics of it. So, we realize that this is not a legislative committee, but a policy committee. The legislation is on the books to do all these things we have talked about in the Resource Recovery Act. But I do think the need now is to study the economics and come up with the new programs which are going to be tremendously new. We will have to take a completely different approach.

Chairman GRIFFITHS. Perhaps what we ought to do is let the ICC go out of business and put Kresges in charge of running the railroads. It might work better.

Thank you very much, gentlemen, for appearing. I am pleased to have your testimony; I think it is very much to the point. You have touched on what to me is a great national problem, and I am sure we have the ability in this body to solve it.

Our next witness is Mr. Darrow, vice president of the American Paper Institute.

Good morning, Mr. Darrow. You may proceed.

STATEMENT OF JOHN F. DARROW, VICE PRESIDENT, AMERICAN PAPER INSTITUTE, NEW YORK, N.Y.

Mr. DARROW. Thank you very much. I appreciate the opportunity to be here.

My name is John Darrow. I am vice president of the American Paper Institute, the national trade association of the pulp and paper industry.

Our 200-member companies produce more than 90 percent of the wood pulp and paper and paperboard in the United States. We have a very direct interest in the subject matter before the committee this morning. I am going to make a very brief statement, Madam Chairman, and then I will later submit a more detailed statement for the record.[1] It is a very complicated subject, quite obviously.

The gentlemen who are here this morning have pointed out that this is a difficult subject. We will try to help the committee in any way we can.

The paper industry has been recyclers of paper for many years. At the present time about 22 percent of our fibers that we use are actually waste paper. Wood residues, sawdust, chips and slabs are other very important waste products that we use. They constitute about another 22 percent of our fiber. About another 20 percent is also waste material such as rags, cotton, linters, flax, and bagasse. So, the paper industry is very concerned with and deeply involved in the consumption of waste products.

We are the end users of the recycled product. I would like to make a few generalizations and then give you a few statistics and submit myself for any questions you may have, Madam Chairman, and then conclude my statement.

As a generalization, the lower quality waste paper cannot be used to make a higher quality of paper. For example, the newsprint cannot be recycled and then made into a higher quality of paper, into very fine stationery, because the fibers themselves which have been used in making newsprint to begin with are lower quality of fiber. You can't upgrade the use of the fiber; you can downgrade but you cannot upgrade.

To give you some idea as to the complexity of this problem, last year in the United States we used 12 million tons of waste paper. That was about 22 percent of our total raw material. Now, it is true, as was mentioned earlier this morning that the ratio has dropped from about 35 percent consumption during World War II down to about 22 percent at the present time. Quite obviously during World War II when conditions were different and there wasn't the demand for the high quality of paper, much more waste paper proportionately could be used.

On the other hand, the 12 million tons of paper that we are now consuming is a record level. In terms of tons we are at the high point. In terms of the proportion of the total, we dropped down from 35 percent to about 22 percent.

The consumption of various grades of waste paper in the use of paper itself varies greatly by grade. This is again a very complex situation

[1] See detailed statement beginning on p. 64.

where we can't simply talk about using waste paper in the paper industry overall. But, considering the specific varieties of paper it is quite different. In the newsprint field that Mr. Scudder briefly spoke about this morning, his company consumes 100 percent recycled paper in the manufacture of newsprint.

In terms of tons, I mentioned earlier that we consumed 12 million tons of waste paper. In the manufacture of newsprint it is less than 400,000 tons. In white paper, such as that is used for business and stationery purpoes, about 700,000 tons of waste paper is used, of which only 300,000 tons are deinked—in other words, the stock has to be deinked.

In the tissue area, the manufacturing of tissue paper, less than 1 million tons of waste paper are used. The largest area where waste papers are used today is in what we call combination boxboard. This is the board that is used for the boxes that you are familiar with in which you get your haberdashery; in which you get your laundry, et cetera. Here the consumption of waste paper is about 6 and a half million tons, with another almost two million tons consumed in other types of paperboard.

So, it is in the paperboard area where the largest consumption of waste paper is today, and where, in my opinion, concentration must be placed for increased use in the future.

The American Paper Institute, the organization of which I am an officer, conducts a very detailed capacity survey each year. We are going to issue our capacity survey for 1971 in a few days. I have with me some of the advance information which I believe would be of interest to the committee.

At the present time in the United States there is a total capacity—let me put the frame of reference in this way: we produce at the present time about 54 million tons of paper and board each year. Against that the capacity to deink paper is approximately 1,200,000 tons. Projecting increases in capacity in the deinking of wastepaper for 1973, there is only a very modest increase in the wastepaper which will be deinked for use in paper manufacturing.

And I believe primarily the low rate at which the deinking capacity is projected to increase is a matter of economics.

Without going into the details, Madam Chairman, of the recommendations that were made earlier this morning, I believe that many of them in the tax area certainly deserve very careful consideration. There must be economic stimulation for the further significant increase in the consumption of waste paper. What forms of economic stimulation that might be I am not prepared to say at this time. The proposals that were made here this morning which would directly affect many of our member companies quite favorably, I believe, are quite complex. And I think they deserve a great deal of study. And in our written comments we hope that we will have time to be able to analyze the recommendations and to make our recommendations with respect to the statements that were made.

This concludes my oral statement, Madam Chairman.

(The following information was subsequently supplied for the record by Mr. Darrow:)

AMERICAN PAPER INSTITUTE,
New York, N.Y., November 11, 1971.

Mr. JAMES W. KNOWLES,
Director of Research, Joint Economic Committee,
New Senate Office Building, Washington, D.C.

MY DEAR MR. KNOWLES: I would like to submit the following as a statement for the record and as an extension of my remarks at the Fiscal Policy Subcommittee of the Joint Economic Committee hearing last Monday, November 8:

(1) A copy of our most recent capacity and waste paper utilization study which was released yesterday, Wednesday, November 10. Pages 4 and 5 contain a statement with respect to waste paper utilization by the paper industry and pages 18 and 19 contain much detail with respect to waste paper utilization. In this connection, I would call your attention to the fact that waste paper consumption by the paper industry last year was in excess of 12 million tons, not 11 million, as referred to by Mr. Mighdoll in his testimony before the Subcommittee. Other capacity data in the enclosed booklet no doubt will be useful to you.

(2) A two-page tabulation, table 1 of which indicates the proportion of waste paper, wood waste residues, and other fibrous materials which were used by the paper industry in 1970, and table 2 of which is a more detailed breakdown of information contained in the waste paper utilization survey referred to in No. 1 above.

(3) A statement entitled "Comments: Paper & Paperboard Production and Waste Paper Consumption" which refers to the data in No. 2 above and which indicates the additional amounts of waste paper which might be consumed by the paper industry in the near term future.

(4) A copy of a letter from Mr. Rod Kreger, Deputy Administrator of the GSA, dated August 10, 1971, in which he states the intention of the GSA to retain the general definition issued on May 17; a copy of a letter from Mr. George W. Ritter, Assistant Commissioner of the GSA to me, dated May 17, 1971, which is the definition referred to by Mr. Kreger; and a copy of a letter, dated August 13, 1971, from Mr. Kreger to Mr. Edwin A. Locke, Jr., President of this Institute, referring to an experimental program to require the inclusion of "post-consumer" waste in a particular item of corrugated fiberboard. This correspondence is sent to you since there was considerable discussion concerning the definition of recycled fiber, especially in the Honorable John Dow's testimony.

I would like to make one general comment with respect to an Associated Press dispatch on November 8 with respect to the hearings before the Fiscal Policy Subcommittee which quoted one of the witnesses, Mr. M. G. Mighdoll, as stating, "The paper industry would soon increase its utilization of recycled paper stock from the present 20 per cent to at least 50 per cent of their raw material and would thus increase the annual conservation of trees from 200 million to 500 million." For the record, I would like to comment that whatever incentives the Congress might offer, it would not be possible for the paper industry to "soon increase" its utilization of recycled paper stock from 20 to at least 50 per cent as Mr. Mighdoll is quoted as saying. In my judgment, it is highly unlikely that a 50 per cent figure ever could be obtained under the most favorable circumstances. During World War II 35 per cent was the highest ever attained under maximum conditions.

If we can supply you with any additional information, or be of help to your Committee in any way, please feel free to call upon me.

With best wishes,

Sincerely,

JOHN F. DARROW, *Vice President.*

AMERICAN PAPER INSTITUTE

PAPER PAPERBOARD & WOOD PULP CAPACITY

WASTE PAPER UTILIZATION

1970-1973

WITH ADDITIONAL DATA FOR 1974-1976

TABLE OF CONTENTS

COMMENTARY

PAPER AND PAPERBOARD

This year's survey covers 730 wood pulp, paper and paperboard mills owned by 325 companies and representing virtually all such mills in the U.S. The 1970 survey included more than 750 mills. The difference between the two years' totals is due both to the unusually large number of old mills shut down, and to the small number of new mills opened, during the intervening 12 months.

Firm plans for capacity additions in the three year period 1972-1974 will increase U.S. capacity by 3.8 million short tons, or 6.3% above the presently forecast 1971 year end capacity of 60.4 million tons. This expansion will consist of 16 new machines (but only two major new mills) with an aggregate rated capacity of 2.1 million tons, and of net improvements and other changes that will provide an additional 1.7 million tons.

The total 3.8 million ton capacity increase forecast for the next three years is the smallest in tonnage since the early 1960's and the smallest percentage increase of any postwar three year period. In that regard it is worth noting that, a year ago, the capacity increase during 1970 was expected to be nearly 2.0 million tons. The actual net increase came to only 580,000 tons largely as a result of a number of permanent shut downs that unexpectedly took place in the latter months of the year, and also to delays in the completion of new mills and machines.

Table No. 1 below presents capacity figures for the 20 year period 1955-1974 which includes the three year period covered by the present survey.

Capacity increases in each of the major grades of paper, as shown in Table No. 2, are now planned at lower levels than their average annual growth rates over the past 16 years. Expansion in printing and writing grades will now average only 1.9% per year over the next years, a very low growth rate for this major paper category. In addition, a number of existing machines were idled during 1970 and 1971 and, in most instances, were described by company managements as permanent shut downs. The removal of these machines reduced total capacity for printing and writing grades by more than 400,000 tons.

Paperboard capacity will increase by 2.2 million tons from the end of 1971 to the end of 1974. Because of the permanent closing of a number of combination paperboard mills in 1970 and 1971, and several postponements and reductions in previously planned expansion projects for other grades, this increase will be added to a considerably lower year end 1971 base of 28.5 million tons, rather than the 29.8 million tons previously anticipated.

Unbleached kraft paperboard capacity at the end of 1971 is now expected to reach 12.8 million tons, which is 308,000 tons less than planned by reporting com-

TABLE 1 YEAR END CAPACITY - ALL GRADES PAPER AND PAPERBOARD

THOUSANDS OF TONS

YEAR	NET ADDITIONS DURING YEAR	TOTAL CAPACITY YEAR END	PERCENT INCREASE
1955	996	33,169	3.0
1956	1,852	35,021	5.6
1957	2,330	37,351	6.7
1958	1,290	38,641	3.5
1959	1,591	40,232	4.1
1960	1,102	41,334	2.7
1961	1,466	42,800	3.5
1962	625	43,425	1.5
1963	1,248	44,671	2.9
1964	1,579	46,250	3.5
1965	1,823	48,073	3.9
1966	3,337	51,410	6.9
1967	2,569	53,979	5.0
1968	2,362	56,341	4.2
1969	2,131	58,372	3.8
1970	580	58,952	1.0
1971F	1,448	60,400	2.5
1972F	1,655	62,055	2.7
1973F	1,470	63,475	2.3
1974F	739*	64,214*	1.2

F – Forecast
* Excludes 173,000 tons of capacity under consideration.

TABLE 2 GROWTH TRENDS IN PAPER AND PAPERBOARD CAPACITY

THOUSANDS OF TONS

GRADES	ADDITIONS 1956 - 1971		CAPACITY FORECAST	ADDITIONS 1972 - 1974			
				COMMITTED		COMMITTED AND TENTATIVE	
	16 YEAR INCREASE	AVERAGE ANNUAL GROWTH	END 1971	3 YEAR INCREASE	AVERAGE ANNUAL GROWTH	3 YEAR INCREASE	AVERAGE ANNUAL GROWTH
TOTAL ALL GRADES	27,731	3.8%	60,400	3,814	2.1%	4,187	2.3%
TOTAL PAPER	12,981	4.8	26,138	1,260	1.6	1,413	1.8
NEWSPRINT	1,941	2.2	3,477	249	2.3	319	3.0
PRINTING, WRITING & RELATED	6,319	4.5	12,519	745	1.9	774	2.0
PACKAGING & IND. CONV.	1,698	2.1	5,886	30	.2	30	.2
TISSUE	2,422	5.4	4,260	237	1.8	291	2.2
TOTAL PAPERBOARD	12,856	3.8	28,468	2,231	2.5	2,451	2.8
UNBL. KRAFT	8,156	6.6	12,770	1,028	2.6	1,028	2.6
SOLID BLEACHED	2,232	6.4	3,555	439	4.0	439	4.0
SEMI-CHEMICAL	2,595	6.6	4,058	558	4.4	778	6.0
COMBINATION	(126)	(.7)	8,086	205	.8	205	.8
TOTAL CONSTRUCTION PAPER & BOARD & WET MACHINE BOARD	1,994	2.7	5,794	323	1.8	323	1.8

panies in last year's survey. While most of these reductions result from delayed expansions that will be picked up by the end of 1973, some 125,000 tons represent shifts to paper grades and shifts from kraft to combination paperboard.

Solid bleached and semi-chemical paperboard increases have also been affected by delays and reductions in previously announced projects. Although total plans for semi-chemical expansion still show a relatively strong growth of 4.4% annually and will achieve an industry total of 4.6 million tons by 1973, this is still considerably less than the previous average annual growth rate of 6.6%. An interesting aspect of this reduced growth is the announced postponement of a major new machine installation originally scheduled for 1973 pending a study of its "environmental impact".

Our data on construction grades of paper and board have been modified this year to include the capacities of dry process hard pressed board mills. This grade is regularly included in industry production figures, which are based on vegetable fiber content rather than method of manufacture, and its inclusion in this survey was the major reason for the capacity increase of 358,000 tons over last year's 1971 year end figure for this grade. On the other hand, maximum operating days, particularly for insulating board, have been revised downward to exclude days reserved for mineral fiber operation. This revision has reduced maximum operating days for total construction grades from 334 days reported in our 1970 report to 327 days, equivalent to some 119,000 tons of capacity.

PAPER AND PAPERBOARD CAPACITY UNDER CONSIDERATION

In addition to committed expansion projects, our survey includes information on projects under serious consideration. This information was requested from senior management officials in all companies participating in the survey. As shown in Table No. 3, substantially less additional capacity than last year is now under serious consideration.

TABLE 3 PAPER AND PAPERBOARD CAPACITY UNDER CONSIDERATION

THOUSANDS OF TONS

GRADES	PLANS REPORTED IN: 1970 SURVEY 1973	1974	1975	3 YEAR TOTAL	1971 SURVEY 1974	1975	1976	3 YEAR TOTAL
TOTAL ALL GRADES	961	827	874	2,662	373	308	641	1,322
TOTAL PAPER	562	462	506	1,530	153	128	391	672
NEWSPRINT	245	249	145	639	70	32	144	246
PRINTING, WRITING & RELATED	248	80	169	497	29	96	247	372
PACKAGING & IND. CONV.	0	54	0	54	0	0	0	0
TISSUE	69	79	11	159	54	0	0	54
UNSPECIFIED	0	0	181	181	0	0	0	0
TOTAL PAPERBOARD	399	365	368	1,132	220	130	250	600
UNBL. KRAFT	250	165	0	415	0	0	250	250
SOLID BLEACHED	0	126	0	126	0	0	0	0
SEMI-CHEMICAL	149	59	27	235	220	130	0	350
COMBINATION	0	15	269	284	0	0	0	0
UNSPECIFIED	0	0	72	72	0	0	0	0
TOTAL CONSTRUCTION PAPER & BOARD & WET MACHINE BOARD	0	0	0	0	0	50	0	50

WOOD PULP

As with paper and paperboard, wood pulp capacities for 1972 through 1974 have been revised downward as compared with those reported a year ago and are well below their historical growth rates. Much of the reduction from last year is the result of postponements of previously scheduled expansions and of the unanticipated closing of several pulp mills in 1970 and 1971.

On a revised base of 48.0 million tons at the end of 1971, Table No. 4 shows that

net additions for the period 1972-1974 are forecast to total 3.4 million tons, equivalent to an average annual growth rate of 2.3%. During the same period, planned expansion of machine dried wood pulp totals 404,000 tons, or a growth rate of 1.8% per year.

The long established decline in sulphite paper grade pulp capacity will continue during the period of this survey, though at a reduced rate. Several paper companies, however, have recently announced that they are reviewing the feasibility of continuing certain sulphite pulp mills in operation in the light of environmental and other considerations. This may result in a decline in sulphite pulp capacity at a faster rate than shown in this survey.

TABLE 4 GROWTH TRENDS IN U.S. WOOD PULP CAPACITY

THOUSANDS OF TONS

GRADES	ADDITIONS 1956 - 1971		CAPACITY FORECAST	ADDITIONS 1972 - 1974			
				COMMITTED		COMMITTED AND TENTATIVE	
	16 YEAR INCREASE	AVERAGE ANNUAL GROWTH	END 1971	3 YEAR INCREASE	AVERAGE ANNUAL GROWTH	3 YEAR INCREASE	AVERAGE ANNUAL GROWTH
TOTAL ALL GRADES	24,311	4.5%	47,961	3,385	2.3%	3,645	2.5%
DISSOLVING & SPECIAL ALPHA	662	3.0	1,775	174	3.2	174	3.2
SULPHITE PAPER GRADES	(446)	(.9)	2,395	(25)	(.3)	(25)	(.3)
SULPHATE & SODA PAPER GRADES	19,907	6.2	32,077	2,208	2.2	2,208	2.2
SEMI - CHEMICAL	1,883	4.3	3,831	460	3.9	670	5.5
GROUNDWOOD	1,127	1.8	4,644	337	2.4	387	2.7
OTHER	1,178	2.9	3,239	231	2.3	231	2.3

WOOD PULP CAPACITY UNDER CONSIDERATION

New wood pulp expansion projects reported as being under serious consideration this year are shown in Table No. 5 below. Some 895,000 tons of new capacity is presently contemplated for the years 1974 through 1976 compared to 1.6 million tons under consideration last year for 1973 through 1975.

TABLE 5 U.S. WOOD PULP CAPACITY UNDER CONSIDERATION

THOUSANDS OF TONS

GRADES	PLANS REPORTED IN: 1970 SURVEY				1971 SURVEY			
	1973	1974	1975	3 YEAR TOTAL	1974	1975	1976	3 YEAR TOTAL
TOTAL ALL GRADES	638	675	282	1,595	260	191	444	895
SULPHATE PAPER GRADES	443	392	20	855	0	111	286	397
GROUNDWOOD	195	238	148	581	50	30	158	238
SEMI - CHEMICAL	0	45	25	70	210	0	0	210
UNSPECIFIED	0	0	89	89	0	50	0	50

NORTH AMERICAN WOOD PULP CAPACITY

At time of publication, it is not possible to include in this survey a current analysis of North American wood pulp capacity as has been done in previous surveys, due to the lack of up-to-date Canadian data. We understand that the 1971 Canadian survey, prepared by the Canadian Pulp and Paper Association, will be completed by the end of the year.

WASTE PAPER

For the first time we have included a study of waste paper utilization in our annual capacity study. This study is designed to provide reliable and much needed data on a valuable paper making material. Table No. 6 shows that the paper and

paperboard industry consumed 12 million tons in 1970, and that consumption will rise to 13 million tons in 1973. At least 200 of the 325 U.S. paper companies will consume some waste paper regularly during this period.

TABLE 6 WASTE PAPER CONSUMPTION IN PAPER AND PAPERBOARD MANUFACTURE

THOUSANDS OF TONS

GRADES	CONSUMPTION IN 1970	INCREASE OVER PREVIOUS YEAR END							
		1971		1972		1973		TOTAL	
TOTAL ALL GRADES	12,021	324	2.7%	341	2.8%	385	3.0%	1,050	8.7%
PAPER	2,226	153	6.9	74	3.1	145	5.9	372	16.7
PAPERBOARD	8,330	153	1.8	234	2.8	225	2.6	612	7.3
CONSTRUCTION PAPER & BOARD, MOLDED PULP & OTHER	1,465	18	1.2	33	2.2	15	1.0	66	4.5

Waste paper included in the study covered usage for paper, paperboard, construction grades, molded pulp and bituminous pipe products, but excluded exports and waste paper consumed in shredded packaging and other miscellaneous uses. Our definition of waste paper conforms to that used by the General Services Administration of the Federal Government for its regular purchases of paper and paperboard products. It includes converting and some finishing wastes that may not be included in statistics published by the Census Bureau of the Department of Commerce, which does not specifically define waste paper in its industry questionnaire.

CONCLUSION

This year's survey clearly indicates that the paper industry is at present building substantially less new capacity than in the past. With the industry's long term growth having been in the range of 4% to 5% annually, questions naturally arise as to the cause of the current slowdown.

Some of the answers are well known. Our tax system weighs more heavily on capital formation than those of most industrial countries. Inflation has brought about such sharp rises in costs that our highly competitive industry, despite good operating rates relative to capacity, has been unable adequately to offset them with larger revenues and greater productivity. New laws and regulations on the abatement of air and water pollution have placed heavy burdens of capital expenditures and operating costs on the industry. For an increasing number of companies, the return on investment is currently so low as to make the building of new capacity unjustifiable. Additionally, the relative stagnation of the economy in the last year and a half has made life more difficult for an industry that, in the past, has benefited consistently from strong expansion.

Other answers are much less clear, and the resulting uncertainty is disturbing to confidence in paper as in other industries. What specifically will be the rules and regulations of the government's anti-inflation program? What is likely to come from the government's efforts to bring about a higher rate of economic expansion? What will be the effect of the 10% import surcharge on international trade where the U.S. paper industry's exports have expanded so impressively in the last decade? Sound and reassuring prospects in such key areas as these must become clearly visible before the paper industry can be expected to resume its secular rate of growth and play a full part in the domestic and international market place.

Edwin A. Locke, Jr.
President
American Paper Institute

November, 1971

Paper and Paperboard Capacity 1970-1974 Summary by Group

Year End Annual

PRACTICAL MAXIMUM CAPACITY

GRADES	1970	1971	1972	1973	1974*
TOTAL ALL GRADES PAPER AND PAPERBOARD	58,952	60,400	62,055	63,475	64,214
TOTAL PAPER	25,806	26,138	26,588	27,025	27,398
NEWSPRINT	3,460	3,472	3,481	3,564	3,721
PRINTING, WRITING and RELATED	12,219	12,519	12,940	13,094	13,265
of which solid bleached bristols	1,112	1,113	1,118	1,123	1,132
PACKAGING AND INDUSTRIAL CONV.	5,940	5,886	5,828	5,875	5,916
TISSUE	4,185	4,260	4,338	4,492	4,497
TOTAL PAPERBOARD	27,619	28,468	29,523	30,376	30,699
UNBLEACHED KRAFT	12,307	12,770	13,420	13,708	13,798
of which kraft linerboard	11,516	11,964	12,594	12,843	12,904
SOLID BLEACHED	3,472	3,555	3,598	3,807	3,993
SEMI-CHEMICAL	3,756	4,058	4,329	4,594	4,616
COMBINATION	8,084	8,086	8,176	8,267	8,291
TOTAL CONSTRUCTION PAPER AND BOARD AND WET MACHINE BOARD	5,527	5,794	5,944	6,074	6,117
CONSTRUCTION PAPER	2,042	2,108	2,141	2,148	2,151
WET MACHINE BOARD	166	174	175	175	175
INSULATING AND HARD PRESSED BOARD	3,318	3,512	3,628	3,752	3,791

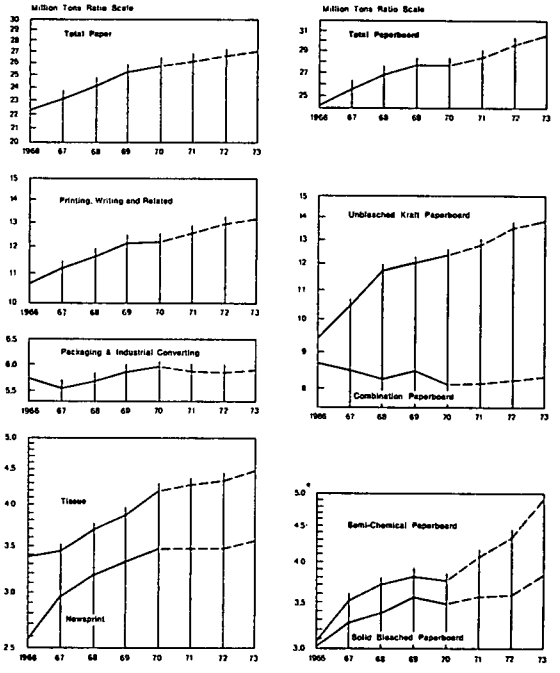
THOUSANDS OF TONS

1971	1972	1973	1974*
59,903	61,505	62,965	63,861
26,084	26,354	26,816	27,256
3,472	3,477	3,500	3,679
12,454	12,737	13,014	13,178
1,112	1,115	1,120	1,127
5,912	5,834	5,879	5,899
4,244	4,306	4,423	4,500
28,118	29,281	30,106	30,490
12,595	13,325	13,629	13,770
11,797	12,509	12,781	12,876
3,513	3,576	3,748	3,839
3,938	4,264	4,492	4,603
8,072	8,116	8,237	8,278
5,701	5,870	6,043	6,115
2,075	2,124	2,144	2,149
172	175	175	175
3,453	3,570	3,723	3,790

Capacity additions presented here for 1974 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Capacity Trends by Grade

YEAR END



Wood Pulp Capacity 1970-1974 Summary by Group

Year End

PRACTICAL MAXIMUM CAPACITY

GRADES	1970	1971	1972	1973	1974 *
TOTAL WOOD PULP	46,471	47,961	49,631	50,841	51,346
DISSOLVING	1,768	1,775	1,801	1,926	1,949
SULPHITE PAPER GRADES	2,403	2,395	2,417	2,397	2,370
Bleached	1,941	1,963	1,952	1,933	1,905
Unbleached	463	431	464	464	464
SULPHATE PAPER GRADES	30,842	31,660	32,810	33,572	33,868
Bleached	11,753	12,123	12,762	13,121	13,274
Semi-Bleached	2,246	2,282	2,306	2,331	2,403
Unbleached	16,843	17,255	17,742	18,121	18,191
SODA	193	417	417	417	417
SEMI-CHEMICAL	3,684	3,831	4,063	4,252	4,291
GROUNDWOOD	4,638	4,644	4,799	4,841	4,981
DEFIBRATED/EXPLODED	2,787	3,083	3,169	3,279	3,316
SCREENINGS	156	156	156	156	156
TOTAL MACHINE DRIED WOOD PULP	7,247	7,455	7,695	7,919	7,859
DISSOLVING	1,768	1,775	1,801	1,926	1,926
BLEACHED SULPHITE	761	772	772	772	772
UNBLEACHED SULPHITE	71	71	71	71	71
BLEACHED SULPHATE	4,384	4,563	4,841	4,938	4,873
UNBLEACHED SULPHATE	261	273	209	211	216
ALL OTHER	1	1	1	1	1

Annual

THOUSANDS OF TONS

1971	1972	1973	1974*
47,516	48,907	50,373	51,056
1,772	1,789	1,898	1,951
2,414	2,395	2,408	2,385
1,966	1,959	1,944	1,921
449	437	465	465
31,364	32,397	33,287	33,649
12,009	12,488	12,982	13,117
2,264	2,294	2,315	2,379
17,091	17,615	17,990	18,153
372	417	417	417
3,814	3,959	4,143	4,253
4,680	4,669	4,808	4,931
2,944	3,125	3,256	3,314
156	156	156	156
7,345	7,516	7,825	7,873
1,772	1,789	1,898	1,950
767	772	772	772
71	71	71	71
4,468	4,642	4,873	4,865
266	241	210	214
1	1	1	1

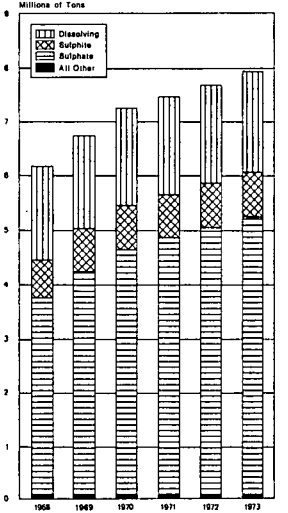
Capacity additions presented here for 1974 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Capacity Trends by Grade

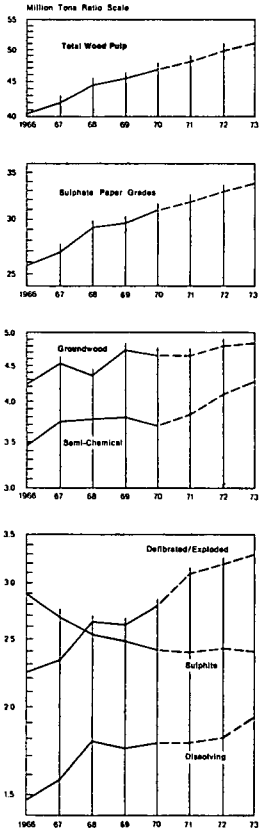
YEAR END

Machine Dried Wood Pulp

Millions of Tons



Million Tons Ratio Scale



Paper, Paperboard and Wood Pulp Capacity — Regional Distribution

Year End 1970 and 1973

PRACTICAL MAXIMUM CAPACITY — THOUSANDS OF TONS

TOTAL U.S. CAPACITY END OF 1970	TOTAL U.S. CAPACITY END OF 1973	GRADES	NEW ENGLAND 1970	NEW ENGLAND 1973	MID. ATLANTIC 1970	MID. ATLANTIC 1973	E. NO. CENTRAL 1970	E. NO. CENTRAL 1973	W. NO. CENTRAL 1970	W. NO. CENTRAL 1973	SO. ATLANTIC 1970	SO. ATLANTIC 1973	E. SO. CENTRAL 1970	E. SO. CENTRAL 1973	W. SO. CENTRAL 1970	W. SO. CENTRAL 1973	MOUNTAIN and PACIFIC 1970	MOUNTAIN and PACIFIC 1973
58,952	63,475	TOTAL ALL GRADES PAPER AND PAPERBOARD	4,748	5,144	6,354	6,556	10,057	10,430	1,587	1,654	13,623	14,600	7,137	7,646	7,106	8,409	8,340	8,987
25,806	27,025	TOTAL PAPER	3,660	4,072	3,411	3,492	5,070	5,229	594	630	3,520	3,544	2,792	3,004	3,188	3,324	3,571	3,729
3,460	3,564	NEWSPRINT	417	417	149	149	113	113	- -	- -	339	367	833	784	721	762	888	972
12,219	13,094	PRINTING, WRITING and RELATED	2,419	2,741	1,926	2,015	3,197	3,274	571	605	1,275	1,330	747	1,007	1,130	1,147	954	975
1,112	1,123	of which solid bleached bristols	114	114	20	17	114	114	1	1	254	269	90	90	404	404	115	115
5,940	5,875	PACKAGING AND INDUSTRIAL CONV.	367	384	300	252	628	640	23	26	1,723	1,581	739	740	1,247	1,327	913	924
4,185	4,492	TISSUE	457	530	1,036	1,076	1,132	1,202	- -	- -	182	266	473	473	88	88	817	857
27,619	30,376	TOTAL PAPERBOARD	895	879	2,087	2,084	4,021	4,233	438	420	9,514	10,407	3,439	3,590	3,172	4,310	4,053	4,453
12,307	13,708	UNBLEACHED KRAFT	- -	- -	- -	- -	- -	- -	- -	- -	6,194	6,707	2,232	2,269	1,704	2,405	2,177	2,328
11,516	12,845	of which kraft linerboard	- -	- -	- -	- -	- -	- -	- -	- -	5,770	6,261	2,168	2,200	1,442	2,097	2,136	2,236
3,472	3,807	SOLID BLEACHED	34	33	- -	- -	124	124	- -	- -	1,382	1,557	626	625	871	1,027	435	440
3,756	4,594	SEMI-CHEMICAL	179	183	- -	- -	1,128	1,195	176	176	1,103	1,294	333	418	352	619	485	709
8,084	8,267	COMBINATION	682	663	2,087	2,084	2,769	2,913	262	244	834	850	248	277	245	259	957	977
5,527	6,074	TOTAL CONSTRUCTION PAPER AND BOARD	192	193	856	979	966	1,018	555	604	589	649	906	1,052	747	774	716	805
2,042	2,148	CONSTRUCTION PAPER	73	73	514	538	564	594	102	117	177	186	87	87	330	348	195	205
166	175	WET MACHINE BOARD	59	60	65	66	28	28	- -	- -	- -	- -	12	19	- -	- -	2	2
3,318	3,752	INSULATING AND HARD PRESSED BOARD	60	60	277	375	374	396	453	487	412	464	807	946	417	426	518	597
46,471	50,841	TOTAL WOOD PULP	2,797	3,092	1,357	1,676	3,209	3,512	959	1,041	14,598	15,625	7,586	8,104	7,069	8,428	8,896*	9,362*
1,768	1,926	DISSOLVING	- -	- -	- -	- -	- -	- -	- -	- -	600	747	285	285	- -	- -	883	894
2,403	2,397	SULPHITE PAPER GRADES	484	479	143	163	567	535	44	44	2	2	- -	- -	- -	- -	1,163	1,174
1,941	1,933	Bleached	292	253	124	163	545	516	44	44	2	2	- -	- -	- -	- -	934	954
463	464	Unbleached	193	226	19	- -	22	19	- -	- -	- -	- -	- -	- -	- -	- -	229	220
30,842	33,572	SULPHATE PAPER GRADES	1,104	1,260	312	487	766	992	231	262	12,362	13,024	5,259	5,555	5,734	6,758	5,074	5,234
11,753	13,121	Bleached	1,037	1,193	312	487	576	801	196	228	3,404	3,703	1,925	2,156	2,439	2,658	1,864	1,894
2,246	2,331	Semi-Bleached	24	24	- -	- -	25	26	10	10	818	872	556	559	530	538	283	301
16,843	18,121	Unbleached	43	43	- -	- -	165	165	24	24	8,140	8,448	2,778	2,839	2,765	3,562	2,928	3,040
193	417	SODA	10	11	86	310	- -	- -	- -	- -	- -	- -	93	93	- -	- -	4	4
3,684	4,252	SEMI-CHEMICAL	140	157	325	134	987	1,046	265	265	913	1,067	429	494	259	537	366	552
4,638	4,841	GROUNDWOOD	953	1,079	247	247	462	502	266	279	385	398	844	795	694	739	787	801
2,787	3,279	DEFIBRATED/EXPLODED	100	100	244	334	427	438	153	189	313	364	634	840	319	331	597	682
156	156	SCREENINGS	5	6	- -	- -	- -	- -	- -	- -	23	23	42	42	64	64	22	22

*Includes non-continental U.S.

Capacity by Grade — Paper 1970–1974

Construction Paper and Board

PRACTICAL MAXIMUM CAPACITY — THOUSANDS OF TONS

	TOTAL ALL GRADES PAPER AND PAPER-BOARD		TOTAL PAPER	NEWSPRINT	PRINTING, WRITING AND				RELATED			PACKAGING AND INDUSTRIAL CONVERTING				TISSUE	CONSTRUCTION PAPER & BOARD & WET MACHINE BOARD					
																				Insulating and Hard Pressed Board		
				Total	Total	Ground-wood Uncoated	Machine and Off-Machine Coated	Book Uncoated and Chemical Writing	Cotton Fiber	Thin Papers	Solid Bleached Bristols	Total	Unbleached Kraft	Other Packaging and Industrial Converting	Special Industrial	Total	TOTAL	Construction Paper	Wet Machine Board	Total	Insulating Board	Hard Pressed Board
YEAR END 1970-1974	58,952	1970 Yearly Rate	25,806	3,460	12,219	1,230	3,700	5,702	153	322	1,112	5,940	4,070	1,316	554	4,185	5,527	2,042	166	3,318	1,721	1,597
	171.04	CAPACITY Daily Rate	74.37	9.88	35.28	3.56	10.57	16.35	.49	.93	3.18	17.11	11.57	3.80	1.74	12.11	16.93	6.06	.53	10.33	5.65	4.68
	345	END of YEAR Number of Days	347	350	346	346	350	345	313	345	350	347	352	347	319	346	327	337	312	321	305	341
	1,078	1971 New Machines	413	11	352	89	- -	258	- -	5	- -	1	- -	1	- -	51	82	- -	6	76	- -	76
	349	Net Improvements	(82)	1	(52)	62	5	(107)	(6)	(6)	- -	(55)	(25)	(34)	4	24	185	66	2	117	40	77
	60,400	CAPACITY Yearly Rate	26,138	3,472	12,519	1,380	3,705	5,853	147	321	1,113	5,886	4,045	1,283	558	4,260	5,794	2,108	174	3,512	1,761	1,750
	175.17	END of YEAR Daily Rate	75.26	9.91	36.07	3.99	10.56	16.94	.47	.93	3.18	16.95	11.50	3.70	1.75	12.33	17.78	6.26	.56	10.96	5.77	5.19
	345	Number of Days	347	350	347	346	351	345	313	345	350	347	352	347	319	346	326	337	313	320	305	337
	754	1972 New Machines	241	- -	205	135	- -	70	- -	- -	- -	2	- -	2	- -	34	- -	- -	- -	- -	- -	- -
	901	Net Improvements	210	9	217	(68)	138	143	(4)	2	6	(61)	(75)	2	12	44	150	33	- -	117	36	81
	62,055	CAPACITY Yearly Rate	26,588	3,481	12,940	1,447	3,843	6,065	144	323	1,118	5,828	3,970	1,286	570	4,338	5,944	2,141	175	3,628	1,797	1,831
	179.89	END of YEAR Daily Rate	76.55	9.93	37.27	4.18	10.95	17.35	.46	.94	3.19	16.80	11.29	3.72	1.79	12.55	18.22	6.36	.56	11.31	5.89	5.42
	345	Number of Days	347	350	347	346	351	346	312	345	350	347	352	347	319	346	326	337	313	321	305	338
	888	1973 New Machines	392	159	18	- -	18	- -	- -	- -	- -	79	79	- -	- -	136	95	- -	- -	95	- -	95
	531	Net Improvements	45	(77)	136	6	41	80	- -	4	5	(32)	(48)	3	13	18	35	7	- -	28	16	12
	63,475	CAPACITY Yearly Rate	27,025	3,564	13,094	1,454	3,901	6,145	144	327	1,123	5,875	4,001	1,291	583	4,492	6,074	2,148	175	3,752	1,813	1,938
	183.99	END of YEAR Daily Rate	77.81	10.16	37.72	4.20	11.12	17.78	.46	.95	3.21	16.93	11.38	3.72	1.83	13.00	18.62	6.38	.56	11.69	5.94	5.75
	345	Number of Days	347	351	347	346	351	346	312	345	350	347	352	347	319	345	326	337	313	321	305	337
	475	1974 * New Machines	265	168	89	- -	89	- -	- -	- -	- -	8	8	- -	- -	- -	36	- -	- -	36	- -	36
	264	Net Improvements	108	(11)	82	13	12	46	- -	2	9	33	16	3	14	5	7	3	- -	4	4	- -
	64,214	CAPACITY Yearly Rate	27,398	3,721	13,265	1,467	4,002	6,191	144	329	1,132	5,916	4,025	1,294	597	4,497	6,117	2,151	175	3,791	1,817	1,974
	186.09	END of YEAR Daily Rate	78.88	10.61	38.20	4.24	11.40	17.91	.46	.96	3.23	17.05	11.45	3.73	1.87	13.02	18.75	6.38	.56	11.80	5.95	5.85
	345	Number of Days	347	351	347	346	351	346	312	345	350	347	352	347	319	345	326	337	313	321	305	337
ANNUAL 1971-1974	59,903	1971 ANNUAL CAPACITY	26,084	3,472	12,454	1,328	3,698	5,845	150	321	1,112	5,912	4,057	1,299	556	4,244	5,701	2,075	172	3,453	1,741	1,712
	913	1972 New Machines	184	- -	153	49	- -	102	- -	2	- -	3	- -	3	- -	28	2	- -	2	- -	- -	- -
	689	Net Improvements	86	5	130	8	56	70	(5)	(2)	3	(81)	(73)	(16)	8	34	167	49	1	117	38	79
	61,505	ANNUAL CAPACITY	26,354	3,477	12,737	1,385	3,754	6,017	145	321	1,115	5,834	3,984	1,286	564	4,306	5,870	2,124	175	3,570	1,779	1,791
	710	1973 New Machines	307	42	112	107	5	- -	- -	- -	- -	67	67	- -	- -	86	81	- -	- -	81	- -	81
	750	Net Improvements	155	(19)	165	(42)	110	91	(2)	3	5	(22)	(38)	3	13	31	92	20	- -	72	26	46
	62,965	ANNUAL CAPACITY	26,816	3,500	13,014	1,450	3,869	6,108	143	324	1,120	5,879	4,013	1,289	577	4,423	6,043	2,144	175	3,723	1,805	1,918
	539	1974 * New Machines	379	238	55	- -	55	- -	- -	- -	- -	20	20	- -	- -	66	51	- -	- -	51	- -	51
	357	Net Improvements	61	(59)	109	10	26	63	- -	3	7	- -	(16)	3	13	11	21	5	- -	16	10	6
	63,861	ANNUAL CAPACITY	27,256	3,679	13,178	1,460	3,950	6,171	143	327	1,127	5,899	4,017	1,292	590	4,500	6,115	2,149	175	3,790	1,815	1,975

* Capacity additions presented here for 1974 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Capacity by Grade — Paperboard 1970- 1974

PRACTICAL MAXIMUM CAPACITY — THOUSANDS OF TONS

				UNBLEACHED KRAFT PAPERBOARD					SOLID BLEACHED PACKAGING PAPERBOARD					SEMI-CHEMICAL PAPERBOARD	COMBINATION PAPERBOARD							
			TOTAL PAPERBOARD	Total	Liner-Board	Corrugating Medium	Folding	Other	Total	Liner-Board	Folding	Milk Carton & Food Service	Other	Total	Total	Liner-Board	Corrugating Medium	Container Chip and Filler Board	Folding	Set-up	Gypsum Wall Board Facing	Other
YEAR END 1970-1974	1970																					
	CAPACITY	Yearly Rate	27,619	12,307	11,516	1	335	456	3,472	130	1,406	1,739	197	3,756	8,084	366	1,019	312	2,805	576	1,013	1,993
		Daily Rate	79.70	34.92	32.68	.00	.96	1.29	9.80	.37	3.97	4.91	.56	10.66	24.32	1.09	3.02	.94	8.48	1.79	2.96	6.05
	END of YEAR	Number of Days	347	352	352	348	350	354	354	354	354	354	356	352	332	334	337	333	331	322	342	329
	1971																					
		New Machines	583	303	303	- -	- -	- -	- -	- -	- -	- -	- -	281	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	266	160	146	- -	3	10	83	2	37	39	6	22	2	(7)	(37)	2	20	(10)	- -	34
	CAPACITY	Yearly Rate	28,468	12,770	11,964	1	338	466	3,555	131	1,443	1,778	203	4,058	8,086	359	982	314	2,825	566	1,013	2,027
	END of YEAR	Daily Rate	82.09	36.23	33.95	.00	.97	1.32	10.03	.37	4.07	5.02	.57	11.52	24.31	1.07	2.92	.94	8.53	1.75	2.96	6.14
		Number of Days	347	352	352	348	350	354	354	354	355	354	355	352	333	334	337	334	331	323	342	330
	1972																					
		New Machines	513	355	355	- -	- -	- -	- -	- -	- -	- -	- -	158	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	542	296	274	- -	11	11	43	- -	34	1	8	113	91	44	8	4	30	1	- -	3
	CAPACITY	Yearly Rate	29,523	13,420	12,594	1	348	477	3,598	132	1,477	1,779	211	4,329	8,176	403	990	318	2,856	567	1,013	2,030
	END of YEAR	Daily Rate	85.08	38.07	35.73	.00	1.00	1.35	10.15	.37	4.17	5.02	.59	12.28	24.58	1.21	2.94	.95	8.62	1.76	2.96	6.14
		Number of Days	347	353	353	348	350	354	354	354	355	354	355	352	333	333	337	334	331	323	342	330
	1973																					
		New Machines	401	197	162	- -	35	- -	156	- -	156	- -	- -	47	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	452	91	89	- -	- -	2	52	- -	39	3	10	218	91	31	8	6	22	1	- -	23
	CAPACITY	Yearly Rate	30,376	13,708	12,845	1	383	479	3,807	132	1,672	1,782	221	4,594	8,267	434	998	325	2,877	568	1,013	2,053
	END of YEAR	Daily Rate	87.51	38.89	36.44	.00	1.10	1.35	10.74	.37	4.72	5.03	.62	13.04	24.85	1.30	2.96	.97	8.68	1.76	2.96	6.21
		Number of Days	347	353	353	348	350	354	354	354	355	354	355	352	333	333	337	334	331	323	342	330
	1974*																					
		New Machines	174	31	- -	- -	31	- -	144	9	19	63	53	- -	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	149	59	59	- -	- -	- -	43	- -	31	1	10	22	24	- -	3	4	4	1	- -	13
	CAPACITY	Yearly Rate	30,699	13,798	12,904	1	414	479	3,993	141	1,722	1,847	284	4,616	8,291	434	1,001	329	2,882	569	1,013	2,066
	END of YEAR	Daily Rate	88.43	39.14	36.60	.00	1.18	1.35	11.26	.40	4.86	5.21	.80	13.10	24.93	1.30	2.97	.98	8.70	1.76	2.96	6.23
		Number of Days	347	353	353	348	350	354	353	354	355	354	356	352	333	333	337	334	331	323	342	330
ANNUAL 1971-1974	1971																					
		ANNUAL CAPACITY	28,118	12,595	11,797	1	337	461	3,513	131	1,424	1,758	200	3,938	8,072	363	1,000	313	2,795	571	1,013	2,017
	1972																					
		New Machines	727	492	492	- -	- -	- -	- -	- -	- -	- -	- -	235	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	436	238	220	- -	7	11	63	1	35	20	7	91	44	19	(15)	3	40	(5)	- -	2
		ANNUAL CAPACITY	29,281	13,325	12,509	1	344	472	3,576	132	1,459	1,778	207	4,264	8,116	382	985	316	2,835	566	1,013	2,019
	1973																					
		New Machines	322	120	99	- -	21	- -	124	- -	124	- -	- -	78	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	503	184	173	- -	5	6	48	- -	37	2	9	150	121	54	8	5	31	1	- -	22
		ANNUAL CAPACITY	30,106	13,629	12,781	1	370	478	3,748	132	1,620	1,780	216	4,492	8,237	436	993	321	2,866	567	1,013	2,041
	1974*																					
		New Machines	110	66	21	- -	45	- -	44	1	32	6	5	- -	- -	- -	- -	- -	- -	- -	- -	- -
		Net Improvements	274	75	74	- -	- -	1	47	- -	35	2	10	111	41	(1)	5	5	13	1	- -	18
		ANNUAL CAPACITY	30,490	13,770	12,876	1	415	479	3,839	133	1,687	1,788	231	4,603	8,278	435	998	326	2,879	568	1,013	2,059

* *Capacity additions presented here for 1974 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.*

Capacity by Grade—Wood Pulp 1970-1974

PRACTICAL MAXIMUM CAPACITY — THOUSANDS OF TONS

			TOTAL WOOD PULP	DISSOLVING	SULPHITE PAPER GRADES			SULPHATE PAPER GRADES								SODA	SEMI-CHEMICAL			GROUNDWOOD			DEFIBRATED EXPLODED	SCREENINGS
									BLEACHED			SEMI-BLEACHED			UN-BLEACHED										
				Total	Total	Bleached	Unbleached	Total	Total	Hardwood	Softwood	Total	Hardwood	Softwood	Total	Total	Total	Bleached	Unbleached	Total	Bleached	Unbleached	Total	Total
YEAR END 1970-1974	1970	Yearly Rate	46,471	1,768	2,403	1,941	463	30,842	11,753	5,336	6,418	2,246	489	1,757	16,843	193	3,684	432	3,253	4,638	1,254	3,383	2,787	156
	CAPACITY	Daily Rate	132.97	5.07	6.93	5.60	1.32	87.53	33.36	15.14	18.22	6.43	1.39	5.04	47.76	.55	10.62	1.24	9.38	13.41	3.60	9.81	8.41	.44
	END of YEAR	Number of Days	349	349	347	346	330	352	352	352	352	349	352	349	353	349	347	350	347	346	349	343	332	354
	1971	New Machines	1,389	- -	26	26	- -	553	335	194	142	- -	- -	- -	218	224	364	- -	364	67	37	30	155	- -
		Net Improvements	101	7	(34)	(3)	(31)	264	34	42	(8)	35	6	29	195	- -	(217)	(191)	(26)	(60)	10	(71)	142	- -
	CAPACITY	Yearly Rate	47,961	1,775	2,395	1,963	431	31,660	12,123	5,571	6,551	2,282	495	1,787	17,255	417	3,831	241	3,590	4,644	1,301	3,343	3,083	156
	END of YEAR	Daily Rate	137.30	5.09	6.91	5.68	1.23	89.88	34.41	15.81	18.61	6.53	1.41	5.12	48.93	1.19	11.04	.70	10.34	13.43	3.73	9.70	9.32	.44
		Number of Days	349	349	347	346	351	352	352	352	352	349	352	349	353	350	347	347	347	346	349	343	331	354
	1972	New Machines	1,173	- -	- -	- -	- -	989	599	384	215	- -	- -	- -	391	- -	145	- -	145	40	40	- -	- -	- -
		Net Improvements	497	26	22	(11)	33	161	40	86	(45)	24	6	18	96	- -	87	- -	87	115	13	102	86	- -
	CAPACITY	Yearly Rate	49,631	1,801	2,417	1,952	464	32,810	12,762	6,041	6,721	2,306	501	1,805	17,742	417	4,063	241	3,822	4,799	1,354	3,445	3,169	156
	END of YEAR	Daily Rate	142.03	5.16	6.97	5.63	1.33	93.13	36.22	17.14	19.08	6.60	1.43	5.18	50.31	1.19	11.70	.70	11.00	13.87	3.89	9.98	9.56	.44
		Number of Days	349	349	347	346	351	352	352	352	352	349	352	349	353	350	347	347	347	346	348	343	331	354
	1973	New Machines	950	110	- -	- -	- -	579	243	143	100	18	- -	18	318	- -	165	- -	165	- -	- -	- -	97	- -
		Net Improvements	260	15	(19)	(19)	- -	184	116	79	37	7	6	1	61	- -	25	- -	25	42	8	34	13	- -
	CAPACITY	Yearly Rate	50,841	1,926	2,397	1,933	464	33,572	13,121	6,263	6,857	2,331	507	1,824	18,121	417	4,252	241	4,011	4,841	1,363	3,479	3,279	156
	END of YEAR	Daily Rate	145.49	5.52	6.92	5.59	1.33	95.29	37.24	17.77	19.47	6.67	1.44	5.23	51.38	1.19	12.24	.70	11.54	13.99	3.91	10.08	9.90	.44
		Number of Days	349	349	347	346	351	352	352	353	352	349	352	349	353	350	347	347	347	346	348	345	331	354
	1974*	New Machines	394	23	- -	- -	- -	200	144	72	72	48	- -	48	8	- -	- -	- -	- -	134	- -	134	37	- -
		Net Improvements	112	- -	(28)	(28)	- -	96	9	3	6	24	17	7	63	- -	38	- -	38	6	6	- -	- -	- -
	CAPACITY	Yearly Rate	51,346	1,949	2,370	1,905	464	33,868	13,274	6,339	6,935	2,403	524	1,879	18,191	417	4,291	241	4,050	4,981	1,368	3,612	3,316	156
	END of YEAR	Daily Rate	146.93	5.59	6.84	5.52	1.33	96.12	37.67	17.98	19.69	6.87	1.49	5.39	51.58	1.19	12.35	.70	11.65	14.39	3.93	10.46	10.01	.44
		Number of Days	349	349	346	345	351	352	352	353	352	350	352	349	353	350	347	347	347	346	348	345	331	354
ANNUAL 1971-1974	1971	ANNUAL CAPACITY	47,516	1,772	2,414	1,966	449	31,364	12,009	5,516	6,494	2,264	492	1,772	17,091	372	3,814	337	3,478	4,680	1,279	3,400	2,944	156
	1972	New Machines	1,093	- -	- -	- -	- -	762	387	222	165	- -	- -	- -	375	45	192	- -	192	26	21	5	68	- -
		Net Improvements	298	17	(19)	(7)	(12)	271	92	96	(4)	30	6	24	149	- -	(47)	(95)	48	(37)	17	(54)	113	- -
		ANNUAL CAPACITY	48,907	1,789	2,395	1,959	437	32,397	12,488	5,834	6,655	2,294	498	1,796	17,615	417	3,959	242	3,718	4,669	1,317	3,351	3,125	156
	1973	New Machines	1,109	88	- -	- -	- -	775	470	287	183	5	- -	5	300	- -	146	- -	146	17	17	- -	83	- -
		Net Improvements	357	21	13	(15)	28	115	24	51	(27)	16	6	10	75	- -	38	- -	38	123	11	112	48	- -
		ANNUAL CAPACITY	50,373	1,898	2,408	1,944	465	33,287	12,982	6,172	6,811	2,315	504	1,811	17,990	417	4,143	242	3,902	4,808	1,345	3,463	3,256	156
	1974*	New Machines	497	45	- -	- -	- -	223	73	47	26	49	- -	49	101	- -	78	- -	78	99	- -	99	52	- -
		Net Improvements	186	8	(23)	(23)	- -	139	62	41	21	15	11	4	62	- -	32	- -	32	24	7	17	6	- -
		ANNUAL CAPACITY	51,056	1,951	2,385	1,921	465	33,649	13,117	6,260	6,858	2,379	515	1,864	18,153	417	4,253	242	4,012	4,931	1,352	3,579	3,314	156

*Capacity additions presented here for 1974 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Waste Paper Utilization in Paper and Paperboard Manufacture

1970 Consumption by Paperstock Grades

THOUSANDS OF TONS

END PRODUCT	TOTAL U.S. PRODUCTION	GRADES OF PAPERSTOCK				
		TOTAL WASTE PAPER CONSUMPTION	MIXED PAPERS	NEWSPAPERS	CORRUGATED	PULP SUBS. AND HIGH GRADE DE-INKING
TOTAL ALL GRADES AND MOLDED PULP	53,100	12,021	2,639	2,235	4,080	3,067
TOTAL PAPER	23,200	2,228	33	455	108	1,632
NEWSPRINT	3,300	371	- -	371	- -	- -
PRINTING, WRITING and RELATED	10,800	736	- -	- -	- -	736
UNBL. KRAFT PKG., IND. CONV. SPECIAL IND. and OTHER	5,400	150	26	8	39	77
TISSUE	3,700	971	7	76	69	819
TOTAL PAPERBOARD	25,500	8,330	1,766	1,473	3,779	1,312
UNBLEACHED KRAFT and SOLID BLEACHED	15,100	285	48	8	162	67
SEMI-CHEMICAL	3,500	754	42	28	622	62
COMBINATION	6,900	7,291	1,676	1,437	2,995	1,183
CONSTRUCTION PAPER AND BOARD, MOLDED PULP AND OTHER	4,400	1,463	840	307	193	123
DISTRIBUTION		100.0%	22.0%	18.6%	33.9%	25.5%

Estimated Future Consumption

THOUSANDS OF TONS

END PRODUCT	1971	1972	1973
TOTAL ALL GRADES AND MOLDED PULP	12,345	12,686	13,071
TOTAL PAPER	2,381	2,455	2,600
NEWSPRINT	392	403	474
PRINTING, WRITING and RELATED	812	861	879
UNBL. KRAFT PKG., IND. CONV. SPECIAL IND. and OTHER	156	148	148
TISSUE	1,021	1,043	1,099
TOTAL PAPERBOARD	8,483	8,717	8,942
UNBLEACHED KRAFT and SOLID BLEACHED	296	289	331
SEMI-CHEMICAL	843	930	995
COMBINATION	7,344	7,498	7,616
CONSTRUCTION PAPER AND BOARD, MOLDED PULP AND OTHER	1,481	1,514	1,529

PAPER STOCK GRADES

Mixed Papers: Number 1 & 2 mixed papers, super mixed papers, boxboard cuttings, mill wrappers.

Newspapers: Number 1 news, over-issue news, super news. Any grade to be used as a news substitute.

Corrugated: Old containers both corrugated and solid fiber, container plant cuttings.

Pulp Substitutes & High Grade De-Inking: Ledger, tabulating cards, bleached sulphate shavings (unless used as a news substitute). Envelope and bleached sulphite and sulphate cuttings, book and magazine stock, news and publication blanks, kraft paper and bags, and all other grades not classified above.

70-422 O - 72 - 6

Regional Consumption

THOUSANDS OF TONS

CENSUS REGION	ACTUAL CONSUMPTION		PLANNED FUTURE CONSUMPTION		
	1970	PERCENT	1971	1972	1973
TOTAL UNITED STATES	12,021	100.0%	12,345	12,686	13,071
NEW ENGLAND	1,093	9.1%	1,071	1,074	1,079
MIDDLE ATLANTIC	2,805	23.3%	2,771	2,786	2,803
EAST NORTH CENTRAL	4,053	33.7%	4,221	4,402	4,547
WEST NORTH CENTRAL	352	2.9%	345	344	344
SOUTH ATLANTIC	1,188	9.9%	1,273	1,332	1,401
EAST SOUTH CENTRAL	503	4.2%	567	569	578
WEST SOUTH CENTRAL	551	4.6%	587	610	618
MOUNTAIN & PACIFIC	1,476	12.3%	1,510	1,569	1,701

Consumption by Processing Facility

THOUSANDS OF TONS

TOTAL CONSUMPTION IN MILLS WITH:	ACTUAL CONSUMPTION		PLANNED FUTURE CONSUMPTION		
	1970	PERCENT	1971	1972	1973
DE-INKING FACILITIES*	1,801	15.0%	1,912	1,978	2,117
OTHER SPECIALIZED FACILITIES*	3,313	27.6%	3,483	3,581	3,644
NO SPECIALIZED FACILITIES	6,907	57.4%	6,950	7,127	7,310
TOTAL	12,021	100.0%	12,345	12,686	13,071

*Includes total paper stock consumption, not all of which requires de-inking or other specialized treatment.

Capacity to De-Ink Waste Paper

THOUSANDS OF TONS

END PRODUCT	EXISTING CAPACITY		PLANNED FUTURE CAPACITY		
	1970	PERCENT	1971	1972	1973
TOTAL PAPER & PAPERBOARD	1,253	100.0%	1,299	1,377	1,433
TOTAL PAPER	1,104	88.1%	1,150	1,228	1,284
NEWSPRINT	353	28.2%	353	380	436
PRINTING, WRITING and RELATED	384	30.6%	416	467	467
TISSUE	367	29.3%	381	381	381
TOTAL PAPERBOARD	149	11.9%	149	149	149
COMBINATION	149	11.9%	149	149	149

WASTE PAPER TREATMENT FACILITIES

De-Inking Designates a specialized waste paper de-inking plant with a measurable daily capacity.
Other Specialized Facilities Designates specialized waste paper treatment facilities for the removal of plastic and other synthetics, wax, asphalt, sand, grit, metal or other contaminants.
No Specialized Facilities Designates facilities, such as hydrapulping and refining equipment, not specifically designed or intended for waste paper treatment but which can be used to process limited quantities of selected paper stock.

DEFINITION OF WASTE PAPER

Waste paper in this survey is defined as paper stock purchased or obtained from sources outside the paper mill, and paper stock obtained from finishing, printing or converting operations either located in, or associated with, the paper mill. It does not include paper waste generated in the paper manufacturing process up to and including the winding cycle (cutting and trimming the paper machine reel into smaller rolls or rough sheets).

DEFINITIONS

PRACTICAL MAXIMUM CAPACITY: Practical Maximum Capacity, as defined in this survey, is the tonnage of paper, paperboard or pulp of normal commercial quality that could be produced with full use of equipment and adequate supplies of raw materials and labor, and assuming full demand. No allowance is made for losses due to unscheduled shutdowns, strikes, temporary lack of power, etc., which cause decreases in actual production, but not in production capacity. Capacity of paper machines which produce more than one grade is apportioned in accordance with actual production patterns or plans for future operation.

Capacity is reported in short tons of net finished paper and paperboard and air-dry (10% moisture content) pulp. Shrinkage of bleached or semi-bleached pulp is taken into account.

Year-end practical maximum capacity - assumes that all changes in capacity are in effect from the first day of the year in which they occur. **Annual practical maximum capacity** - includes changes in capacity only for the portion of the year in which they are actually effective.

NEW MACHINES AND NET IMPROVEMENTS: Capacity increases or decreases are shown in two main groups: New Machines and Net Improvements.

New Machines - are defined as machines purchased or to be purchased from equipment manufacturers. Consequently, capacity changes resulting from transfers of paper machines from one mill to another are shown under Net Improvements. **Net Improvements** - are defined as net changes resulting from modernization of machines, dismantling old machines, shifts in grades, etc.

Capacity increases from new machines are shown under New Machines for the first two years of operation (including the year of installation). Any additional capacity realized in a third or subsequent year is shown under Net Improvements.

PAPER GRADES

NEWSPRINT: Paper made largely from groundwood pulp, used chiefly in the printing of newspapers.

GROUNDWOOD, UNCOATED: Uncoated papers containing more than 25% groundwood fiber in their furnish, excluding newsprint.

MACHINE AND OFF MACHINE, COATED: Bleached papers with a coating weight of at least 2½ pounds (25 x 38 - 500) on either side and at least 50% of the coating consisting of pigment.

BOOK PAPER, UNCOATED: AND CHEMICAL WRITING: Bleached uncoated printing and writing papers containing not more than 25% groundwood pulp in their furnish; i.e., offset, tablet, envelope, business papers (bond, ledger, mimeo, duplicator), form bond, cover and text and related papers.

BLEACHED BRISTOLS: Includes tabulating index, tag and ... folder, coated cover bristols, and uncoated bristols ...dex, printing, and postcard).

COTTON FIBER: Papers containing 25% or more in their furnish of cotton, cotton rags, cotton waste, linters, linter pulp, flax, or similar fibers.

THIN PAPERS: Includes carbonizing, condenser, cigarette, and similar thin specialties.

PACKAGING AND INDUSTRIAL CONVERTING: Wrapping paper, shipping sack, bag and sack other than shipping sack, and other converting papers—18 pounds and over.

UNBLEACHED KRAFT: Paper containing more than 50% unbleached sulphate wood pulp.

OTHER PACKAGING AND INDUSTRIAL CONVERTING: Paper used for these purposes and containing more than 50% bleached wood pulp, also includes glassine, greaseproof, and vegetable parchment.

SPECIAL INDUSTRIAL: Paper and board, of all weights, calipers and furnishes, designed for specialized end uses, such as abrasive paper, absorbent paper, cable paper, electrical insulation, vulcanized fiber, resin-impregnating stock, and similar grades. It does not include wet machine board.

TISSUE: Includes sanitary grades; i.e., toilet, facial, napkin, toweling, sanitary napkin, wiper and special sanitary papers, and waxing, wrapping, wadding and miscellaneous grades.

PAPERBOARD GRADES

UNBLEACHED KRAFT PAPERBOARD: Paperboard made from a furnish containing not less than 80% wood pulp produced by the kraft sulphate process.

LINERBOARD: Unbleached kraft paperboard manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes. Includes solid unbleached kraft linerboard, both Fourdrinier and Cylinder, mottled white linerboard and clay coated unbleached kraft linerboard.

CORRUGATING MEDIUM: Unbleached kraft paperboard manufactured for use as the fluting material when combining paperboard for conversion into corrugated boxes.

FOLDING: Paperboard manufactured, such as clay coated unbleached kraft and bleached lined unbleached kraft backed, for conversion into folding cartons and beverage carriers.

OTHER: All unbleached kraft paperboard whose end use is not otherwise classified, such as board for a filler for solid fiber board to be fabricated into a shipping container, tube, can, drum, file folder tag, automotive panel, etc.

SOLID BLEACHED PACKAGING PAPERBOARD: Paperboard made for use in packaging from a furnish containing not less than 80% virgin bleached chemical wood pulp. (Please note that all bleached bristols not manufactured for packaging are included in the proper bleached bristol classification under paper).

LINERBOARD: Solid bleached paperboard, either Fourdrinier or Cylinder, manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

FOLDING: Solid bleached paperboard for conversion into folding cartons, such as folding cartons for ice cream, butter, oleo, frozen foods, bakery products, cosmetics, drugs, etc.

MILK CARTON AND FOOD SERVICE: Solid bleached paperboard for conversion into milk carton, heavyweight cup, and round nested food container, plate, dish and tray.

OTHER: Solid bleached paperboard for conversion into packaging of moist, liquid and oily foods not classified above and for industrial products not classified under bleached bristols.

PAPERBOARD GRADES (continued)

SEMI CHEMICAL PAPERBOARD: Paperboard made from a furnish containing not less than 75% virgin wood pulp, the predominant portion of which is produced by a semi-chemical process.

COMBINATION PAPERBOARD: Paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion of its furnish being recycled fibers—sometimes including a very minor portion of virgin fibers.

LINERBOARD: Combination paperboard produced from a furnish containing less than 80% virgin kraft wood pulp and used as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

CORRUGATING MEDIUM: Combination paperboard produced from a furnish containing less than 75% virgin wood pulp and used as the fluting material when combining paperboard for conversion into corrugated boxes.

CONTAINER CHIP AND FILLER BOARD: Combination paperboard manufactured as a filler for solid fiber board for conversion into solid fiber boxes and other container chipboard (all chipboard under 26# per m sq. ft. manufactured for use as a facing corrugated, solid fiber and single faced products which are used for interior packing, e.g. pads, partitions, dividers, layers and cushioning).

FOLDING: Combination paperboard manufactured with bending quality for conversion into folding cartons (including unlined chipboard, kraft lined, white lined and clay coated).

SET UP: Combination paperboard manufactured with non-bending specifications for conversion into rigid or set-up boxes (including plain chipboard, newslined, white vat lined).

GYPSUM WALLBOARD FACING: Combination paperboard manufactured for use as liner or facing on gypsum board, plasterboard (includes white, cream, gray, blue and all colors).

OTHER: Combination paperboard with the same characteristics as paperboard for bending packaging or non-bending packaging but for non-packaging uses; plus combination paperboard for end uses not otherwise classified, such as tag, file folder, tube, can, drum, match stem, tablet backs, toys, etc.

CONSTRUCTION PAPER AND BOARD

CONSTRUCTION PAPER: Sheathing paper, felts (roofing felts, floor covering, automotive felts, deadening, industrial, pipe covering, refrigerator), asbestos paper and asbestos filled paper, flexible wood fiber insulation.

WET MACHINE BOARD: Binders board, shoe board (e.g., counter board, heel board, innersole, etc.) automotive board, chair seat backing, coaster board, luggage, mill board, panel board, table top board, etc.

INSULATING BOARD: A fibrous-felted, homogeneous panel made by inter-felting of the fibers (e.g., interior building board, wallboard, sound deadening board, acoustical tile, exterior sheathing board, roof insulation board, trailer board, etc.

HARD PRESSED BOARD: Vegetable fiber hardboard density 31 lbs. or over per cubic foot, treated or tempered or, not treated or tempered.

WOOD PULP

DISSOLVING & SPECIAL ALPHA: Highly refined bleached white sulphite or sulphate pulps with a high content of alpha (pure cellulose) fiber.

SULPHITE PAPER GRADES: Paper grade pulps produced by the sulphite process. Bleached pulp must achieve a G.E. Brightness of more than 75.

SULPHATE PAPER GRADES: Paper grade pulps produced by the sulphate (Kraft) process. Bleached pulp must achieve a G.E. Brightness of more than 75. Semi-bleached pulp must achieve a G.E. Brightness of not less than 45 or more than 75.

SODA: Paper grade pulp produced by the soda process.

SEMI - CHEMICAL: High yield pulps produced with the use of some chemical agent such as neutral sulphite, alkaline cook, chemipulp, etc.

GROUNDWOOD: Relatively short-fibered pulps produced by mechanically grinding wood rather than by reducing it to fiber by chemical action.

DEFIBRATED/EXPLODED: **Defibrated** - Pulp produced mechanically by means of a Defibrator. Used principally in the manufacture of hardboards, insulating boards and roofing felts. **Exploded** - Pulp produced by subjecting wood chips to very high steam pressure. Used primarily in the production of hardboards.

SCREENINGS: Rejects and off-quality screenings from all grades of wood pulp except dissolving.

U. S. CONSUMPTION OF FIBROUS MATERIALS TO PRODUCE 53 MILLION TONS OF PAPER, PAPERBOARD AND MOLDED PULP PRODUCTS IN 1970

TABLE 1

	Thousand Tons	% of Total
Waste Paper	12,000	21.7
Other Fibrous Materials	900	1.6
Wood Residues	11,900	21.5
Sub-Total	24,800	44.8
Woodpulp from Roundwood	30,600	55.2
Total	55,400	100.0

Source: American Pulpwood Association and American Paper Institute

* SEE TABLE 2 FOR BREAKDOWN BY TYPE

U. S. PAPER, PAPERBOARD AND MOLDED PULP PRODUCTION

AND

WASTE PAPER CONSUMPTION - 1970

TABLE 2

(In Thousand Tons)

	Paper, Paperboard & Molded Pulp 1970 Production	1970 WASTE PAPER CONSUMPTION					
			Bulk Grades			High Grades	
		Total	Mixed Papers	Old Corrugated Boxes & Clippings	Newspapers	Pulp Substitutes	Deinking
PAPER							
Newsprint	3,300	371			371		
Printing, writing & related	10,800	736				446	290
Unbleached Kraft Packaging, Industrial Converting, Special Industrial and Other	5,400	150	26	39	8	60	17
Tissue	3,700	971	7	69	76	449	370
Paper Sub-Total	23,200	2,228	33	108	455	955	677
PAPERBOARD							
Woodpulp paperboard (unbleached kraft, solid bleached and semi-chemical)	18,600	1,878	337	1,109	215	217	
Combination Paperboard	6,900	6,470	1,432	2,679	1,263	956	140
Paperboard Sub-Total	25,500	8,348	1,769	3,788	1,478	1,173	140
CONSTRUCTION PAPER AND BOARD, WET MACHINE AND MOLDED PULP PRODUCTS	4,400	1,445	837	184	302	102	20
GRAND TOTAL	53,100	12,021	2,639	4,080	2,235	2,230	837

American Paper Institute 11/1/71

COMMENTS: PAPER AND PAPERBOARD PRODUCTION AND WASTE PAPER CONSUMPTION

Paper

Newsprint—Through 1970 and so far in 1971 the one manufacturer of newsprint from old newspapers operated on a full 7 day week and produced 11% of domestic production and 4% of U.S. consumption (the U.S. imported 6,600,000 tons of newsprint in 1970, mostly from Canada.) The three mills of this manufacturer cannot use a significant amount of additional tonnage of news unless they add to their capacity.

Printing, Writing and Related (including uncoated groundwood, coated paper, uncoated book, writing and related). Mills producing these grades did not operate at capacity in 1970 nor to date in 1971. Mills with de-inking facilities have evidenced an increase in demand during the last six months and are operating closer to full than they did in 1970. However, there is still additional capacity available to produce approximately 50,000 to 75,000 tons of paper with deinked stock in the furnish. Planned increases for 1972 and 1973 could add 35,000 tons of this type on an annual basis.

As shown on Table 2, printing and writing paper mills do not and, indeed, can not, use newspaper or old corrugated boxes as a fiber furnish, but are limited to the high grades of waste. This is because from a technical standpoint, the secondary fiber can be no better than it was as a virgin fiber and must be used in applications compatible with the physical characteristics of the original fiber. The available supply of high grade waste at a reasonable economic cost level is also a factor that must be considered.

The furnish for the additional production mentioned in the first paragraph of this section of about 100,000 tons will probably be available because of the broad geographic distribution of the mills involved. However, given the present technology and collection processes it would be very difficult to supply a sufficient quantity of high grade waste to a machine of a size that was competitive with a modern woodpulp based paper machine.

Tissue (facial, toilet, toweling, napkin, sanitary and other). Most tissue mills using high grades are seven-day mills and do not have much additional running time. Practically all de-inking capacity is being used. They could replace some purchased pulp with pulp substitutes if the proper quantity and quality were available and demand remained strong.

Paperboard

Solid Woodpulp

Several unbleached kraft (lineboard) mills with the necessary equipment are using corrugated clippings and, in some cases, old corrugated boxes up to 10 to 15% and maintaining quality. Mills so equipped today might use another 100,000 tons by cutting back on woodpulp aid substituting waste paper, but in at least some cases this would increase costs. Semi-chemical paperboard mills use about 15% corrugated clippings and carefully sorted old corrugated.

If these mills increased the ratio to 20% recycled fiber, through cutting back on woodpulp, they could use some 170,000 additional tons of waste paper.

Solid Bleached Packaging Paperboard mills use virtually no waste paper.

Combination Paperboard mills ran at 86% of their capacity in 1970 and have been running at 87% in 1971 to date. However, it should be noted that the capacity for this product was 780,000 tons lower in 1971 than in 1970. This was caused by mills shutdown due to cost pressures and the demand for investments for pollution control that could not be justified on an economic basis.

The main problem in increasing the usage of recycled fiber in this type paper is the demand for the end product which is particularly sensitive to the overall level of the national economy. Under the right conditions these mills could use between an additional half a million and a million tons of bulk grade waste paper.

Construction paper and board mills run full when building activity is high and shutdown when demand is weak. The sharp growth in home building in 1971 has increased their use of waste paper. In 1970 waste paper provided 35% of the total fiber requirements for making the construction grades. In 1971 a 5% to 10% increase is expected due to higher home building activity, causing consumption of another 100,000 tons.

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., August 10, 1971.

The President has asked me to thank you for your letter of July 2, 1971, regarding our definition of recycled material.

As you know, the President's objective is to promote the utlization of recycled material to the maximum extent. To carry out his objective, we have been working closely with the paper industry and the secondary material industry to arrive at a definition for recycled materials which will have the maximum effect on the reduction of solid waste and at the same time would permit the broadest participation in our paper procurements.

We plan to retain the definition which was issued in our May 17 letter for use in our general procurements of paper products. As you indicated, this definition will permit cotton cuttings in addition to other material.

As a matter of interest, we have initiated a test project to procure a specific quantity of fiberboard sheeting with a minimum of 35 percent recycled fibers which are to meet the requirements shown on the enclosure. Of this 35 percent, at least 10 percent must be post-consumer wastes which include materials which have passed through their intended use and have been collected from homes, offices, factories or municipal solid waste. The remaining 25 percent will be manufacturing wastes, forest residues and other wastes.

If this first step is successful, the requirement for a minimum percentage of post-consumer wastes will be continued and expanded to other specifications wherever possible.

If we can be of further assistance, please let us know.

Sincerely,

MICHAEL J. NORTON,
(For Rod Kreger, Deputy Administrator.)

GENERAL SERVICES ADMINISTRATION,
FEDERAL SUPPLY SERVICE,
Washington, D.C., May 17, 1971.

Mr. JOHN F. DARROW,
Vice President, American Paper Institute,
New York, N.Y.

DEAR MR. DARROW: This is in further clarification of our letter dated April 28, 1971, concerning the definition for reclaimed fiber.

At a meeting on May 5, 1971, with Dr. Robert Hobbs, Government Printing Office, Mr. William Wilson, National Bureau of Standards, and Messrs. R. T. Morgan and W. H. Dieterichs, General Services Administration, the following statement for the use of reclaimed fiber was agreed upon:

"The paper stock shall contain not less than _____ percent, by weight, of fibers reclaimed from solid waste or waste collected as a result of a manufacturing process but shall not include those materials generated from and reused within a plant as part of the paper making process."

It was agreed that the paper making process should include the cutting and trimming of the paper machine reel into smaller rolls or rough sheets but should not include waste generated in subsequent cutting (guillotine or Lenox), coating, or converting operations.

Those paper specifications for which the General Services Administration has responsibility as the specification manager, and that are changed to require the use of reclaimed fiber, will incorporate the above statement in the requirements section of the specification. Federal specifications that reference the Government Paper Specification Standards, established by the Joint Committee on Printing, will not be changed, pending action by the Committee.

We trust that with these additional comments our definition of reclaimed fiber has been clarified.

Sincerely,

R. T. CARROLL, Jr.
(For Geo. W. Ritter,
Assistant Commissioner, Standards and Quality Control).

GENERAL SERVICES ADMINISTRATION,
Washington, D.C., August 13, 1971.

MR. EDWIN A. LOCKE,
President, American Paper Institute,
New York, N.Y.

DEAR MR. LOCKE: On February 8, 1971, President Nixon, in his Environmental Message to the Congress, announced the initiation of a General Services Administration (GSA) paper recycling program. This program established a requirement for a minimum percentage of reclaimed fiber in selected paper and paper products GSA purchases for the Federal Government. Because of your interest in this program, we are taking this opportunity to inform you of the new steps we are taking in an attempt to increase the use of recycled paper.

GSA is proceeding to determine the feasibility of a "post-consumer waste" requirement for the purchase of corrugated fiberboard sheeting (Federal Specification PPP–F–320D, and Interim Amendment 1 (January 4, 1971), Fiberboard, Corrugated and Solid) and, secondly, the inclusion of a certificate by the bidder describing the types of reclaimed waste he will use. We will shortly issue a Solicitation for Offers for a definite quantity fiberboard sheeting procurement with an estimated approximate value of $154,000. Enclosed is a news release describing our steps in more detail.

The new requirements that will be included in this test Solicitation for Offers by no means represent GSA's final position, but is a progressive approach toward achieving maximum use of reclaimed fibers.

We are pleased to provide this data for your information. If we can be of any further assistance, please let us know.

Sincerely,

MICHAEL J. NORTON,
(For Rod Kreger, Deputy Administrator).

—

[GSA news release, No. 5326, Aug. 2, 1971]

GSA TAKES NEW STEPS TO SPUR PAPER RECYCLING

The Federal Government is taking still another step in its drive to encourage the use of recycled waste paper, the General Services Administration announced today.

Administrator Robert L. Kunzig of GSA, which does most of the Government's buying, said that effective immediately his agency will require the inclusion of "post-consumer" wastes in the corrugated fiberboard it buys to line packing cartons.

The specification change will require at least 35 percent waste fibers. Of this at least 10 percent must be post-consumer wastes, which include materials which have passed through their intended use and been collected from homes, offices, factories or municipal solid waste. The remaining 25 percent will be manufacturing wastes, forest residues and other wastes.

In announcing the change, Kunzig said, "GSA's new definition will be applied to only one product at this time. If this first step is successful, the requirement for a minimum percentage of post-consumer wastes will be continued and expanded to other specifications wherever possible."

This program is in furtherance of the President's program to promote recycling of post-consumer wastes and thereby help alleviate already overburdened municipal waste disposal systems. It also encourages the maximum utilization of forest residues and manufacturing wastes.

GSA also announced that on all paper specifications requiring reclaimed fibers a statement of the types of wastes used in the product will be required in accordance with the new definitional breakdowns attached.

Kunzig also said, "We laud the paper industry's efforts in this area to date, but much more needs to be done. Therefore, we will work closely with industry and other concerned agencies in revising all our specifications to spur the maximum use of post-consumer wastes and all other wastes consistent with our capacity to utilize them."

GSA DEFINITION

The paper stock shall contain not less than 35 percent by weight of reclaimed fibers as listed in Part I and Part II, but not less than 10 percent by weight as listed in Part I. A certificate shall be submitted with each bid indicating compliance with these requirements. The certificate should identify the types of reclaimed fiber to be used in the material listed in the invitation.

Part I

A. Paper, paperboard and fibrous wastes from factories, retail stores, office buildings, homes, etc., after they have passed their end-usage as a consumer item including:

1. Used corrugated boxes;
2. Old newspapers;
3. Old magazines;
4. Mixed waste paper;
5. Tabulating cards; and
6. Used cordage.

B. All paper, paperboard and fibrous wastes that enter and are collected from municipal solid waste.

Part II

A. Dry paper and paperboard waste generated after completion of the papermaking process [1] including:

1. Envelope cuttings, bindery trimmings and other paper and paperboard waste, resulting from printing, cutting, forming and other converting operations;
2. Bag, box and carton manufacturing wastes; and
3. Butt rolls, mill wrappers and rejected unused stock.

B. Finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters or others.

C. Fibrous by-products of harvesting, manufacturing, extractive or woodcutting processes, flax straw, linters, bagasse, slash and other forest residues.

D. Wastes generated by the conversion of goods made from fibrous materials; i.e., waste rope from cordage manufacture, textile mill waste and cuttings.

E. Fibers recovered from waste water which otherwise would enter the waste stream.

Chairman GRIFFITHS. I presume you don't have any real objection to having the freight rates reduced?

Mr. DARROW. Not at all.

Chairman GRIFFITHS. How many people does it require in employment to produce a ton of reusable paper as opposed to a ton of newly made?

Mr. DARROW. I think, Madam Chairman, that the ratio would be about the same. We wouldn't get any significant difference between the number of people.

Chairman GRIFFITHS. Who do you substitute for the people who are cutting the trees?

Mr. DARROW. I guess I didn't make my point clear. I was assuming that the pulp has already been manufactured from whatever source.

Chairman GRIFFITHS. Starting from scratch.

Mr. DARROW. I would prefer not to hazard a guess on that, Madam Chairman. I can submit that for the record.[2]

---

[1] The papermaking process is defined as those manufacturing operations up to and including the cutting and trimming of the paper machine reel into smaller rolls or rough sheets.

[2] The information to be submitted for the record was not available at time of printing the hearings.

Chairman GRIFFITHS. I would be interested, if you can figure out how many people.

Mr. DARROW. Yes.

Chairman GRIFFITHS. And then I think it would be interesting to know whether or not the prices that are paid for gathering the paper are sort of the same as those paid to the person who cuts the timber.

Now, I presume someplace along there you must hit the Teamsters Union and it would be quite a substantial amount.

Mr. DARROW. Now, we are getting to the economics of the use of wastepaper. And at the present time I believe that the economics are certainly not favorable, not only because of the various unfavorable factors that the gentlemen from the secondary material industries mentioned earlier, but the matter of economics of manufacture.

The truth of the matter is that even in this past year about three-quarters of a million tons of capacity to make paper from wastepaper has been permanently retired from the market because it is economically not feasible any longer to compete.

Chairman GRIFFITHS. Is that because they are old plants?

Mr. DARROW. Yes. There are a lot of problems. There were old plants and problems of pollution and many problems. They were old and uneconomic plants.

Chairman GRIFFITHS. Is there as much pollution in one of these as there is in a pulp mill?

Mr. DARROW. Here again we have to look at what we are talking about. If we are talking about deinking wastepaper, there is a considerable amount of pollution. On the other hand, if we are talking about making the combination board that I have referred to earlier, the haberdashery-type thing, the pollution is relatively small.

And let me explain. In the deinking process to make printing papers the various inks and clays and fillers that are in the paper have to be removed. If we take 100 tons of fiber that has been reclaimed in a deinking process to make printing paper, in all probability about 40 to 50 tons of what we call sludge will be the result of that deinking. Therefore, we have 40 to 50 tons of sludge, clay, ink, et cetera, to get rid of. If this is discharged into the stream it pollutes the stream. If it isn't discharged into the stream, some other method has to be found to dispose of it. Deinking newsprint, on the other hand, to make newsprint, does not result in the same type problem. Here, I believe, the yield of good fiber is about 90 percent.

So there is a problem. When we are talking about deinking of papers there is a pollution problem; you are right. And this is one of the economic factors, I am sure.

Chairman GRIFFITHS. Where do you locate the plants in comparison to the point of recovery of the paper?

Mr. DARROW. Most papermills, or all papermills, have to be located near plentiful water sources. Usually they are located in remote areas and if they are forest-based they are located near a forest.

One of the economic problems again, as far as the utilization of wastepaper is concerned is that most of your papermills, like many of those in your State, are located not in the metropolitan areas where the wastepaper is, but in remote areas, adjacent to good water supplies and usually near good wood supplies.

Chairman GRIFFITHS. I understand that someone tried to locate one in Escanaba, Mich., and the residents don't think it is remote enough.

Mr. DARROW. It is always a problem.

Chairman GRIFFITHS. I would like to thank you for appearing here this morning. Your testimony has been very helpful.

Thank you.

Mr. DARROW. Thank you.

Chairman GRIFFITHS. The subcommittee will meet tomorrow morning at 10 o'clock in this room.

(Whereupon, at 11:40 a.m., the subcommittee adjourned, to reconvene at 10 a.m., Tuesday, November 9, 1971.)

THE ECONOMICS OF RECYCLING WASTE MATERIALS

TUESDAY, NOVEMBER 9, 1971

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON FISCAL POLICY
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittee met, pursuant to notice at 10 a.m., in room 1202, New Senate Office Building, Hon. Martha W. Griffiths (chairman of the subcommittee) presiding.

Present: Representatives Griffiths and Conable.

Also present: James W. Knowles, director of research; and Walter B. Laessig and Leslie J. Bander, economists for the minority.

Chairman GRIFFITHS. The subcommittee will come to order.

This morning the Subcommittee on Fiscal Policy of the Joint Economic Committee continues its hearings on the economics of recycling waste materials. Yesterday among our witnesses were a number from various industries concerned with these problems.

This morning we will hear from three government officials concerned with these programs. The first is David D. Dominick, Assistant Administrator for categorical programs, Environmental Protection Agency. The second is Jerome L. Klaff, chairman, National Commission on Materials Policy. The third is Jeffrey S. Padnos, who will be speaking on behalf of Jerome Kretchmer, administrator, New York City Environmental Protection Administration. Finally we will hear from Blair Bower, economist for Resources for the Future, Inc.

Senator Thomas F. Eagleton, of Missouri, was scheduled to testify this morning, but he will be unable to appear because of the pressure of other congressional duties. Without objection, his prepared statement is inserted in the record at this point.

(The prepared statement of Senator Eagleton follows:)

PREPARED STATEMENT OF HON. THOMAS F. EAGLETON, A U.S. SENATOR FROM THE STATE OF MISSOURI

Madam Chairman and members of the committee, it is a pleasure to appear before you this morning to discuss the recycling of solid wastes.

The reasons *why* we should recycle more of our "waste" materials are fairly clear:

—increasing volumes of solid wastes that pose serious disposal problems and public health problems;

—diminishing reserves of some non-renewable resources on both a domestic and world-wide basis;

—the social costs involved in the harvesting and manufacturing of products from virgin, often non-renewable resources.

It is also clear that we *can* recycle. Indeed, we are already doing it.

Recovered materials now compete with virgin materials on their economic merits. Often they are easier to come by than virgin materials which require costly and complicated extraction.

There is an existing market for "waste," including collection systems, transportation facilities and processors. In addition to the commercial scrap-handling system which is already part of our recycling economy, there is a vast collection and processing system running at a fast idle for lack of an outlet—all the municipal trash collection workers, their trucks, their incinerators and dumps which the public now supports at considerable cost.

The question before us, then, is how we can do more of what we are already doing: How we can feed more of the wastes we are already using, and perhaps some others, back into the productive cycle?

Part of the answer no doubt lies in technological advances. I understand that, for example, certain nonferrous metals recovered from the solid waste stream can be used to convert almost valueless nonmagnetic iron ores into magnetic material which can then be magnetically separated to yield iron. On a less sophisticated level, there must be better ways to separate our domestic refuse so that the reusable components can be economically recovered.

Part of the answer may also lie in overcoming psychological prejudices against "used" goods.

I am convinced, however, that the fundamental answer lies in straight economics—in the relative prices of recycled material and virgin material. If the price of recycled material can be reduced vis-a-vis the price of virgin material, the recycling mechanisms already functioning in our materials market should use more of it.

During public hearings on the legislation that became the Resource Recovery Act of 1970, I became convinced that there may be a number of existing public policies, expressed in regulatory decisions and legislation, which may tend artificially to depress the market for recycled materials.

I introduced an amendment to the Resource Recovery Act which calls upon the Administrator of the Environmental Protection Agency to carry out an investigation to determine:

". . . the effect of existing public policies, including subsidies and economic incentives and disincentives, percentage depletion allowances, capital gains treatment, and other tax incentives and disincentives, upon the recycling and re-use of materials, and the likely effect of the modification or elimination of such incentives and disincentives upon the re-use, recycling, and conservation of such materials."

The kinds of policies my amendment refers to have their origins in public requirements which were and perhaps still are perfectly valid. Some were adopted for public health reasons. Some were adopted to meet the requirements of a young country eager to exploit its natural wealth to the full. Today, however, an additional urgent public requirement—recycling—must be weighted in the balance.

I expected the studies that the Administrator of EPA carries out to provide a great deal of valuable information about the effects of our public policies on recycling. I anticipate that the work of the Administrator in this area will be complemented, as well, by the efforts of the National Commission on Materials Policy authorized under the National Materials Policy Act of 1970, the second title of the Resource Recovery Act of 1970.

The reports of the Administrator and the Chairman of the Commission, plus the testimony your Committee hears, should provide specific information on the existence, magnitude, and ultimate significance of such public policies for recycling and re-use of materials from our solid waste stream. My purpose is not to attempt to anticipate or duplicate the findings of experts in this field. I will, instead, try to illustrate the kinds of areas where critical scrutiny is required.

Consider, for example, prohibitions against the use of returnable containers. These prohibitions protected the public from re-use of containers that probably would have been unsafe if refilled under the sanitary conditions of an earlier era. There are reasons other than health, perhaps, for the manufacture of non-returnable bottles, but it is difficult to deny that glass containers could safely be refilled and re-used by the public today.

Likewise, labeling requirements applicable to used crankcase oil were intended to protect the public from unscrupulous vendors who otherwise might sell cleaned oil as "re-refined" oil. Today testing and refining technology can make used oil virtually as good as new. Why should this marketability be limited by a prejudicial label?

In the 1940's, timber and pulp operations were granted highly favorable capital gains treatment in an effort to encourage reforestation—a valid and laudable goal. But since that time, the percentage of scrap paper used in American paper production has steadily declined. Why? It is because pulp producers are subsidized and waste paper products are not.

What about the percentage depletion allowances which may significantly reduce the relative cost of fresh miners, thereby limiting consumption of scrap? Are these still valid at a time when our national interest has shifted from exploitation of new resources to conservation and recycling?

Consider freight rates, set by the ICC. Iron ore travels for less than scrap partly because of its greater bulk and economies of scale. But it the differential economically realistic or is it discriminatory?

The experts who testify before you will doubtless identify other similar areas of inquiry.

It is easy to raise these questions. Satisfactory answers may be hard to find. The tax and regulatory policies may marginally discourage recycling, but this fact may be outweighed by valid reasons for their continuation. Moreover—let's face it—these laws and regulations have been the rules of the economic game in the United States for a long time, and they have generated a lot of powerful vested interests.

Even if these policies on balance no longer serve our national objectives, it is probably not possible either economically or politically to cut them off overnight.

On the other hand, as we embark on an effort to establish public policies which will stimulate greater re-cycling, we should try to begin, at least on paper, with an economic tabula rasa. We should have a firm estimate of how much waste material the American economy would absorb if government did not interfere with the market at all. Only by starting at that point can we begin sensibly to apply regulations or subsidies to optimize use of both waste and virgin material.

Congress will be offered a wide variety of proposals designed to overcome the obstacles to recycling. Among them probably will be, for example, tax allowances or subsidies for recycling designed to counteract the effect of percentage depletion allowances and capital gains treatment on mineral resources and timber. There will be proposals to apply these subsidies or regulations at a variety of points in the production cycle. There will be proposals to subsidize plant conversion research and development in new re-cycling technologies. Prescriptive standards requiring minimum recycled waste content (including specifications for Government procurements) are already being adopted.

Some or all of these ideas may be completely valid.

But I want to caution that unless we are very careful we may find, as taxpayers and consumers, that we are simply spending money out of one pocket to offset the effects of regulations and subsidies which are already taking money out of another pocket.

Until all the evidence is in, therefore, I suggest that any compensation allowances, minimum-recycled-waste specifications, or similar, public policy incentives to recycling should be considered additional biases inflicted on the market mechanism, rather than once-and-for-all cures. Furthermore, if such measures are adopted, I believe we should view them as temporary corrective measures limited to specific periods of time that will expire after an established interval unless it is determined to be in the public interest to continue them.

I congratulate the chairwoman of the subcommittee for her interest in this important subject matter and the time and effort that she is devoting to it. I know that the record made in these hearings will be of invaluable assistance to the Congress and to the executive branch as they pursue this subject, and I am confident that the information and insights that are developed in the course of this hearing will contribute directly and substantially to the development of sound public policy in this area.

Chairman GRIFFITHS. We will hear from each of our four witnesses and then question them all at the same time.

Mr. Klaff, will you lead off with your statement in your own way.

STATEMENT OF HON. JEROME L. KLAFF, CHAIRMAN, NATIONAL COMMISSION ON MATERIALS POLICY

Mr. KLAFF. Thank you very much.

Madam Chairman and members of the committee: My name is Jerome L. Klaff and I reside in Baltimore, Md. I am president of H. Klaff & Co., Inc., a secondary metals company with offices in Baltimore.

I am pleased to appear before this committee in my relatively new role as Chairman of the National Commission on Materials Policy. This Commission was created under the Resource Recovery Act of 1970, Public Law 91–512.

Parenthetically, I think I should note that the members of the seven-man commission were sworn in just a few weeks ago on September 15, to be precise, and that we have had our second meeting since that time. We are, therefore, only in the preliminary phase of our work.

Section 202, title II of the law, outlines our mission as follows:

> It is the purpose of this title to enhance environmental quality and conserve materials by developing a national materials policy to utilize present resources and technology more efficiently, to anticipate the future materials requirements of the nation and the world and to make recommendations on the supply, use, recovery and disposal of materials.

The same legislation, section 205(a)(5), title I, states that:

> The Secretary [now the administrator of EPA] shall carry out an investigation and study to recommend incentives (including Federal grants, loans and other assistance) and disincentives to accelerate the reclamation or recycling of materials from solid wastes.

Citing only these two broad statements of purpose, I believe it is most appropriate that the National Commission on Materials Policy, which has the broadest policy and economic mandates in the recycling field, should testify on the importance of fair and equitable treatment of both virgin and recycled resources when requested to do so by the Congress.

The chairman of the Materials Policy Commission in the early 1950's wrote:

> This is a matter that touches virtually all aspects of our national life, the availability of materials and use and reuse, the development of alternatives, the disposals of waste products, are of increasing urgency as our population grows and our society becomes interdependent.

Recycling is one of the most constructive and positive approaches toward solving the dilemma of solid waste accumulation. The concept of recycling has assumed a major role in the environmental management program. In the expansion of materials recycling, lies the key to the recapture of resources, which ordinarily would be lost, but which. through reuse, can contribute to a sound materials policy.

My testimony today cannot be specific since the Commission has not been in existence long enough to study the problem and formulate its recommendations on this or any of the other issues involved. However, I can state that the Commission considers this problem to be one which should be carefully investigated.

The Commission will report its findings and recommendations for a National Materials Policy to the President and to the Congress no later than June 30, 1973.

The Commission can, and we trust will, become a national forum for harmonizing the needs of those deeply concerned about the development and utilization of materials to meet our economic requirements and those who seek environmental quality, not only in this country, but throughout the world. We must, of course, as a nation answer the basic economic questions:

How much material is available?

How much will be needed by 2000 A.D.?

We must also answer the question:

What is the least damaging way, environmentally, of extracting and disposing of material?

Among the specific studies which the Commission will undertake between now and mid-1973 is one designed to determine the best means for extraction, development, and use of materials which are susceptible to recycling, reuse or self-destruction.

The Commission wishes to work closely on this important matter with the staff of the Joint Economic Committee.

Madam Chairman, this concludes my statement.

Chairman GRIFFITHS. Thank you very much, Mr. Klaff.

Mr. Padnos, you may proceed.

STATEMENT OF JEFFREY S. PADNOS, NEW YORK CITY ENVIRONMENTAL PROTECTION ADMINISTRATION, ON BEHALF OF JEROME KRETCHMER, ADMINISTRATOR

Mr. PADNOS. Thank you.

My name is Jeffrey S. Padnos. Since June 1970 I have been a member of the staff of New York City's Environmental Protection Administration. I am speaking today on behalf of Jerome Kretchmer, who since May 1970 has been head of the administration.

The Environmental Protection Administration encompasses New York City's Departments of Air Resources, Water Resources, and Sanitation. The EPA provides the city's water supply, treats the city's sewage, collects its garbage, and cleans its streets. We must contend with a variety of urban ills: abandoned automobiles, litter, air pollution, and water pollution, to mention those most often talked about.

But of all these, EPA's single most difficult problem, our single most significant unanswered environmental question, is, how are we going to dispose of our city's solid waste?

At this point, Madam Chairman, I will excerpt from my prepared statement and add a few thoughts which I hope will be of help in dealing with some of the questions that arose yesterday.

The costs of handling New York City's wastes are described in some detail in my prepared statement. To sum up, I can say that New York City has tremendous volume, more than 24,000 tons every day, and our total sanitation expense bill, exclusive of capital costs, was over $175 million last year.

Moreover, three quarters of our refuse is now disposed of relatively cheaply through sanitary land fills. As we run out of land fill space, we will have to build expensive new processing plants or, if regional waste-handling plans could be worked out, pay heavily to export our refuse.

In contrast, each ton of what is now called solid waste that could be recycled back into the industrial process would mean a $10 to $15 or more toll charge that the city would not have to pay. For every 1,000 tons of secondary materials we would remove from our daily solid waste load, the city can avoid spending $10 to $15 million or more to build a processing plant that would cost up to $5 million per year to operate.

In addition, recycling could become the basis for major industrial expansion, with desperately needed jobs in the city. An evaluation of

the raw materials now in New York City's garbages reveals the potential. A table in my prepared statement shows that the value of only the newspapers and containers in our solid wastes is more than $32 million per year, and this does not include the paper in office wastes or the metals in appliances.

The New York City Environmental Protection Administration has been working to encourage recycling in four important ways. First, we have introduced recycling incentive legislation. This legislation will be discussed a bit later.

Second, we have worked for industrial expansion, seeking new firms which could use some portion of our solid waste as their raw material.

Third, we are undertaking an experimental program involving separate collection of recyclable newspapers. Results are not in yet, but early indications are that a substantial percentage of the public is willing to make the additional effort necessary to separate refuse for recycling. We are considering additional newspaper programs, as well as a program to see that bulky items such as refrigerators are reused instead of buried.

Finally, one of our most significant steps has been the institution of an environmental purchasing program, through which we have been working to develop specifications for the purchase of products made from secondary materials. The first steps in the program are described in testimony submitted by Jerome Kretchmer and New York City Purchase Commissioner Marvin Gersten to the Senate Committee on Rules and Administration in support of S. 2266 and S. 2267.

If you feel it is appropriate, Madam Chairman, I would like to submit a copy of that testimony for the record of the present proceedings.

Chairman GRIFFITHS. Without objection, we will be glad to have it.

Mr. PADNOS. Thank you very much.

(The testimony follows:)

TESTIMONY BY MARVIN GERSTEN, COMMISSIONER OF PURCHASE, AND JEROME KRETCHMER, ENVIRONMENTAL PROTECTION ADMINISTRATOR, THE CITY OF NEW YORK, SUBMITTED TO THE COMMITTEE ON RULES AND ADMINISTRATION OF THE SENATE OF THE UNITED STATES, AUGUST 9, 1971, ON S. 2266 AND S. 2267

Mr. Gersten has been Commissioner of the New York City Department of Purchase since 1966. The Department of Purchase is responsible for the acquisition of equipment and supplies valued at approximately $170 million for the City of New York every year.

Mr. Kretchmer has been Environmental Protection Administrator of the City of New York since early 1970. The New York City EPA includes the Departments of Sanitation, Water Resources, and Air Resources. The EPA employs approximately 20,000 people and has an annual expense budget of over $300 million.

It is a pleasure to submit this statement regarding the proposed legislation designed to stimulate the use of paper made from secondary fibres. The committee is to be congratulated for recognizing the significant role that government purchasing policy can have in encouraging the reutilization of raw materials which are now wastefully clogging the disposal facilities of our cities.

On February 2, 1971—"Recycling Day in New York"—Mayor John V. Lindsay stated his intent to use, wherever possible, New York City's purchasing dollars for environmental ends. Specifically, he announced that the City was preparing purchasing specifications for paper that would require the use of recycled fibres. (A copy of the Mayor's address is included with this submission.) We would like to discuss briefly New York's motivation in undertaking this environmental purchasing program, and then describe our experiences with the program to date.

Motivation

New York City's solid waste burden is growing rapidly. The Department of Sanitation currently disposes of over 24,000 tons of refuse every day—almost 15 billion pounds last year. Between 1960 and 1970, the City's population remained essentially constant, yet the solid waste load increased 40%. By 1985, our refuse load is expected to grow to 36,000 tons per day—nearly 22 billion pounds per year.

Expenses are rising. It now costs the City more than $36.00 to collect and dispose a ton of refuse. Our total sanitation bill is close to $200 million per year, exclusive of capital expenditures.

New technology for increasing collection productivity, including containerization, is currently being introduced, but these innovations are expected to do no more than slow down the rate of increase in costs. Volume growth is more than offsetting cost per ton savings.

Moreover, we are running out of places to dispose of our solid waste. According to current height regulations, New York City's sanitary landfill areas will be exhausted by 1976. Extension of the landfills is possible, but can only delay the day of reckoning by 10 or 15 years. The traditional alternative to landfill, incineration, will most likely not be satisfactory. The City's Environmental Protection Administration recently announced cancellation of a plan to construct a 6000-ton-per-day incinerator because the capital cost—$200 million, or over $33,000 per daily ton—and the air pollution—more than 3,000 tons of particulates per year even with the most modern abatement equipment—were judged intolerable.

A final solution to the City's solid waste problem is still being sought. It is hoped that recycling will become a major, if not total, part of that solution.

This is the motivation behind the City's environmental purchasing program: to encourage the reutilization of resources which are now wastefully—and at a great expense to all municipalities—thrown away. We hope to help turn the tremendous tax burden of solid waste collection and disposal into a new source of economic activity and tax revenue. We will now relate how that program has developed, and what the results have been.

Specification development—Definition of recycling

Work on the program began last fall, when, at the direction of the Mayor, the staffs of the City's Purchase Development and Environmental Protection Administration began meetings and discussions with various representatives of the paper industry. Out of that study came the following addtiion to our specification for bond paper for office use:

"Recycled bond paper . . . shall contain a minimum of 20% recycled deinked fibres. Such deinked fibre shall be in addition to any use of envelope cuttings, hard white shavings, mill broke or bindery trimmings . . ."

We have recently developed another specification, this one for corrugated cases:

"Corrugated cases shall contain a minimum of 30% recycled fibres (by weight). For the purposes of this requirement, recycled fibres include fibres from old corrugated, newspapers, mixed papers or other previously used products reclaimed from the municipal solid waste stream, and shall not include waste generated in manufacturing or converting processes, such as mill broke, roll trim, kraft or corrugated cuttings."

This second specification is currently under review and has not yet been adopted. It is included here because it helps to emphasize a very important distinction which is also being made in the legislation the committee is considering. The distinction is between two major classes of waste paper: "Manufacturing and converting waste" and "post-consumer waste".

Our research indicates that existing economic incentives are such that almost all manufacturing and converting waste—including wood residuals such as sawdust and chips, "mill broke", and "cuttings" or "clippings" from envelopes or cartons—are already being reclaimed. For this reason, we decided to focus our efforts upon the post-consumer wastes, including newspapers, containers, and mixed papers (such as office building waste), which constitutes the bulk of the nearly 40 million tons of paper products entering our nation's solid waste stream every year.

Availability and price

On February 2, 1971, Mayor Lindsay announced the beginning of New York City's environmental purchasing program. A few weeks later, the Purchase Department solicited bids for office bond paper, with the recycling requirement included. On March 19, 1971, we received bids from paper distributors representing five paper manufacturers. (Two other bids were received, but the manufacturers did not meet the recycling requirement.)

In order to gain perspective on the price of recycled paper, the Purchase Department requested bids for bond paper with no recycling requirement. On April 5, 1971, we received bids from distributors representing six paper manufacturers. We found the prices to be comparable. The lowest recycled paper bid of $354,177 for 365,000 reams was lower than five of the six virgin paper bids. Among those five was the brand of paper the City had bought in 1970. The lowest virgin paper bid was approximately $30,000 or 8.4% below the lowest recycled paper bid.

Shortly thereafter, the Mayor announced the award of the contract to the lowest recycled paper bidder. The Mayor said:

"Under a program of selective purchasing of environmentally protective products, the City's dollars are used for two positive purposes: First, to provide the basic products necessary for carrying on governmental activities, and second, to provide incentives to those sectors of private industry which are helping us to preserve the environment."

Quality

To date the City has taken delivery on over 50,000 reams, approximately 250,000 pounds, of the recycled paper, and we have encountered no problems in use.

Response

The response to the City's actions has been tremendous. We have answered hundreds of requests for information regarding recycled paper, including more than sixty from other government agencies.

The City of Buffalo recently solicited two bids for paper, one using their old specification, the other including the recycling requirement for bond paper quoted above. Buffalo's Purchase Department has reported that the lowest of all bids received was for recycled paper, and a contract has been awarded.

The paper industry is also responding to the environmental concern being voiced around the country. Several new lines of recycled paper have come onto the market in recent months. One paper manufacturer reported that it is reactivating a waste paper deinking system which has been in mothballs for 10 years.

In conclusion, we can say that on the basis of our experience to date, the City is working to expand its program to other products, including corrugated containers mentioned previously. We feel that a strong Federal commitment to purchase environmentally beneficial products such as recycled paper is necessary, if recycling is to expand to levels that will have significant impact on municipal solid waste problems. We applaud and support S. 2266 and S. 2267 and all other measures undertaken to increase the utilization of secondary materials.

Mr. PADNOS. I will explain briefly this testimony a little bit later.

The thrust of yesterday's testimony had to do with what the Federal Government can do to encourage recycling.

In the remainder of this statement, I shall discuss four broad areas in which Federal action is needed: tax legislation, standards and procurement policy, transportation, and research and development expenditures.

At this point, Madam Chairman, I would like to introduce for the record a copy of New York City's proposed recycling incentive tax on containers.

Chairman GRIFFITHS. Without objection, it will be placed in the record at this point.

(The document follows:)

LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 1971

No. 43

Introduced by Messrs. Merola and Clingan (request of Mayor)—

A LOCAL LAW

To amend the administrative code of the city of New York, in relation to raising revenue by imposing taxes on plastic containers and to promote the recycling of such containers and reduce the cost of solid waste disposal to the city.

Be it enacted by the Council as follows:

Section 1. Chapter forty-six of the administrative code of the city of New York is hereby amended by adding thereto a new title, to be title F, to follow title E, to read as follows:

TITLE F

TAX ON CONTAINERS

§ F46-1.0. **Definitions.**—When used in this title, the following terms shall mean and include:

1. "Person." An individual, partnership, society, association, joint stock company, corporation, estate, receiver trustee, assignee, referee, or any other person acting in a fiduciary or representative capacity, whether appointed by a court or otherwise and any combination of individuals or of the foregoing.

2. "Container." Any article, thing or contrivance made in whole or in part of rigid or semi-rigid plastic, including, but not limited to, barrels, baskets, bottles, boxes, cartons, carrying cases, crates, cups, cylinders, drums, jars, jugs, pails, pots, trays, tubs, tubes, tumblers, and vessels, intended for use in packing or packaging any product intended for sale:

(a) Metal containers and paperboard or fiber containers which have been impregnated, lined or coated with plastic or other materials shall be considered to be classified as metal containers and paperboard containers, respectively;

(b) Paperboard or fiber containers with fastenings, tops and/or bottoms made of plastic shall be classified as paperboard or fibre containers;

(c) Plastic caps that are easily, readily, usually, and customarily separated from the container before disposal shall not be considered part of the container.

3. "Recycled material." Component materials which have been derived from previously used material or from new or old scrap material.

4. "Taxable period." Such calendar period prescribed for filing returns by this title or by the finance administrator.

5. "Retail sale" or "sale at retail" A sale to any person for any purpose other

than for resale as such or as a physical component part of tangible personal property.

6. "Sale." The sale or furnishing of a container by a seler or supplier to a retailer.

7. "Seller or supplier." Any person who sells containers to a retailer.

8. "Retailer." Any person who purchases containers (whether filled or unfilled) for the purpose of using them in connection with and as part of sales at retail or who receives them as containers of products intended for sale at retail.

9. "City." The city of New York.

10. "Finance Administrator." The finance administrator of the city.

1. "Comptroller." The comptroller of the city.

§ F46-2.0. **Imposition of tax.**—1. On and after July first, nineteen hundred seventy-one, there is hereby imposed within the city of New York and there shall be paid a tax upon every sale of a plastic container at the rate of two cents for each container sold:

2. A credit shall be allowed against the taxes imposed by this title of one cent for each taxable container if manufactured with a minimum of thirty per cent of recycled material.

§ F46-3.0. **Presumptions and burden of proof.**—For the purpose of proper administration of this title and to prevent evasion of the tax hereby imposed, it shall be presumed that all sales of plastic containers are taxable, and not entitled to any credit allowed against the taxes imposed hereby. Such presumptions shall prevail until the contrary is established and the burden of proving the contrary shall be upon the taxpayer.

§F46-4.0 **Payment of the tax.**—The tax imposed hereunder shall be paid by the seller or supplier. However, where the tax has not been paid on a sale by such seller or supplier, the retailer shall be liable for tax thereon upon purchasing the container. Should sellers and suppliers having no business situs in the city, who sell containers to retailers within the city, pay the tax, the retailer purchasing the containers shall not be liable for the tax.

§ F46-5.0. **Records to be kept.**—Every seller or supplier and every retailer shall keep records of all plastic containers taxed hereunder and of all purchases and sales thereof and of the taxes due and payable on the sale or on the purchase thereof, in such form as the finance administrator may by regulation require. Such records shall be available for inspection and examination at any time upon demand by the finance administrator or his duly authorized agent or employee and shall be preserved for a period of three years, except that the finance administrator may consent to their destruction within that period or may require that they be kept longer.

§ F46-6.0. **Exemptions.**—1. The following shall be exempt from the payment of the tax imposed by this title:

(a) The state of New York, or any of its agencies, instrumentalities, public corporations (including a public corporation created pursuant to agreement or compact with another state or Canada) or political subdivisions where it is the purchaser, user or consumer;

(b) The United States of America, and any of its agencies and instrumentalities insofar as it is immune from taxation where it is the purchaser, user or consumer;

(c) The United Nations or other international organizations of which the United States of America is a member; and

(d) Any corporation, or association, or trust, or community chest, fund or foun-

dation, organized and operated exclusively for religious, charitable, or educational purposes, or for the prevention of cruelty to children or animals, and no part of the net earnings of which inures to the benefit of any private shareholder or individual, and no substantial part of the activities of which is carrying on propaganda, or otherwise attempting to influence legislation; provided, however, that nothing in this paragraph shall include an organization operated for the primary purpose of carrying on a trade or business for profit, whether or not all of its profits are payable to one or more organizations described in this subdivision.

2. The following containers shall be exempt from the tax imposed by this title:

a. Containers sold or furnished containing products intended for use in manufacturing processes and not for final retail sale.

b. Containers used as receptacles for food, food products, beverages, dietary foods and health supplements, sold for human consumption but not including (i) candy and confectionery, (ii) fruit drinks which contain less than seventy per cent of natural fruit juice, (iii) soft drinks, sodas and beverages such as are ordinarily dispensed at soda fountains or in connection therewith (other than coffee, tea and cocoa) and (iv) beer, wine or other alcoholic beverages.

§ F46-7.0. **Returns**—1. Every seller or supplier shall file with the finance administrator a return of containers sold and of the taxes due and payable thereon for the period from the day this tax takes effect until the last day of September 1971, and thereafter for each of the four-monthly periods ending on the last day of January, May and September of each year.

2. Every retailer shall file with the finance administrator a return of containers purchased by him from sellers or suppliers having no situs within the city and of the taxes due thereon for the same periods provided in subdivision one of this section.

3. The returns shall be filed within twenty days after the end of the periods covered thereby. The finance administrator may permit or require returns to be made for other periods and upon such dates as he may specify. If the finance administrator deems it necessary in order to insure the payment of the tax imposed by this title, he may require returns to be made for shorter periods than those prescribed pursuant to the foregoing povisions of this subdivision and upon such dates as he may specify.

4. The forms of returns shall be prescribed by the finance administrator and shall contain such information as he may deem necessary for the proper administration of this title. The finance administrator may require amended returns to be filed within twenty days after notice and to contain the information specified in the notice.

5. If a return required by this title is not filed or if a return when filed is incorrect or insufficient on its face the finance administrator shall take the necessary steps to enforce the filing of such a return or a corrected return.

§ F46-8.0. **Determination of tax.**—If a return required by this title is not filed, or if a return when filed is incorrect or insufficient, the amount of tax due shall be determined by the finance administrator from such information as may be obtainable and, if necessary, the tax may be estimated on the basis of external indices, such as volume of sales, inventories, purchases of containers, or of raw materials, production figures, and/or other factors. Notice of such determination shall be given to the person liable for the collection and/or payment of the tax. Such determination shall finally and irrevocably fix the tax unless the person against whom it is assessed, within thirty days

after giving notice of such determination, shall apply to the finance administrator for a hearing, or unless the finance administrator of his own motion shall re-determine the same. After such hearing the finance administrator shall give notice of his determination to the person against whom the tax is assessed. The determination of the finance administrator shall be reviewable for error, illegality or unconstitutionality or any other reason whatsoever by a proceeding under article seventy-eight of the civil practice law and rules if application therefor is made to the supreme court within four months after the giving of the notice of such determination. A proceeding under article seventy-eight of the civil practice law and rules shall not be instituted unless (a) the amount of any tax sought to be reviewed, with penalties and interest thereon, if any, shall be first deposited with the finance administrator and there shall be filed with the finance administrator an undertaking, issued by a surety company authorized to transact business in this state and approved by the superintendent of insurance of this state as to solvency and responsibility, in such amount as a justice of the supreme court shall approve to the effect that if such proceeding be dismissed or the tax confirmed, the petitioner will pay all costs and charges which may accrue in the prosecution of the proceeding; or (b) at the option of the applicant such undertaking filed with the finance administrator may be in a sum sufficient to cover the taxes, penalties and interest thereon stated in such determination plus the costs and charges which may accrue against it in the prosecution of the proceeding, in which event the applicant shall not be required to to deposit such taxes, penalties and interest as a condition precedent to the application.

§ F46-9.0. **Refunds.**—a. In the manner provided in this section the finance administrator shall refund or credit, without interest, any tax, penalty or interest erroneously, illegally or unconstitutionally collected or paid if application to the finance administrator for such refund shall be made within one year from the payment thereof. Whenever a refund is made by the finance administrator, he shall state his reasons therefor in writing. Such application may be made by the seller or supplier or the retailer or other person who has actually paid the tax. The finance administrator may, in lieu of any refund required to be made, allow credit therefor on payments due from the applicant.

b. An application for a refund or credit made as herein provided shall be deemed an application for revision of any tax, penalty or interest complained of. If the finance administrator, prior to any hearing being held, initialy denies the application for refund, he shall give notice of such determination of denial to the applicant. Such determination shall be final and irrevocable unless the applicant, within thirty days after the giving of notice of such determination, shall apply to the finance administrator for a hearing, or unless the finance administrator of his own motion shall redetermine the same. After such hearing the finance administrator shall give notice of his determination to the applicant, who shall be entitled to review such determination by a proceeding pursuant to article seventy-eight of the civil practice law and rules, provided such proceeding is instituted within four months after the giving of the notice of such determination, and provided that a final determination of tax was not previously made. Such a proceeding shall not be instituted unless an undertaking is filed with the finance administrator in such amount and with such sureties as a justice of the supreme court shall approve to the effect that if such proceeding be dismissed or the tax confirmed, the petitioner shall pay all costs and charges which may accrue in the prosecution of such proceeding.

c. A person shall not be entitled to a revision, refund or credit under this section of a

tax, interest or penalty which had been determined to be due pursuant to the provisions of section F46-8.0 of this title where he has had a hearing or an opportunity for a hearing, as provided in said section, or has failed to avail himself of the remedies therein provided. No refund or credit shall be made of a tax, interest or penalty paid after a determination by the finance administrator made pursuant to section F46-7.0 of this title unless it be found that such determination was erroneous, illegal or unconstitutional or otherwise improper, by the finance administrator after a hearing or of his own motion, or in a proceeding under article seventy-eight of the civil practice law and rules, pursuant to the provisions of said section, in which event refund or credit without interest shall be made of the tax, interest or penalty found to have been overpaid.

§ F46-10.0. **Reserves.**—In cases where the seller or supplier or the retailer has applied for a refund and has instituted a proceeding under article seventy-eight of the civil practice law and rules to review a determination adverse to him on his application for refund, the comptroller shall set up appropriate reserves to meet any decision adverse to the city.

§ F46-11.0. **Remedies exclusive.**—The remedies provided by sections F46-8.0 and F46-9.0 of this title shall be the exclusive remedies available to any person for the review of tax liability imposed by this title; and no determination or proposed determination of tax or determination on any application for refund shall be enjoined or reviewed by an action for declaratory judgment, an action for money had and received or by any action or proceeding other than a proceeding in the nature of a certiorari proceeding under article seventy-eight of the civil practice law and rules; provided, however, that a taxpayer may proceed by declaratory judgment if he institutes suit within thirty days after a deficiency assessment is made and pays the amount of the deficiency assessment to the finance administrator prior to the institution of such suit and posts a bond for costs as provided in section F46-8.0 of this title.

§ F46-12.0. **Proceedings to recover tax.**—a. Whenever any seller or supplier or retailer or other person shall fail to pay any tax, penalty or interest imposed by this title as therein provided, the corporation counsel shall, upon the request of the finance administrator bring or cause to be brought an action to enforce the payment of the same on behalf of the city of New York in any court of the state of New York or of any other state or of the United States. If, however, the finance administrator in his discretion believes that any such seller or supplier or retailer or other person is about to cease business, leave the state or remove or dissipate the assets out of which the tax, penalties or interest might be satisfied, and that any such tax, penalty or interest will not be paid when due, he may declare such tax, penalty or interest to be immediately due and payable and may issue a warrant immediately.

b. As an additional or alternate remedy, the finance administrator may issue a warrant, directed to the city sheriff commanding him to levy upon and sell the real and personal property of the seller or supplier or retailer or other person liable for the tax, which may be found within the city, for the payment of the amount thereof, with any penalties and interest, and the cost of executing the warrant, and to return such warrant to the finance administrator and to pay to him the money collected by virtue thereof within sixty days after the receipt of such warrant. The city sheriff shall within five days after the receipt of the warrant file with the county clerk a copy

thereof, and thereupon such clerk shall enter in the judgment docket the name of the person mentioned in the warrant and the amount of the tax, penalties and interest for which the warrant is issued and the date when such copy is filed. Thereupon the amount of such warrant so docketed shall become a lien upon the title to and interest in real and personal property of the person against whom the warrant is issued. The city sheriff shall then proceed upon the warrant, in the same manner, and with like effect, as that provided by law in respect to executions issued against property upon judgments of a court of record, and for services in executing the warrant he shall be entitled to the same fees, which he may collect in the same manner. In the discretion of the finance administrator a warrant of like terms, force and effect may be issued and directed to any officer or employe of the finance administration, and in the execution thereof such officer or employee shall have all the powers conferred by law upon sheriffs, but shall be entitled to no fee or compensation in excess of the actual expenses paid in the performance of such duty. If a warrant is returned not satisfied in full, the finance administrator may from time to time issue new warrants and shall also have the same remedies to enforce the amount due thereunder as if the city had recovered judgment therefor and execution thereon had been returned unsatisfied.

c. Whenever a seller or supplier or the retailer shall make a sale, transfer, or assignment in bulk of any part of the whole of his fixtures, or of his stock of merchandise, or of stock or merchandise and of fixtures pertaining to the conduct or operation of business of the seller or supplier or the retailer, otherwise than in the ordinary course of trade and regular prosecution of business, the purchaser, transferee or assignee shall at least ten days before taking possession of the subject of said sale, transfer or assignment, or paying therefor, notify the finance administrator by registered mail of the proposed sale and of the price, terms and conditions thereof whether or not the seller, transferrer or assignor, has represented to, or informed the purchaser, transferee or assignee that it owes any tax pursuant to this title, and whether or not the purchaser, transferee or assignee has knowledge that such taxes are owing, and whether any such taxes are in fact owing.

Whenever the purchaser, transferee or assignee shall fail to give notice to the finance administrator as required by the preceding paragraph, or whenever the finance administrator shall inform the purchaser, transferee or assignee that a possible claim for such tax or taxes exists, any sums of money, property or choses in action, or other consideration, which the purchaser, transferee or assignee is required to transfer over to the seller, transferrer or assignor shall be subject to a first priority right and lien for any such taxes theretofore or thereafter determined to be due from the seller, transferrer or assignor to the city, and the purchaser, transferee or assignee is forbidden to transfer to the seller, transferrer or assignor any such sums of money, property or choses in action to the extent of the amount of the city's claim. For failure to comply with the provisions of this subdivision, the purchaser, transferee or assignee, in addition to being subject to the liabilities and remedies imposed under the provisions of article six of the uniform commercial code, shall be personally liable for the payment to the city of any such taxes theretofore or thereafter determined to be due to the city from the seller, transferrer or assignor, and such liability may be assessed and enforced in the same manner as the liability for tax under this title.

§ F46-13.0. **General powers of the finance administrator.**—In addition to the powers granted to the finance administrator in this title, he is hereby authorized and empowered:

1. To make, adopt and amend rules and regulations appropriate to the carrying out of this title and the purposes thereof;

2. To extend, for cause shown, the time of filing any return for a period not exceeding thirty days; and for cause shown, to remit penalties but not interest computed at the rate of six per cent per annum; and to compromise disputed claims in connection with the taxes hereby imposed:

3. To request information from the tax commission of the state of New York or the treasury department of the United States relative to any person; and to afford information to such tax commission or such treasury department relative to any person, any other provision of this title to the contrary notwithstanding;

4. To delegate his functions hereunder to a deputy administrator, assistant administrator, commissioner or deputy commissioner in the finance administration or to any employee or employees of the finance administrator;

5. To prescribe methods for determining the containers sold or supplied or purchased and to determine which are taxable and nontaxable.

6. To require sellers and suppliers and retailers within the city to keep detailed records with respect to containers bought, sold, used, manufactured or produced, and stock and production records with respect to such containers whether or not subject to the tax imposed by this title, and to furnish any information with respect thereto upon request to the finance administrator;

7. To assess, determine, revise and readjust the taxes imposed under this title.

§ F46-14.0. **Administration of oaths and compelling testimony.**—a. The finance administrator or his employees or agents duly designated and authorized by him shall have power to administer oaths and take affidavits in relation to any matter or proceeding in the exercise of their powers and duties under this title. The finance administrator shall have power to subpoena and require the attendance of witnesses and the production of books, papers and documents to secure information pertinent to the performance of his duties hereunder and of the enforcement of this title and to examine them in relation thereto, and to issue commissions for the examination of witnesses who are out of the state or unable to attend before him or excused from attendance.

b. A justice of the supreme court either in court or at chambers shall have power summarily to enforce by proper proceedings the attendance and testimony of witnesses and the production and examination of books, papers and documents called for by the subpoena of the finance administrator under this title.

c. Any person who shall refuse to testify or to produce books or records or who shall testify falsely in any material matter pending before the finance administrator under this title shall be guilty of a misdemeanor, punishment for which shall be a fine of not more than one thousand dollars or imprisonment for not more than one year, or both such fine and imprisonment.

d. The officers who serve the summons or subpoena of the finance administrator and witnesses attending in response thereto shall be entitled to the same fees as are allowed to officers and witnesses in civil cases in courts of record, except as herein

otherwise provided. Such officers shall be the city sheriff and his duly appointed deputies or any officers or employees of the finance administration, designated to serve such process.

§ F46-15.0. **Penalties and interest.**—a. Any person failing to file a return or to pay any tax to finance administrator within the time required by this title shall be subject to a penalty of five percent of the amount of tax due; plus interest at the rate of one percent of such tax for each month of delay excepting the first month after such return was required to be filed or such tax became due; but the finance administrator if satisfied that the delay was excusable, may remit all or any part of such penalty, but not interest at the rate of six percent per year. Such penalties and interest shall be paid and disposed of in the same manner as other revenues from this title. Unpaid penalties and interest may be enforced in the same manner as the tax imposed by this title.

b. Any seller or supplier or any retailer or any officer of a corporate seller or supplier or retailer, failing to file a return as required by this title, or filing or causing to be filed or making or causing to be made or giving or causing to be given any return, certificate, affidavit, representation, information, testimony or statement required or authorized by this title which is willfully false, and any seller or supplier or any retailer or any officer of a corporate seller or supplier or retailer failing to keep the records required by subdivision six of section F46-13.0 of this title, shall, in addition to the penalties herein or elsewhere prescribed, be guilty of a misdemeanor, punishment for which shall be a fine of not more than one thousand dollars or imprisonment for not more than one year, or both such fine and imprisonment. It shall not be any defense to a prosecution under this subdivision that the failure to file a return or that the actions or failures to act mentioned in this subdivision was unintentional or not wilful.

c. The certificate of the finance administrator to the effect that a tax has not been paid, that a return has not been filed, or that information has not been supplied pursuant to the provisions of this title, shall be presumptive evidence thereof.

§ F46-16.0. **Returns to be secret.**—a. Except in accordance with proper judicial order, or as otherwise provided by law, it shall be unlawful for the finance administrator, any officer or employee of the finance administration, any person engaged or retained on an independent contract basis or any person who, pursuant to this section is permitted to inspect any return or to whom a copy, an abstract or a portion of any return is furnished, or to whom any information contained in any return is furnished, to divulge or make known in any manner any information contained in or relating to any return required under this title. The officers charged with the custody of such returns shall not be required to produce any of them or evidence of anything contained in them in any action or proceeding in any court, except on behalf of the finance administrator in an action or proceeding under the provisions of this title, or on behalf of any party to any action or proceeding under the provisions of this title, when the returns or facts shown thereby are directly involved in such action or proceeding, in either of which events the court may require the production of, and may admit in evidence, so much of said returns or of the facts shown thereby, as are pertinent to the action or proceeding and no more. Nothing herein shall be construed to prohibit the delivery to a taxpayer or his duly authorized representative of a certified copy of any return filed in connection with his tax; nor to prohibit the delivery of such a certified copy of such return or of any infor-

mation contained in or relating thereto, the United States of America or any department thereof, to the state of New York or any department thereof, or to any agency or department of the city of New York, provided the same is requested for official business; nor to prohibit the inspection for official business of such returns by the corporation counsel or other legal representatives of the city or by the district attorney of any county within the city; nor to prohibit the publication of statistics so classified as to prevent the identification of particular returns and the items thereof. Returns shall be preserved for three years and thereafter until the finance administrator pemits them to be destroyed.

b. Any violation of subdivision a of this section shall be punishable by a fine not exceeding one thousand dollars, or by imprisonment not exceeding one year, or both, in the discretion of the court, and if the offender be an officer or employee of the city he shall be dismissed from office and be incapable of holding any public office for a period of five years thereafter.

§ F46-17.0. **Notices and limitations of time.**—a. Any notice authorized or required under the provisions of this title may be given by mailing the same to the person for whom it is intended in a postpaid envelope addressed to such person at the address given in the last return filed by him pursuant to the provisions of this title or in any application made by him or, if no return has been filed or application made, then to such address as may be obtainable. The mailing of such notice shall be presumptive evidence of the receipt of the same by the person to whom addressed. Any period of time which is determined according to the provisions of this title by the giving of notice shall commence to run from the date of mailing of such notice.

b. The provisions of the civil practice law and rules or any other law relative to limitations of time for the enforcement of a civil remedy shall not apply to any proceeding or action taken by the city to levy, appraise, assess, determine or enforce the collection of any tax or penalty provided by this title. However, except in the case of a wilfully false or fraudulent return with intent to evade the tax, no assessment of additional tax shall be made after the expiration of more than three years from the date of the filing of a return; provided, however, that where no return has been filed as provided by law the tax may be assessed at any time.

c. Where, before the expiration of the period prescribed herein for the assesssment of an additional tax, a taxpayer has consented in writing that such period be extended, the amount of such additional tax due may be determined at any time within such extended period. The period so extended may be further extended by subsequent consents in writing made before the expiration of the extended period.

§ F46-18.0. **Construction and enforcement.**—This title shall be construed and enforced in conformity with chapter three hundred ninety-nine of the laws of nineteen hundred seventy-one, pursuant to which it is enacted.

§ F46-19.0. **Separability.**—In any provision of this title, or the application thereof to any person or circumstances, is held invalid, the remainder of this title, and the application of such provisions to other persons or circumstances shall not be affected thereby.

§ 2. This local law shall take effect July first, nineteen hundred seventy-one.

THE CITY OF NEW YORK, OFFICE OF THE CITY CLERK, S.S.:

I hereby certify that the foregoing is a true copy of a local law of The City of New York, passed by the Council on June 22, 1971 and approved by the Mayor on June 30, 1971.

HERMAN KATZ, City Clerk, Clerk of the Council.

CERTIFICATION PURSUANT TO MUNICIPAL HOME RULE LAW SECTION 27

Pursuant to the provisions of Municipal Home Rule Law Section 27, I hereby certify that the enclosed local law (Local Law 43 of 1971, Council Int. No. 640A), contains the correct text and:

Received the following vote at the meeting of the New York City Council on June 22, 1971: 32, For; 5, Against.

Was approved by the Mayor on June 30, 1971.

Was returned to the City Clerk on June 30, 1971.

J. LEE RANKIN, Corporation Counsel.

Mr. PADNOS. Thank you very much.

The proposed tax—the New York State Legislature has given the city authorization to enact the tax in full. To date, however, the New York City Council has implemented only the plastics portion—is a 1-to-3-cent levy at the wholesale level on rigid and semirigid paper, glass, metal, and plastic containers for all nonfood items sold at retail. Any container made of a prescribed percentage of recycled material is allowed a 1-cent credit against the tax. Wholesalers purchasing products from manufacturers reusing old containers would receive an additional 1-cent credit per container. As a result of the combinations of credits, all taxes are avoidable on paper, glass, aluminium, and tin-free steel cans. Thus, the more successful the tax, the less revenue it actually generates.

The basic philosophy behind this recycling incentive tax, also referred to as a disposal tax, is very important. The capacity of our environment—the land, the water, the air—to absorb and assimilate society's wastes is not unlimited. It is a natural resource which must be used for social benefit as prudently as any other resource such as a forest, an iron ore deposit, or a seashore.

Every time an individual or a corporation throws something away, a cost is being imposed upon the environment. And when the collection and disposal of discards is handled by a Government agency, each article thrown away imposes a direct financial cost upon all taxpayers.

Yet our society has persisted in treating disposal as practically a free good. Individual disposers have not been held accountable for the waste they generate and the costs they impose upon the environment and society. Consequently, all of us as individuals have been unrestrained in our wasteful habits. The disastrous results are all around us.

The purpose of a disposal tax is to assess each individual for the social and environmental costs of his consumption and discard. In establishing such a tax, we as a society are recognizing that no economic process can be undertaken without generating some form of pollution. But we are also saying that pollution must be treated as a cost of production and consumption, and this cost can no longer be ignored when economic decisions are made.

A disposal tax would not, of course, curtail the ability of environmental agencies to protect society by prohibiting or limiting various types of pollution.

The solid waste problem in New York City is so critical that we have felt it necessary work to initiate our own recycling incentive tax. It is clear to us, however, that national recycling incentive or disposal legislation is more desirable than a proliferation of possibly conflicting local laws. National legislation would have a number of advantages.

First, and most important, a national tax could be levied on the packagers, where maximum leverage could be exerted to minimize excess packaging and to choose environmentally sound types of packaging. New York City's tax was designed to apply at the wholesale level, primarily because it is the point nearest the packager that is within the administrative jurisdiction of the city.

A number of other advantages are mentioned in the prepared statement.

The second tax I would like to mention is a reclamation allowance comparable to that discussed yesterday. A manufacturer or materials processor could be paid a fixed sum for each ton of secondary raw material reclaimed from the solid waste stream.

Another alternative would be to follow normal percentage depletion procedures and allow a reclaimer of secondary materials to deduct a percentage of his gross sales or purchases from his pretax earnings.

Congress could find justification for a reclamation allowance in two basic ways:

First, if an allowance could stimulate significantly higher levels of recycling, lower tax revenues would be offset by lower government expenditures for solid waste handling.

But for those who may not be satisfied by seeing lower Federal revenues offset by lower municipal expenditures, there is another basis for a reclamation allowance: equity.

At this point, Madam Chairman, I would like to mention that yesterday in the discussion it was suggested that possibly we could achieve equity by removing tax advantages given to the virgin industries instead of adding advantages to the secondary industries.

I agree with their philosophy totally. This suggestion here is based primarily on the experience that we faced in New York City in trying to impose a very small disposal tax which affected the primary industries, but——

Chairman GRIFFITHS. It is easier to give people a new advantage than to take away the advantages they have.

Mr. PADNOS. Absolutely right, Madam Chairman. That is why the present suggestion.

The record of Federal material policy in this century is one of continuous incentive and subsidy to the extractive industries. This assistance has at time worked unwittingly to the detriment of the recycling industries as well as the environment.

According to the U.S. Treasury Department, the total subsidy to our extractive industries is roughly $4 million annually. This total includes both direct budget outlays as well as tax expenditures, and revenue not collected because of tax advantages given to various industries.

My purpose here is not to debate the merits of these expenditures. What I do want to emphasize is the unbalanced effect these policies have had upon the way in which our economy has grown. By subsidizing the cost of virgin raw materials, our country's natural resource policy has encouraged the substitution of virgin materials for both labor and secondary materials. This may have been the country's best path toward economic maturity. Today, however, as our Nation suffers from both a glut of wasted resources in our disposal facilities, as well as a scarcity of jobs in the labor market, it is time to reexamine a policy which can only aggravate these conditions.

A reclamation allowance could mitigate or even remove the existing Federal policy bias against recycling, even if subsidies to virgin materials industries are left untouched.

A related proposal, which could have much the same effect as a reclamation allowance, is a price support system for materials reclaimed from the solid waste stream. It might even be possible to administer this program through existing government agencies.

A final tax approach is one which is not included in my prepared statement, but it is perhaps the most immediate tax measure Congress could enact to encourage recycling; that is, extension of accelerated depreciation allowances to include all machinery designed either to process or to utilize secondary materials reclaimed from post consumer wastes.

Right now Congress allows a corporation to take accelerated depreciation for equipment designed to abate air and water pollution. What I propose is that this allowance be extended to include equipment design to abate land pollution as well.

Let me illustrate.

A scrap processor who installs a car shredder is allowed accelerated depreciation on only that part of his installation designed to control air pollution, which results from dust. I argue that the tax incentive should be granted to the entire investment, since the entire machinery fights pollution in one way or another. With an incentive like this, combined with freight rate rationalization, maybe even the derelict hulks in Montana mentioned yesterday would find their way to be recycled.

Another application would be to paper. Mr. Darrow of the American Paper Institute mentioned yesterday that there exists only 1.2 million tons of deinking capacity in the United States today. But the paper industry is expected to add more than 50 million tons to its capacity by 1985. Accelerated depreciation or similar tax credit granted to equipment for reprocessing paper—bailers, shredders, as well as to deinking equipment—could help see to it that a sizable percentage of this increase is in recycling capacity.

Now we go on to a second major area, standards and procurement policy.

Buying environmentally beneficial products, particularly products made from secondary materials, is one of the most significant actions an individual, corporation, or government agency can take to encourage expanded recycling.

As described in the separate testimony I mentioned earlier, New York City has begun its environmental purchasing program with recycled paper. Our objective in the work we have done to date has been exactly the same as that described by Representative Dow yesterday. We want to write specifications which will encourage the use of post-consumer waste, waste from products which have served their use in society and which would enter our solid waste stream if not reclaimed.

We want to encourage expanded utilization of those secondary fibers which, under existing economic incentives, are not being reclaimed.

A definition is included in the written statement which I hope will be considered both in legislation if it is drafted and in whatever directions are given to the Federal GSA.

Incidentally, New York City recently used a similar definition in a competitively bid contract for the purchase of corrugated boxes. The contract was recently awarded to a company which is supplying the

city with boxes which meet all of our technical standards at a price lower than the lowest bid submitted a year ago, when we had no recycling requirement.

Unfortunately, a good deal of controversy and confusion still surrounds the question of defining recycled paper. Strong leadership from the Federal General Services Administration could settle this matter, but that leadership has not yet been forthcoming.

The original standards proposed by the GSA were so lax that most paper mills could meet them simply by changing the name of their existing practices, so that use of production wastes would qualify as recycling. Subsequent specifications have shown some improvement, but they still seem to indicate a greater commitment to preserving existing practices than to providing new incentives for solid waste utilization.

Requiring the use of recycled paper involves changing material specifications. But technical standards must be examined also. The National Bureau of Standards or some other appropriate agency should be designated to reevaluate as many existing product standards as possible with environmental improvement as the foremost objective. A number of key areas immediately come to mind.

First, we must begin to consider what happens to a product when we throw it away. There are several questions.

Can it be disposed of at relatively little environmental cost, or does it necessarily contaminate the air, water, or land?

Could a product be made in a manner that would facilitate reuse?

Interchangeable bottles, which could be used by any one of several manufacturers, are one example of such a product. Similarly, if all glass bottles were one color—"ecology green"—it would be much easier to recycle glass cullett.

Do certain materials used in the manufacture of a product prevent or deter recycling?

Could these materials be replaced?

An infamous example of contaminating product components is the "no carbon required" business form, which included polychlorinated biphenyls (PCB's). The impact of PCB on the environment is now being investigated by the FDA.

Another example is perhaps more familiar, census forms. Census forms are made from a high-grade paper, and would be eminently recyclable but for one problem, they are printed with an insoluble ink. When the forms are put into a beater for repulping, the ink cannot be removed. Consequently, a potentially high grade of pulp is relegated to the lowest grade reuse.

A second major area for standards investigation is overspecification. In many instances today, we are buying more product capability than we actually require for a given job. Overspecification places a needless added strain upon the environment, both in raw material consumption and in waste generation. It can also limit the applicability of secondary materials, particularly paper.

A prime example of this is the brightness specification in many grades of paper. Over the years, paper companies have sought to compete with one another by increasing the brightness of their products. The results in some cases have actually been disfunctional—some printing papers are so bright that they are uncomfortable to read.

This is not simply harmless folly. Research performed by Resources for the Future, Inc., indicates that the higher the brightness requirement for either virgin or recycled paper, the greater the amount of solid, liquid, and gaseous wastes generated in the manufacturing process.

Now, there are other examples, but since Mr. Bower will be speaking shortly, I will defer to him in this matter.

A third fruitful area for standards investigation is obsolescence. Obsolescence is frequently thought of as a consumer battleground, but it is an environmental problem as well. Some sanitation department in the country will eventually get nearly every appliance that wears out. And no doubt a large share of the 73,000 automobiles abandoned on New York City's streets last year were deserted by frustrated victims of the acknowledged masters of planned obsolescence.

Mention of New York City's abandoned automobile problem brings up a third major area in which Federal action could help to encourage recycling: transportation.

Other speakers either have discussed the impact that freight rate discrimination has had on the recycling industries. I would like only to emphasize that discriminatory actions which hurt the recycling industry hurt urban taxpayers as well. Abandoned cars are a good example.

New York City has a very effective program for removing the cars from our streets, but it costs us money. The cars are spotted and tagged by sanitation personnel, and removed by private contractors. The contractor either pays the city or is paid, depending on the location of the car.

In Manhattan, the city pays $10 for each car removed; in the other boroughs, the city receives a small amount, but not enough to cover administrative expenses. Since contracts are let on a competitive basis, the amount the city receives is related to the value of scrap steel. Discriminatory freight rates reduce the value of the scrap in abandoned autos and thus increase the city's costs for handling them.

Finally, no testimony from a representative of a major American city today would be complete without a request for money. Money must be invested by both private industry and government to develop new means for extracting commodities from mixed refuse and for developing new uses for reclaimable materials.

I am certain that venture dollars will be forthcoming from private industry if businessmen can be convinced that there are profits to be made in recycling. The enactment of some of the proposals discussed here today would certainly help to convince them.

But Federal expenditure will also be necessary. As I mentioned earlier, the extractive industries receive roughly $4 billion annually in Government assistance. So far, just about the only major enacted legislation which even relates to recycling is the Resource Recovery Act. The $80 million authorization for resource recovery in fiscal 1972 looked like it might be a good start, but only $4 million has actually been appropriated.

Contrasted with a sanitation bill, excluding capital expenditure, approaching $200 million in New York City alone, a $4 million Federal expenditure is very small indeed.

These hearings, however, indicate that there is a willingness in Congress to expand upon the tiny start that has been made. I hope that the testimony we have offered is helpful in your efforts to determine how best to proceed with that expansion.

Having discussed potential Federal actions relating to tax legislation, standards and procurement policy, transportation, and research and development expendtures, I will conclude with one much smaller proposal: That the record of these hearings be printed on recycled paper.

I would like to say that it has been a great honor for me to be able to participate in these hearings, and I am prepared to answer any questions you might have about either New York City's program or our proposal for Federal actions.

Thank you very much.

(The prepared statement of Mr. Padnos follows:)

PREPARED STATEMENT OF JEFFREY S. PADNOS

My name is Jeffrey S. Padnos. Since June, 1970, I have been a member of the staff of New York City's Environmental Protection Administration, first in the Office of Program Analysis, and currently in the Office of Project Management. I am speaking today on behalf of Jerome Kretchmer, who since May, 1970, has been head of the Administration.

The Environmental Protection Administration encompasses New York City's Departments of Air Resources, Water Resources, and Sanitation. The EPA provides the City's water supply, treats the City's sewage, collects its garbage and cleans its streets. We must contend with a variety of urban ills: abandoned automobiles, litter, air pollution, and water pollution, to mention those most often talked about.

But of all these, EPA's single most difficult problem, our single most significant unanswered environmental question, is, How are we going to dispose of our City's solid waste?

RECYCLING: A POTENTIAL ANSWER

Recycling is one potential solution to our solid waste problem. If this potential is ever to be realized, however, strong, creative federal leadership will be necessary. In my remarks today, I will outline the scope of New York City's solid waste problems and indicate the potential benefits, environmental as well as financial, which could be achieved if large scale recycling of municipal refuse becomes a reality. I will then briefly describe what New York City is doing to encourage higher levels of recycling. Finally, the main section of this statement is a discussion of a number of actions the Federal Government could undertake to encourage recycling.

CURRENT COSTS OF HANDLING SOLID WASTE

On February 2, 1971, "Recycling Day in New York," Mayor John Lindsay said, "In New York City we must recycle our solid waste because we can no longer afford to throw it away." Sanitation Department statistics bear him out.

In the year ending in June, 1971, the New York City Department of Sanitation collected 3.8 million tons of solid waste at a cost of $114 million, or about $30.00 per ton. The Department was responsible for the disposal of over 7 million tons, at a cost of $28 million, or about $4.00 per ton. The City's total bill for refuse collection, refuse disposal, and street cleaning in fiscal year 1971–72 was over $170 million. And our refuse load—along with the bill for handling it—continues to grow. Between 1960 and 1970, the City population remained essentially constant, and yet the solid waste load increased 40%. By 1985, our refuse volume is expected to grow to 36,000 tons per day—nearly 22 billion pounds per year.

In addition to the staggering costs of picking up the garbage, we are running out of places to put it down. At current rates of usage, our sanitary landfill space

is projected to be exhausted by 1975. Although the life of the fills can be extended by mounding refuse, it is clear that we will have to find something else to do with it by the end of this decade.

Existing alternatives to sanitary landfill, however, are tremendously expensive. Right now disposal is only costing us about $4.00 per ton. But that is because we dispose of about three-quarters of our refuse in sanitary landfills. As the landfills are retired, we will have to turn to more expensive disposal methods. Our present incinerators cost up about $7–8.00 per ton to operate. It appears that future disposal facilities will cost more than double that amount when capital as well as operating costs are considered.

Just a few weeks ago, Mayor Lindsay accepted our Administration's recommendation that the City cancel plans for a super-incinerator in the Brooklyn Navy Yard. That incinerator would have handled 6,000 tons of garbage a day, a bit less than one-fourth of our load. But it would have cost over $200 million to build, $10 per ton to operate, and $15 per ton to amortize. Worse, it would have dumped 3,000 tons per year of particulates into the City's air, even with the most advanced pollution control equipment.

The Navy Yard incinerator is one plant that we hope we will not have to build. But those 6,000 tons are going to have to go somewhere. Some of them might go to a new pyrolysis plant we are considering building in cooperation with a private corporation. The plant would cost $10–15 million, and the City would be charged $10–15 for each ton processed. Pyrolysis, never before used on a full scale basis for processing refuse, has several advantages over incineration, including significantly less air pollution. It is important to keep in mind, however, that all this money would be spent simply to dispose of refuse. The plant we are considering would have only limited opportunity for resource recovery.

RECYCLING: POTENTIAL IMPACT ON URBAN ECONOMY

The potential impact of recycling on the urban economy should be evident. As we run out of landfill space, we will have to build expensive new processing plants, or, if regional waste handling plans can be worked out, pay heavily to export our refuse. In contrast each ton of what is now called solid waste that could be recycled back into the industrial process would mean a $10 to $15 or more toll charge that the City would not have to pay. For every 1,000 tons of secondary materials we can remove from our daily solid waste load, the City can avoid spending $10 to $15 million or more to build a processing plant that could cost up to $5 million per year to operate.

In addition, recycling could become the basis for major industrial expansion with desperately needed jobs in the City. An evaluation of the raw materials now in New York City's garbage reveals the potential. Table I shows that the value of only the newspapers and containers in our solid waste is more than $32 million per year. This total includes neither the waste from office buildings which contains paper fibre worth as much as $80 per ton in segregated form, nor the stoves, refrigerators, and other bulky metal items which are now buried in our landfills because the price of scrap steel is so low that it costs more to remove these items than they are worth in the scrap market.

RECYCLING: CURRENT TRENDS

In view of the City's growing solid waste load, and thus our increasing need for expanded recycling, it is discouraging to examine recycling trends in the last quarter century. I have already mentioned that steel recycling is deterred by low prices. In fact, the value of scrap steel is now just more than half what it was in 1951, twenty years ago. But the most discouraging recycling record is that of waste paper. It is estimated that waste paper constitutes as much as 50% of the volume of our solid waste stream. Yet while this nation's garbage piles have been growing, the paper industry has been using progressively less waste paper (on a percentage basis) in the manufacturing of new paper. Data compiled by the American Paper Institute reveals that in 1944, waste paper accounted for 36.6% of the fibre consumed in the manufacture of new paper. Today, waste paper accounts for less than 20%. And some projections call for this figure to drop to 15% by 1985.

TABLE I.—ESTIMATED VALUE OF SCRAP IN NEW YORK CITY MUNICIPAL WASTE FLOW (PER YEAR)

	Approximate number of tons	Current dealer's scrap value per ton [1]	Total estimated scrap value
Aluminum cans	12,000	$200	$2,400,000
Steel (from tin-free cans [2])	23,000	10	230,000
Steel (from detinning and remaining bimetal containers)	169,000	3	507,000
Glass containers	348,000	17	5,920,000
Newspapers	500,000	17	8,500,000
Paper corrugated and folding container of all types	1,480,000	10	14,800,000
Subtotal	2,532,000		32,357,000
Abandoned cars [3]	100,000	15–20	1.5–2,000,000
Total	2,632,000		[4] 34,000,000

[1] Average current market price when dealers sell to reprocessing plants. Includes dealer's costs and markup. Prices vary widely depending on density of collection input and grade of scrap material. These figures therefore represent only rough approximations.
[2] Approximately 12 percent of total steel containers of 192,000.
[3] 75,000 cars at 1 to 1.5 ton per car. Most abandoned cars are now recycled.
[4] Approximate.

NEW YORK CITY'S RECYCLING PROGRAM

The New York City Environmental Protection Administration has been working to reverse this downward trend in recycling in four important ways. First, we have introduced recycling incentive legislation. This legislation will be discussed a bit later.

Second, we have worked for industrial expansion, seeking new firms which could use some portion of our solid waste as their raw material. One such company which has already been established uses garbage as the basic ingredient in a high grade fertilizer. Pilot testing has already been completed, and we are now negotiating a contract under which we would pay the firm a fee for handling 150 tons per day of our solid waste.

Third, we are undertaking an experimental program involving separate collection of recyclable newspapers. Results are not in yet, but early indications are that a substantial percentage of the public is willing to make the additional effort necessary to separate refuse for recycling. We are considering additional newspaper programs, as well as a program to see that bulky items such as refrigerators are reused instead of buried. Unfortunately, however, separate collections are extremely expensive; it appears that mechanical separation of mixed refuse will be much more economical—if such a separation process is ever fully developed.

Finally, one of our most significant steps has been the institution of an environmental purchasing program, through which we have been working to develop specifications for the purchase of products made from secondary materials. The first steps in the program are described in testimony submitted by Jerome Kretchmer and New York City Purchase Commissioner Marvin Gersten to the Senate Committee on Rules and Administration in support of S. 2266 and S. 2267. If you feel it is appropriate, Madame Chairman, I would like to submit a copy of that testimony for the record of the present proceedings. I will expand upon this testimony later.

STRONG FEDERAL ACTION NEEDED

These activities will hopefully have some impact on the level of recycling in the country. As has been stated throughout these hearings, however, strong federal leadership is necessary if the nation is ever to attain significant levels of recycling. In the remainder of this statement, I shall discuss four broad areas in which Federal action is needed: tax legislation, standards and procurement policy, transportation, and research and development expenditures.

WHAT THE FEDERAL GOVERNMENT CAN DO

(1) Tax Legislation

Recycling Incentive Tax, or Disposal Tax

At this point, Madame Chairman, I would like to introduce for the record a copy of New York City's proposed Recycling Incentive Tax on containers.

The proposed tax (The New York State Legislature has given the City authorization to enact the tax in full. To date, however, the New York City Council has implemented only the plastics portion) is a 1 to 3 cent levy at the wholesale level on rigid and semi-rigid paper, glass, metal and plastic containers for all non-food items sold at retail. Any container made of a prescribed percentage of recycled material is allowed a 1 cent credit against the tax. Wholesalers purchasing products from manufacturers reusing old containers would receive an additional 1 cent credit per container. As a result of the combinations of credits, all taxes are avoidable on paper, glass, aluminum, and tin-free steel cans.

The per unit tax rate for each material is based on current estimates of the degree of difficulty of disposing and the feasibility of recycling for that material. In New York City, if fully implemented, the tax would yield between $30 and $50 million per year during its initial phase. However, if recycling operations make headway, manufacturers would qualify for more credits against the tax. This would reduce the yield of the tax, but it would also lessen the City's solid waste load and encourage the reuse of valuable materials now thrown out as garbage.

The basic philosophy behind this recycling incentive tax (also referred to as a disposal tax) is very important. The capacity of our environment—the land, the water, the air—to absorb and assimilate society's wastes is not unlimited. It is a natural resource which must be used for social benefit as prudently as any other resource such as a forest, an iron ore deposit, or a seashore. Everytime an individual or a corporation throws something away, a cost is being imposed upon the environment. And when the collection and disposal of discards is handled by a government agency, each article thrown away imposes a direct financial cost upon all taxpayers.

Yet our society has persisted in treating disposal as practically a free good. Individual disposers have not been held accountable for the waste they generate and the costs they impose upon the environment and society. Consequently, all of us as individuals have been unrestrained in our wasteful habits. The disastrous results are all around us.

The purpose of a disposal tax is to assess each individual for the social and environmental costs of his consumption and discard. In establishing such a tax, we as a society are recognizing that no economic process can be undertaken without generating some form of pollution. But we are also saying that pollution must be treated as a cost of production and consumption; and this cost can no longer be ignored when economic decisions are made. A disposal tax would not, of course, curtail the ability of environmental agencies to protect society by prohibiting or limiting various types of pollution.

The solid waste problem in New York City is so critical that we have felt it necessary work to initiate our own recycling incentive tax. It is clear to us, however, that national recycling incentive or disposal legislation is more desirable than a proliferation of possibly conflicting local laws. National legislation would have a number of specific advantages.

First, a national tax could be levied on the packagers, where maximum leverage would be exerted to minimize excess packaging and to choose environmentally sound types of packaging. New York City's tax was designed to apply at the wholesale level, primarily because it is the point nearest the packager that is within the administrative jurisdiction of the City.

Second, local merchants would need not worry about residents' avoiding regulations by purchasing products in neighboring communities.

Third, effective centralization of collection and enforcement procedures could reduce total administrative expenses.

Finally, national legislation should cover all types of packaging, including food and non-food containers. This would eliminate variations in local definitions. (For instance, in New York City, where sales taxes are collected only on non-food items, butter is tax exempt while margarine is not.)

Reclamation Allowance

The second tax I would like to suggest is a Reclamation Allowance. A manufacturer or materials processor could be paid a fixed sum for each ton of secondary raw material reclaimed from the solid waste stream. Another alternative would be to follow normal percentage depletion procedures and allow a reclaimer of secondary materials to deduct a percentage of his gross sales from his pre-tax earnings.

Congress could find justification for a reclamation allowance in two basic ways. First, if an allowance could stimulate significantly higher levels of recycling, lower tax revenues would be offset by lower government expenditures for solid waste handling.

But for those who may not be satisfied by seeing lower federal revenues offset by lower municipal expenditures, there is another basis for a reclamation allowance: equity. The record of federal material policy in this century is one of continuous incentive and subsidy to the extractive industries. This assistance has at time worked unwittingly to the detriment of the recycling industries as well as the environment.

According to the United States Treasury Department (the figures that follow are based upon testimony by former Treasury Secretary Joseph W. Barr before the Joint Economic Committee in January, 1969), the total subsidy to all extractive industries is roughly $4 billion annually. More than $1.7 billion of this total results from tax provisions including expensing of exploration and development costs, allowing percentage instead of cost depletion, and granting capital gains treatment for certain profits from timber, coal, and iron ore.

Another $2 billion subsidy comes in the form of direct budget outlays for such agencies as the Forest Service, the Bureau of Mines, the Geological Survey, or the Office of Coal Research.

My purpose here is not to debate the merits of these expenditures, although some of them are certainly debatable. What I do want to emphasize is the unbalanced effect these policies have had upon the way in which our economy has grown. By subsidizing the cost of virgin raw materials, our country's natural resource policy has encouraged the substitution of virgin materials for both labor and secondary materals. This may have been the country's best path toward economic maturity. Today, however, as our nation suffers from both a glut of wasted resources in our disposal facilities, as well as a scarcity of jobs in the labor market, it is time to re-examine a policy which can only aggrevate these conditions.

A reclamation allowance could mitigate or even remove the existing federal policy bias against recycling, even if subsidies to virgin-materials industries are left untouched.

Price Support System for Materials Reclaimed from Solid Waste

A related proposal, which could have much the same effect as a reclamation allowance, is a price support system for materials reclaimed from the solid waste stream. It might even be possible to administer this program through existing government agencies.

(2) Standards and Procurement Policy

Buying environmentally beneficial products, particularly products made from secondary materials, is one of the most significant actions an individual, corporation, or government agency can take to encourage expanded recycling.

As described in the separate testimony I mentioned earlier, New York City has begun its environmental purchasing program with recycled paper. Our objective in the work we have done to date has been to write specifications which will encourage the use of "post-consumer waste," waste from products which have served their use in society and which enter our solid waste stream if not reclaimed. We want to encourage expanded utilization of those secondary fibres, which, under existing economic incentives, are not being reclaimed.

Our most recently developed definition of "recycled paper" is as follows:

> (Napkins, towels, etc.) shall contain a minimum of (25%) recycled fibres by weight. For the purposes of this requirement, recycled fibres are fibres reclaimed from post-consumer waste, including de-inked fibres, as well as fibres from old corrugated, newspapers, magazines, waste from office buildings or banks (shredded or unshredded), mixed papers, or other paper or paperboard products which have been used for the purpose originally intended, and returned to a paper mill for reuse. Post-consumer waste does not include waste generated in manufacuring, concerting, or printing processes, such as mill broke, roll trim, shavings, or kraft, corrugated, or envelope cuttings.

This definition is still under review, and has not yet been adopted. It does indicate, however, what we are trying to accomplish. New York City recently used a similar definition in a competitively bid contract for the purchase of corrugated

boxes. The contract was recently awarded to a company which is supplying City with boxes which meet all of our technical standards at a price lower than the lowest bid submitted a year ago.

Unfortunately, a good deal of controversy and confusion still surrounds the question of defining recycled paper. Strong leadership from the Federal General Services Administration could settle this matter, but that leadership has not yet been forthcoming. The original standards proposed by the GSA were so lax that most paper mills could meet them simply by changing the name of their existing practices, so that use of production wastes would qualify as recycling. Subsequent specifications have shown some improvement, but they still seem to indicate a greater commitment to preserving existing practices than to providing new incentives for solid waste utilization.

New Technical Standards

Requiring the use of recycled paper involves changing material specifications. But technical standards must be examined also. The National Bureau of Standards or some other appropriate agency should be designated to re-evaluate as many existing product standards as possible with environmental improvement as the foremost objective. A number of key areas immediately come to mind.

First, we must begin to consider what happens to a product when we throw it away. There are several questions. Can it be disposed of at relatively little environmental cost, or does it necessarily contaminate the air, water or land? Could a product be made in a manner that would facilitate reuse? Interchangeable bottles, which could be used by any one of several manufacturers, are examples of such a product. If all glass bottles were one color—"Ecology Green"—it would be much easier to recycle glass cullet. Do certain materials used in the manufacture of a product prevent or deter recycling? Could these materials be replaced? An infamous example of contaminating product components is the "No Carbon Required" business form, which included poly-chlorinated biphenyls—PCB's. The impact of PCB on the environment is now being investigated by the FDA. Another example is perhaps more familiar: census forms. Census forms are made from a high grade paper, and would be eminently recyclable but for one problem—they are printed with an insoluble ink. When the forms are put into a beater for repulping, the ink cannot be removed. Consequently, a potentially high grade of pulp is relegated to the lowest grade reuses.

Overspecification

A second major area for standards investigation is overspecification. In many instances today, we are buying more product capability than we actually require for a given job. Overspecification places a needless added strain upon the environment, both in raw material consumption and in waste generation. It can also limit the applicability of secondary materials, particularly paper. A prime example of this is the brightness specification in many grades of paper. Over the years, paper companies have sought to compete with one another by increasing the brightness of their products. The results in some cases have actually been disfunctional—some printing papers are so bright that they are uncomfortable to read.

This is not simply harmless folly. Research performed by Resources for the Future, Inc., indicates that the higher the brightness requirement for either virgin or recycled paper, the greater the amount of solid, liquid, and gaseous wastes generated in the manufacturing process.

Another example is corrugated boxes. Some manufacturers have reported to us that at a given thickness, using secondary fibres means a slight sacrifice in the strength of the box. But how strong must our boxes be? On what are our present standards based? American manufacturers generally sneer at "flimsy" Japanese boxes. But those flimsy boxes are apparently capable of protecting delicate electronic equipment through ship, air, truck and rail transport from manufacturing centers in Japan to retail outlets in this country.

Obsolescence

A third fruitful area for standards investigation is obsolescence. Obsolescence is frequently thought of as a consumer battleground, but it is an environmental problem as well. Some sanitation department in the country will eventually get nearly every appliance that wears out. And no doubt a large share of the 73,000 automobiles abandoned on New York City's streets last year were deserted by frustrated victims of the acknowledged masters of planned obsolescence.

(3) Transportation

Mention of New York City's abandoned automobile program brings up a third major area in which Federal action could help to encourage recycling: transportation. I am certain that other speakers either have or will discuss the impact that freight rate discrimination has had on recycling industries. I would like only to emphasize that discriminatory actions which hurt the recycling industry hurt urban taxpayers as well. Abandoned cars are a good example. New York City has a very effective program for removing the cars from our streets. But it costs us money. The cars are spotted and tagged by Sanitation personnel, and removed by private contractors. The contractor either pays the City or is paid depending on the location of the car.

In Manhattan, the City pays $10 for each car removed; in the other boroughs, the City receives a small amount, but not enough to cover administrative expenses. Since contracts are let on a competitive basis, the amount the City receives is related to the value of scrap steel. Discriminatory freight rates reduce the value of the scrap in abandoned autos and thus increase the City's costs for handling them.

Mayor Lindsay called for an end to discriminatory freight rates last February. We repeat his call today.

(4) Research and Development Expenditures

No testimony from a representative of a major American city today would be complete without a request for money. Money must be invested by both private industry and government to develop new means for extracting commodities from mixed refuse and for developing new uses for reclaimable materials. I am certain that venture dollars will be forthcoming from private industry if businessmen can be convinced that there are profits to be made in recycling. The enactment of some of the proposals discussed here today would certainly help to convince them.

But Federal expenditure will also be necessary. As I mentioned earlier, the extractive industries receive roughly $4 billion annually in government assistance. So far, just about the only major enacted legislation which even relates to recycling is the Resource Recovery Act. The $80 million authorization for resource recovery in Fiscal 1972 looked like it might be a good start. But only $4 million has actually been appropriated.

Contrasted with a sanitation bill (excluding capital expenditures) approaching $200 million in New York City alone, a $4 million Federal expenditure is very small indeed.

These hearings, however, indicate that there is a willingness in Congress to expand upon the tiny start that has been made. I hope that the testimony we have offered is helpful in your efforts to determine how best to proceed with that expansion.

FINAL PROPOSAL

Having discussed potential Federal actions relating to tax legislation, standards and procurement policy, transportation, and research and development expenditures, I will conclude with one much smaller proposal: that the record of these hearings be printed on recycled paper.

Chairman GRIFFITHS. Thank you very much for a very interesting and thoughtful statement.

Mr. Bower, please proceed.

STATEMENT OF BLAIR T. BOWER, ECONOMIST, RESOURCES FOR THE FUTURE, INC.

Mr. BOWER. Thank you, Madam Chairman and Mr. Conable.

I will attempt to summarize and emphasize the major points and let my prepared statement speak for itself.

First, I would like to suggest a slight modification to the focus of the hearings and perhaps of our concern. That shift in focus is represented by my phrase, "the use of residuals."

I suggest this for several reasons.

First, although I do not wish to engage in a discussion of semantics, semantics does have some importance in terms of the kind of impact it has on the discussion of some of the economic, technological, and political problems. Both the terms "recycling" and "reuse" are subject, I think, to some undesirable connotations. With respect to the first, Webster, usually a knowledgeable authority, defines "cycle" as follows:

> An interval or space of time in which is completed one round of events or phenomena that recur regularly and in the same sequence.

Literally interpreted, this definition means that the material discharged at one end of a process is immediately returned to the front end of the process to become a factor input. There is no intermediate processing of that residual involved, there is no intermediate storage in the environment.

In the context of the planet earth as a whole, this definition may well be relevant. However, in the real world, on less than a global scale in our economy or in a metropolitan area, this definition obscures the many alternative flow paths which residuals have through the economic and social system, and the related economic, technological, and institutional difficulties associated therewith. I want to emphasize that only a small portion of the residual problems relate to this type of direct return flow.

The second term, "reuse" is deficient because a residual as such is seldom likely to be reused. That is, some material in it—the residual—is amenable to reuse, such as the steel in an automobile body, or the cellulose fibers in an old magazine, or the copper in steel wire. Before reuse of that material is possible, the residual must be processed. Residuals processing requires inputs itself and results in the generation of further residuals. Hence, the "circular" path of residuals is not costless to society, and this should be, I think, remembered.

My final introductory point is that the current interest in and concern for reuse has behind it three assumptions. The first is that recycling or reuse means making use of something which has not been made use of before. The second assumption is that doing so will result in a decrease in the solid residuals management problem, and thereby improve environmental quality. The third is that use of residuals is less environmentally damaging, however that is defined, than is the alternative use of virgin materials for which the residuals are a substitute raw material. I have tried in my prepared statement to shed some light on these three assumptions.

The four major sources of residuals can be described as production residuals, converting residuals, distribution residuals, and user residuals. In my prepared statement I have indicated this taxonomy with some examples. It is not a perfect taxonomy, but has utility in differentiating among the different sources and the problems relating to each.

One important point I want to emphasize with respect to the production process as a source of residuals. Within most black boxes of production processes, there are internal flows of materials and energy which are always recirculated as normal parts of the production process. Mr. Padnos has referred to processing material in the paper industry. Broke is the term traditionally used. This material is always recirculated under all circumstances. An economic production process would not exist if this were not done.

The same is true for fiber passing through the wire screen of a paper machine. Again, this is always recycled. Similarly, chemical recovery systems traditionally have been installed in order to save materials as an economic proposition.

The point that I want to emphasize here is that these kinds of activities have been undertaken in the absence of pollution controls and in the absence of any pressure or subsidy for increased recycling or reuse. They are integral parts of normal production processes. One of the particularly difficult problems the committee will have to face in writing any legislation is to be careful that any proposals, for tax relief or whatever they might be, will not in fact subsidize normal production processes by this mechanism.

Let me skip now to illustrate both the sources of residuals and the problems associated therewith, and some of the reasons for the validity or lack of validity of the three assumptions I mentioned, by using at least one specific example. However, before that, let me suggest this proposition: The extent of use of residuals in a society is a function of the relative cost of alternative factor inputs into economic activity, essentially residuals as a raw material versus virgin material as raw material.

As with any raw material, the important characteristics which affect its value, or the cost of the material as a factor input, are its location, quantity, and quality. A large mass of high quality, that is, high concentration, close to the source of production and/or market, are desired characteristics. This is just as true for a residual as it is for a virgin raw material. The quantity and quality of the raw material affects the cost of its processing, the quantity of residuals generated in that processing, and hence the residuals management cost associated therewith.

The factors affecting the relative costs between the two types of raw materials are as follows:

First, the quality of the raw material, virgin, or residual;

Second, the technology of processing, processing iron ore as against processing steel scrap, abandoned automobiles, vehicles, household appliances, or what have you;

Third, the residuals management cost associated with the processing of the raw material, whether it be the residual or the virgin material. And these residuals management costs in turn are a function of the quality of the raw material, the technology of processing, the product output specifications, and of course the effluent controls imposed upon the processing unit.

The fourth factor affecting the relative costs between these two types of raw materials is transport costs.

The fifth factor affecting the relative cost is the technology of the production process itself, making steel by an open hearth process as against the basic oxygen furnace or the electric furnace, or different types of pulping process.

One other factor which affects relative costs has been alluded to by Mr. Padnos, and I will return to it subsequently; that is product output specifications.

To illustrate the effects of these factors on relative costs, I want to describe very quickly the production of paper products. In those products there are three possible types of raw material: first, virgin roundwood from the forest, or chips from such roundwood; second, residues from wood products operations, sawmills, furniture factories,

planing mills; and third, paper residuals. The last in turn is comprised basically of two subcategories, converting residuals and user residuals.

Neglecting any market imperfections, for whatever reasons they may exist, the relative quantities of the three types of raw materials which are currently used in the production of paper products are a function of their relative costs to the manufacturer. Even before the advent of air pollution controls in recent years, and before the current agitation for increased recycling, wood products residues were comprising an increasing proportion of the raw material input for paper products.

In the Northwest 60 to 70 percent of raw material input consists of these wood products residues. Even in the Southeast, an area in which you can grow pulpwood very rapidly, that is, 12 to 15 to 20 years, there has been an increase in the porportion of raw material inputs comprised of wood products residues from about 10 percent in 1960 to almost 20 percent in 1970. In the absence of pollution controls and the absence of any subsidy, this is simply because the relative costs of the factor inputs have shifted.

The cost of pulpwood and roundwood in the forest has tended to increase. There are a number of factors explaining this. I have indicated some of those in my prepared statement. However, it is valid to say that in the last few years, increased use of wood products residues, particularly in the Northwest, has in fact been stimulated by air pollution control, but the incremental additions to total use because of this factor appears relatively small.

Turning now to the third category of raw materials for paper products production, paper residuals, I want to look specifically at converting residuals. Converting residuals are generated in the process of transforming a jumbo roll of paper, or a bale of flat sheets of paper, into the final user paper product—the newspaper, the packaged napkins, the paper towels. Converting residuals are generated in these processes on the order of from 2 to 3 percent in newspaper production to about 20 percent in the production of folding cartons.

Converting residuals have very desirable characteristics as raw material: large quantities in a single location, high degree of homogeneity in quality, and if contamination does exist, it is of a known specific nature. As a result, the large bulk of converting residuals has been used over the last several decades at least. In 1969 about 80 percent of the 5 million tons of converting residuals generated were used without any pressure for increased recycling, without any pollution controls imposed, and so on, simply because the converting residuals are less expensive than the alternative raw material.

The significance of all this in relation to the original three assumptions can be summarized as follows:

First, with respect to both wood products residues and converting residuals, there would be little decrease in solid waste management costs if somehow the concern were focused on increased reuse of these materials, since they are already being very substantially used. This is not where the breakthrough is needed in terms of policy or activities at any level of government.

The third assumption, that increased use of residuals is environmentally desirable, may or may not be valid. That is, in order to utilize paper residuals, or any other type of residuals, as a raw ma-

terial, processing is necessary. This processing operation results in the generation of residuals. Whether or not these residuals are more or less environmentally damaging than the residuals generated in the processing of a virgin raw material, and whether or not the costs of managing those residuals to mitigate any adverse impacts on the environment, are less or more, depends on the particular situation.

For example, if 100 percent wastepaper is used to make a paper product in contrast to softwood using the kraft process, the former results in the generation of essentially no gaseous residuals, but substantially more dissolved and suspended solids than the kraft process. Whether or not the gaseous residuals generated in the kraft process are more damaging or are more costly to modify than the residuals generated in processing the wastepaper to produce the same product depends on the particular situation.

One final point on the question of relative cost. That is that the product output specifications play a major role in influencing the relative costs of virgin versus residuals as raw material. Depending on these specifications, greater or lesser amounts of paper residuals can be used to produce paper products in the case to which I am addressing my remarks in particular, but the same point is valid across the board.

For example, if a brown paper towel is acceptable rather than a white paper towel, no bleaching is necessary for either the virgin raw material or for the paper residual, but larger quantities of paper residuals can be used to make a brown towel than a white towel. The towel performs the same function of wiping with the same degree of efficiency.

It should be emphasized nonetheless that different kinds of paper products do require different component inputs. Photographic paper, for example, cannot be made from most paper residuals, and there are other limitations. But the bulk of paper products is amenable to the use of substantially increased quantities of paper residuals. This would be desirable if, but only if, the relative cost, including all of the costs, residuals management costs as well, are less for the use of paper residuals than for the use of the virgin raw material.

If I might add one point in this connection, it is clear from the economics of the production process that the capital and operating costs of utilizing paper residuals to produce products are substantially less than the capital and operating costs of the pulping process to provide the same input to the paper machine. This is something which has perhaps received inadequate attention in the past.

I have two final points. I hope that the example which I discussed in some detail, shows the multiplicity of factors affecting the economics of residuals use. The extent of this use is a function of the price of the residual as a raw material compared with the price of all alternative virgin materials.

But there is a major area of uncertainty in relation to some additional factors beyond those I have mentioned, such as technology in processing, residuals processing, and production processing, about which it is not clear in terms of the impacts on the relative prices of the two raw materials. These include some of those which Mr. Padnos has mentioned, such as depletion allowances; and the possible differential assessment on land and processing facilities, because those facilities processing residuals are typically located in metropolitan areas, and those processing virgin materials are typically located in small

towns and rural areas. The activities of some congressional committees have already indicated the differential degree of assessment relating to location in our society. Other factors include the possible differential effect of capital gains taxes, the attitude of purchasing agents who specify virgin material rather than utilizing a performance specification, and finally, labeling requirements which require designation as a used material in spite of the fact that the user can tell no difference in performance.

My last point is one which attempts to suggest an analytical approach which is fundamental to policymaking, Government organization, and society in general. The best analogy I can think of to what I have in mind is the traditional industrial complex analysis in the economic literature. This type of analysis looks explicitly at the outputs of multiple processes as possible inputs into other processes to determine what the optimal mix of activities is for a given location in relation to alternative raw material sources and markets. For example, if one is considering constructing a petroleum refinery, one might analyze, as was done in the case of the early development of Puerto Rico, at the related operations which might utilize the outputs of that refinery in relation to raw material sources and final markets. In some cases petrochemical operations would be a logical direct link, so that the outputs of the refinery would be the direct inputs into the production process of the petrochemical operation. Traditionally this kind of industrial complex analysis has not considered residuals explicitly. I suggest that it could be extended to take the possible uses of residuals directly into account, along with all transport costs of raw materials, products, residuals, and the associated energy costs.

I have indicated in my prepared statement an example of this kind of analysis with this figure, which attempts to show in one specific instance how the residuals were looked at in relation to the possible inputs to additional production processes essentially in the same location, in order to minimize total social costs. This obviously involves a much more explicit consideration of the relationship between land use and residuals generation, between land use and residuals management cost.

Thank you, Madam Chairman.

(The prepared statement of Mr. Bower follows:)

PREPARED STATEMENT OF BLAIR T. BOWER

The present concern for, and attention being given to, the use of residuals stem from the growing recognition that the increasing quantities of residuals generated in an affluent society require consideration of alternative strategies for handling residuals, strategies in addition to the traditional one of simply trying to find less damaging sinks in the environment into which to dispose of them. This leads to the focus of this statement: what factors affect the economics of using residuals?

A definition of residual and an explanation of the title are in order. Residual is defined operationally. Into essentially all activities there are flows of materials and energy. From these activities flow equal amounts of materials and energy. One or more of the material or energy outflows will be the desired "product" or products. The other material and energy outflows are residuals in economic terms, because they have zero prices in existing markets, or at least prices less than the variable costs of production. The market, at any point in time, involves the current technology and relative prices among different factor inputs into various production processes and the current spatial distribution of economic activities. It is a critical factor with respect to use of residuals.

The explanation relates to terminology. Because terminology may affect the understanding of the economics involved, some attention thereto is essential.

Both the terms "recycling" and "reuse" are subject to some understandable connotations. With respect to the first, Webster defines cycle as, "an interval or space of time in which is completed one round of events or phenomena that recur regularly and in the same sequence".[1] Literally interpreted, this definition means that material discharged from the end of the process is immediately returned as an input into the same process or activity. There is no intermediate processing nor temporary storage in the environment. In the context of the planet earth as a whole, this definition has some relevance. However, when applied on less than a global scale, this definition tends to obscure the many flow paths of residuals which are possible and which have different economic, technologic, institutional, and ecological implications. Only a small portion of the problem of use of residuals involves this type of direct return flow.

The term "reuse" is deficient because a residual *as such* is not likely to be reused. Rather, some material in it has the potential for being reused, such as the steel in the automobile body, the copper in copper wire, the cellulosic fibers in discarded magazines. In essence, a residual is simply a potential raw material, with characteristics similar to other raw materials; hence the preferred terminology, "use of residuals".

A final introductory comment is there are three assumptions which seem to be inherent in the current interest in, and the pressure for increasing the extent of, use of residuals in society. The first is that "recycling" or "reuse" means making use of something that has *not* been utilized previously. The second is that doing so will result in a decrease in the residuals—particularly solid residuals—management problem, thereby improving environmental quality. The third is that use of residuals is less environmentally damaging—however that is defined—than use of alternative factor inputs for which they substitute. The following discussion will hopefully shed light on these current assumptions.

SOURCES OF RESIDUALS AND COSTS OF RESIDUALS HANDLING

Table 1 is an attempt to provide a classification of the sources of residuals in society. The classification does not purport to be exhaustive, nor will the terminology used necessarily be accepted by all. However, the operational definitions should make clear what is meant. Figure 1 illustrates some of these definitions, along with possible subsequent flows of residuals, using paper residuals as the example.

TABLE 1.—*Classification of sources of residuals with examples of use of residuals*

Production residuals
- *Without* storage in the environment—
  - *Materials recovery* (residual is input into same process)—e.g., second stage of collector on recovery furnace stack of kraft pulp mill
  - *By-product production* (residual is input into *another* production activity at same or different site)—e.g., food processing residuals as animal feed, fly ash from energy generation as raw material for brick manufacture, waste heat from energy generation for catfish production or for maintaining ice-free navigation channels
- *With* storage in the environment—
  - *Materials recovery*—e.g., reworking of copper mine and copper ore processing tailings for additional production of copper
  - *By-product production*—e.g., use of gold mining tailings for production of aggregate

Converting residuals
- *By-product production*—e.g., converting residuals from making folding boxes or printing newspapers returned to paper mills as raw material

Distribution residuals
- *Separated*—e.g., used corrugated shipping containers stored and handled separately by supermarkets and manufacturing plants for subsequent input to paper mills
- *Mixed*—e.g., used corrugated shipping containers as part of mixed solid residuals from supermarkets, drug stores, department stores, et al, for collection and disposition or reclamation by public or private agencies

User residuals
- *Without* storage in the environment—
  - *Separated*—e.g., newspapers stored separately in residences for collection by philanthropic groups, used computer printout stored separately
  - *Mixed*—e.g., newspapers in mixed solid residuals collected by public or private agencies for disposition or reclamation
- *With* storage in the environment—
  - *Separated*—e.g., abandoned vehicles
  - *Mixed*—e.g., mixed solid residuals in landfills

NOTE.—The term "reclamation" is applied to the recovery of materials from mixed solid residuals, e.g., metals from incinerator residue, glass containers from mixed solid residuals.

[1] Webster's New Collegiate Dictionary, G. & C. Merriam Co., Springfield, Mass., 1961 Edition.

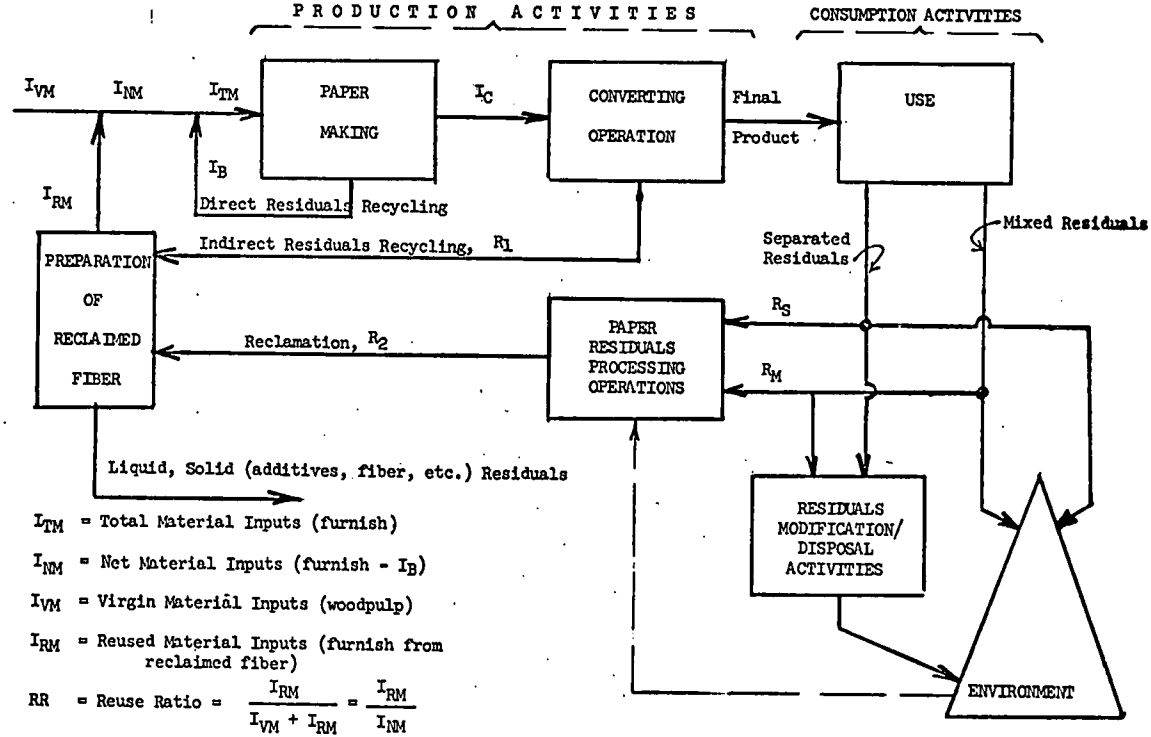


Figure 1: PAPER RESIDUALS: SOURCES AND POTENTIAL USE

Source: W.O. Spofford, Jr., 1971, Solid residuals management: some economic considerations, Natural Resources Journal, 11, 3, p. 564.

Materials recovery is also referred to, as indicated in Figure 1, as direct recycling. By-product production is also referred to as indirect recycling. As with all classification systems, this one is not perfect. The definition of residual given previously implies that all materials recovery and all by-product production which is *economically* justifiable with a given set of prices does not involve the use of residuals. That is, within the "black box" of many production processes are flows of materials and energy which are *normally* recovered and reused. Broke[2] from a paper machine is an example. Direct recycling of broke is an integral part of the production process, as shown in Figure 1. Chemical recovery systems to save input chemical costs and hot water recirculation to save fuel costs are other examples. Hence, no residuals are defined as being generated to the extent that such internal recirculation of materials and energy are instituted in the *absence* of pollution controls, i.e., are economically justified in relation to the costs of factor inputs given present prices. Obviously, as relative prices change over time, some materials and energy generated in production will become residuals; others will move out of the category of residuals to become part of the "basic production process".

Applying the terms "materials recovery" and "by-product production" to the use of residuals means these are possible options which might be adopted instead of waste treatment at the end-of-pipe or internal process modifications which have no savings stemming from material or energy recovery. They are non-economic in the sense that returns do not cover costs. Thus it may not be economical to produce bricks from fly ash, but the net cost to the individual firm and to society may be less than the alternative of disposing of the fly ash to a landfill or in the ocean.

Costs of course are fundamental to the economics of use of residuals. What costs are involved? Figure 2 indicates the various components of costs relating to the use of residuals—paper residuals in this case—and the alternative raw material, virgin pulp, and the variation in those costs as the degree of use of paper residuals increases. Both raw materials can be utilized to provide identical inputs (furnish) to a paper machine. The costs include:

(1) the costs of furnish from the virgin raw material, including costs resulting from environmental controls imposed upon the pulp mill;

(3) the costs of furnish from paper residuals, including necessary costs for managing residuals generated in processing paper residuals;

(4) the costs of handling and disposing of used paper residuals via incineration and/or landfill, i.e., the solid wastes management costs, which of course decrease with increased use of paper residuals; and

---

[2] Broke is the term applied to paper scrap from trimming and slitting the paper sheet and from miscellaneous sources in start-up and shut-down of a paper machine.

(5) the external damages associated with all of the remaining residuals discharged from all of the operations.

Some of these costs are borne by the producer of the paper product; some are borne by the public sector in the form of solid wastes management costs; some are borne by individual receptors, in terms of damages stemming from the remaining residuals discharged at various points in the system to the environment. It is the total cost to society in terms of resource inputs which are relevant for analyzing the economics of use of residuals.

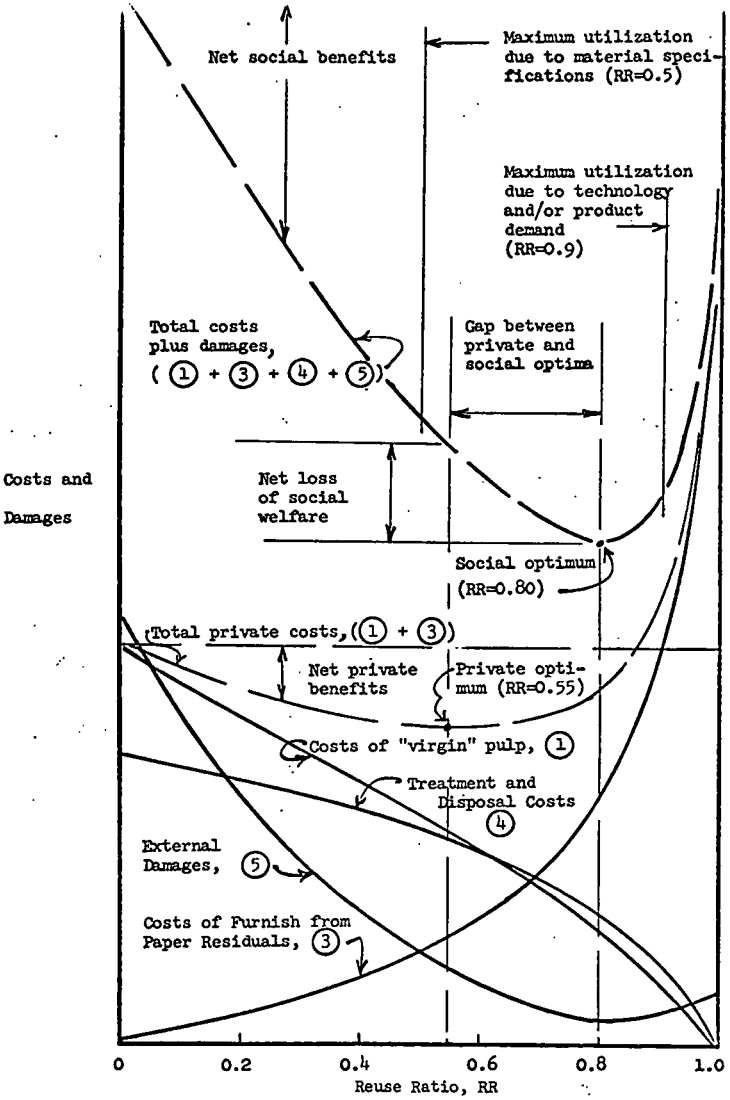
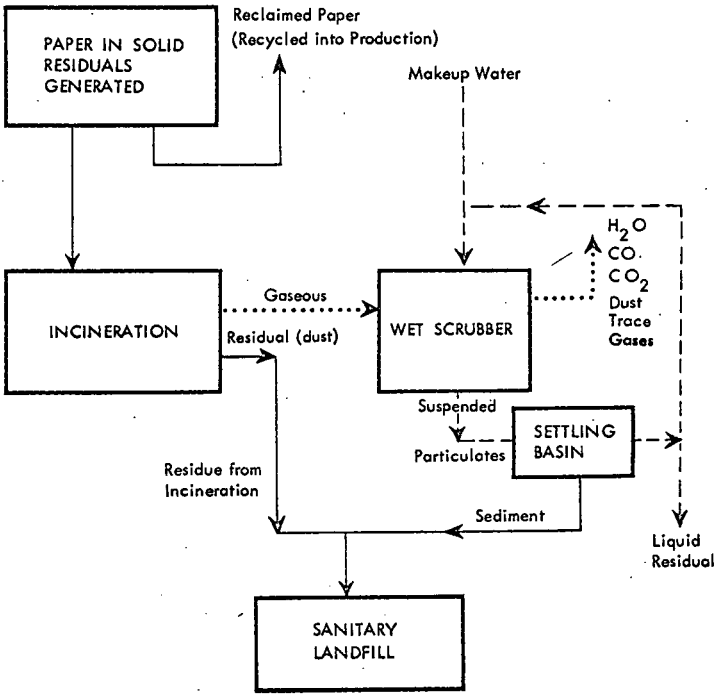


Figure 2: COMPONENTS OF COSTS, USE OF PAPER RESIDUALS

Source: W.O. Spofford, Jr., 1971, Solid residuals management: some economic considerations, Natural Resources Journal, 11, 3, p. 585.

Before discussing the factors which influence the economics of residuals use, an example which will illustrate the impact of increasing use of residuals on solid wastes management costs may be helpful. Figure 3 shows estimated an-

nual costs of solid wastes management for the New York region for about the year 2000 under each of two different degrees of use of paper residuals, 20% and 80%. In addition to the difference in solid residuals handling costs, about $90 million, there is a significant difference in the quantity of particulates discharged into the environment, the resulting decrease in damages not having been amenable to quantitative estimation. Against these savings there may be a net offsetting cost, comprised of the difference between the value of the paper residual and the costs of its collection and transport.



Assumptions ---

1. 56.8×10^6 tons of solid wastes are generated in one year, 50% of which is paper.
2. All solid wastes are incinerated, except the portion of paper which is recycled, in collective incineration facilities; no on-site incineration
3. Incinerators are operated 24 hours per day, 250 days per year.
4. Adequate facilities and operational inputs are provided to insure that good incineration is achieved, i.e., 10 pounds of particulates emitted per ton of waste incinerated.

Results --- Annual cost with 20% of paper recycled: $300,000,000
Annual cost with 80% of paper recycled: $210,000,000
Particulates emitted to the atmosphere with 20% of paper recycled: 25.6×10^4 tons
Particulates emitted to the atmosphere with 80% of paper recycled: 17.0×10^4 tons

Figure 3: HANDLING AND DISPOSAL OF RESIDUALS GENERATED IN CONSUMPTION OF PAPER

Source: B.T. Bower, et al, 1968, Waste management, a report of the Second Regional Plan Association, New York, p. 15.

In this connection it should be noted that the use of residuals is not necessarily "environmentally desirable" in comparison with the use of virgin materials. Virtually all residuals must be processed. For example, the insulation must be stripped from copper and aluminum wire; dirt and other contaminants in paper

residuals must be removed and the paper residual repulped and sometimes bleached before becoming the input to the paper machine. Although use of residuals may decrease management costs for a municipality, the costs of managing the residuals generated in the processing of those residuals for use may be substantial, and must not be ignored.

ECONOMICS OF USE OF RESIDUALS

The extent of use of residuals is a function of the relative costs of alternative factor inputs into economic activities, i.e., residuals as raw material versus alternative raw material, usually termed virgin raw material. As with any raw material, the important characteristics which affect its value, or the cost of the material as a factor input into production, are location, quantity, and quality. Large mass of high quality, i.e., high concentration, close to the locus of production and/or market, are desired characteristics. This is as true for a residual as a potential raw material as it is true for a virgin raw material. A high grade iron ore in comparison to a low grade iron ore is similar to the comparison of high grade newsprint residual with low grade newsprint residual. The quantity and quality of the raw material affects the cost of its processing and the quantity of residuals generated in that processing and hence the residuals management—pollution control—costs associated therewith. It is true that there is likely to be a wider variety of contaminants or nonusable materials in residuals than is true for many virgin raw materials. In some cases these contaminants, while small in quantity, may be difficult to remove, thus increasing the cost of processing the residual for use. Table 2 lists the major factors influencing the costs of the two alternative types of raw materials.

Table 2.—Factors affecting raw material costs

	RESIDUAL
	Quality, i.e., contaminants
	Technology of residuals processing, i.e., stripping mine, deinking waste paper, shredding vehicle bodies
	Residuals management costs with respect to residuals processing
	VIRGIN
	Quality, i.e., concentration of ore
	Technology of processing virgin material, i.e., pelleting ore
	Residuals management costs with respect to virgin material processing
NOTE.—ResMgtCosts=f (RM, T, PO, E_c), where RM= raw material; T=technology of processing; PO=product output specifications; E_c=effluent controls [1]	
	Transport cost, both of raw residual and processed residual
	Technology of production process, i.e., paper making
	Transport cost, both of raw virgin material and processed virgin material
	Technology of production process, i.e., open hearth vs. basic oxygen furnace

Product output specifications.—Assumed same for both raw materials because cost comparison relates to use in making the same product, i.e., newsprint, steel.

[1] For a more detailed discussion of this relationship see Bower, B. T. and Sewell, W. R. D., 1971, Selecting strategies for air-quality management, Resource Paper No. 1, Department of Energy, Mines, and Resources, Ottawa, Canada, pp. 8–9.

An example—steel scrap and the production of steel

It is instructive to look at the steel industry, and its two basic ferrous raw materials—iron ore and steel scrap—in the context of the listed factors. The relative values of these two raw materials have fluctuated substantially over the last two decades, as a result of changes in the technology of steel production, changes in technology of ore processing, changes in technology of scrap production, and—to some less clearly defined degree, the design of automobles. The following is a simplified summary of these interacting factors.

As the high quality iron ore deposits of the Mesabi range neared exhaustion, costs for processing iron ore increased, thereby making scrap more attractive as a raw material, given the predominance of the open hearth method for producing steel. The next event was the development of pelletizing, which enabled

economic upgrading of low grade iron ores, 35–40%, to high grade ores, 66–67%.[3] This shifted the balance back toward iron ore as the raw material.

Traditionally the technology for processing junked vehicles involved compressing a stripped and burned out hulk into a chunk of impure "No. 2" scrap. As long as the open hearth was the predominant method of producing steel, this raw material had utility, for about 70% of the charge to the open hearth could be relatively impure scrap.[4] With the advent and growing use of the basic oxygen furnace (BOF) for producing steel—a less expensive production process than the open hearth—the bottom dropped out of the scrap steel market, because the maximum charge to the BOF is about 40%, the limiting factor being the impurities in the scrap raw material.[5] By 1970 BOF steel production exceeded open hearth steel production in the U.S.[6]

Around 1960 a technological development on the residual side was introduced, the automobile shredder. This process takes whole automobile hulks and grinds them into small pieces, enabling better extraction of impurities and producing a raw material of far better quality than the old No. 2 bundle. A shift in relative prices in favor of the residual tended to result.

The shredding plants installed in the decade of the 1960's have typically been highly capital intensive, large-volume operations, i.e., plant costs—$3 million; plant capacity—one car per minute.[7] This means that almost all such plants have been located in major metropolitan areas, leaving significant numbers of abandoned vehicles still resting in the environment.

Even so, the growth in the use of the BOF process and the increasing number of available abandoned cars, stemming from the continued increase in the U.S. car population, tended to keep scrap prices low. This availability of low cost scrap in turn stimulated the initiation of a number of small steel mills around the country based on the electric furnace, with annual capacities of 50 to 500 thousand tons of steel. By 1969 about forty of these mills existed, producing about 2.3 million tons of raw steel.[8] Essentially 100% of the charge to an electric furnace can be scrap. This evolution, and the development in the last few years of the mobile automobile crusher and the mini automobile-shredder[9] suggest a likely increase in the use of the abandoned vehicle residual.

Technological developments can affect not only the type of residuals which can be used in a production process but also the quantity of residuals generated in that process. Continuous casting, a recent development in the steel industry, reduces scrap generated internally in a steel mill. Such scrap is generated, in conventional steel production, in ingot and slab trimming and in rolling operations, in an amount up to 30% of the steel poured. Continuous casting cuts these losses to 10% or less.[10] Because the BOF operates on a low scrap charge, minimizing internal scrap generation is desirable. Thus the BOF and continuous casting go well together, further tending to shift the relative prices of virgin ore and scrap as raw materials and inducing more electric furnace capacity, which will tend to counteract that shift.

At the same time as these various technological developments have taken place, there has been a change in the product output specifications for automobiles, in terms of the component materials. As indicated above, the value of a residual is a function of the quality of the material which can be produced from it, and of course of the cost of processing. But the quality depends in turn on the original quality of the residual. The more impurities in scrap steel, the lower its value. With respect to automobiles, the trend has been ever upward in the amount of non-ferrous materials utilized. The average 1970 model car contained about 100 pounds of zinc, 75 pounds of aluminum, 38 pounds of copper, and about 100 pounds of plastics. The last was about five times the amount used in 1960.[11] Increased impurities in the residual increase the cost of processing and/or decrease the quality and hence the value.

---

[3] For example see Anon., 1969, Savage River Mines, *Civil Engineering*, 39, 1, p. 62.
[4] Reinfeld, W., 1968. An economic analysis of recent technological trends in the U.S. steel industry, Ph. D. Thesis, p. 93.
[5] Reinfeld, op. cit.
[6] Neely, H. C., 1970, The steel industry, *Chemical and Engineering News*, 48, 12, p. 48.
[7] Haltenhoff, C. E., 1971, Mini automobile-shredding plant for western Michigan, *Civil Engineering*, 41, 4, p. 55.
[8] Neely, op. cit., p. 56.
[9] Haltenhoff, op. cit.
[10] Neely, op. cit., p. 55.
[11] Anon., 1970, Detroit's minis grab new-car spotlight, *Chemical and Engineering News*, 48, 40, pp. 18, 19 and Anon., 1970, Aluminum use in autos climbs, *Chemical and Engineering News*, 49, 4, p. 23.

An example—paper residuals and the production of paper products

There are three types of possible raw materials for production of paper products: (1) virgin roundwood or chips from such roundwood, the latter in situations where the chipping is done in the woods; (2) residues from wood products operations, such as saw mills; and (3) paper residuals. In turn, the last is comprised basically of two subcategories, converting residuals and user residuals (See Figure 1). Neglecting any imperfections in the market, the relative quantities of the three types of raw materials utilized for production of paper products is a function of their relative costs to the manufacturer. Even before the advent of air pollution controls in recent years, and before the current agitation for increased "recycling", wood products residues were comprising an increasing proportion of the raw material input for paper production. This stemmed from the fact that the cost of this input has been becoming less than the cost of the alternative source of raw material, virgin round wood. In northern California, Oregon, and Washington, by the end of the sixties, 60%–70% of the input into paper manufacture was wood products residues. Even in the southeast, the area of fast growing pine, the proportion rose in the decade of the sixties from 10% to 20%.

Virgin pulpwood costs are tending to increase for various reasons, perhaps not the least of these is the increasing competition for alternative outputs from the forest land—recreation in particular. Labor costs have continued to rise and although productivity has increased, the net result has been, and is likely to remain, a trend toward increased cost of virgin round wood. Note that these trends in costs and use would take place in the absence of any pollution controls or any pressure for recycling. Consequently, basic use of wood products residues does not meet the first assumption noted above, namely, that recycle means making use of something which previously had not been utilized. It *is* valid to say that in the last few years *increased* use of wood products residues has been stimulated by air pollution controls, at least in the Northwest where air quality standards could not be met with use of the traditional teepee burner. But the incremental addition to total use because of this factor appears relatively small.

Turning to the third category of raw material, paper residuals—specifically converting residuals, the percentage of residuals generated in converting operations varies from two to three percent in printing newspapers to about 20% in making folding cartons. Converting residuals have desirable characteristics as raw materials—large quantities in a single location, high degree of homogeneity or little contamination, and if contamination exists it is of a known, specific nature. Consequently the large bulk of converting residuals has been used for many years. In 1969, about five million tons of converting residuals were generated, of which about four million tons were used. This use has occurred by virtue of the fact that the raw material cost represented by converting residuals was less than that of the alternative raw material of virgin round wood. Thus, the bulk of converting residuals has been and is being used, in the absence of pollution controls or "recycling" pressure.

The significance in relation to the second assumption noted originally is obvious, both with respect to wood products residues and with respect to converting residuals. That is, there would be little decrease in the solid wastes management problem because the bulk of converting residuals and much of wood products residues are being used. What it means is that in cases where costs for pollution and residuals disposal are imposed directly on converting and wood products operations, these costs will stimulate some further use of residuals.

The third assumption may or may not be valid. That is, in order to utilize paper residuals—or any other type of residuals—as raw material, processing of the residual is required, just as the raw iron ore must be processed. The processing operation itself requires inputs, such as energy, and results in the generation of residuals. Whether or not these residuals are less environmentally damaging than those generated in the use of virgin raw material depends on the quantities and characteristics of the residuals generated and on the costs of reducing or modifying the residuals before discharge into the environment. For example, if 100% waste paper is used to make a paper product in contrast to softwood using the kraft pulping process, the former results in the generation of no gaseous residuals, but substantially more dissolved and suspended solids than the kraft process. Whether or not the gaseous residuals generated in the kraft process are more damaging and/or more costly to modify, depends on the particular situation.

One other point merits mention in the context of comparing the economics of using residuals with using virgin raw materials, namely, the importance of product specifications. Depending on those specifications, greater or lesser amounts of paper residuals can be used, and greater or lesser amounts of residuals are generated because the degree of processing required is directly related to the product specifications. For example, if a brown paper towel is acceptable rather than a white paper towel, no bleaching is necessary either for the paper residuals as raw material or for virgin round wood. Because bleaching is a major generator of residuals, this takes on added significance. But it should be emphasized that different paper products require different component inputs, computer punch cards in contrast to newsprint, for example. Many paper residuals simply cannot physically be used for certain products.

CONCLUDING COMMENTS

The above examples show the multiplicity of factors affecting the economics of residuals use. As emphasized, the extent of use of residuals is a function of the price of a residual as a raw material compared with the prices of alternative "virgin" raw materials. In addition to the factors discussed above which affect these relative prices, there are other factors, the effects of which are less clear. These include: depletion allowances on virgin raw materials; possible differential assessment on land and processing facilities between those located in metropolitan areas—typically the location of residuals processing, and those located in small towns and rural areas—typically the location of virgin raw materials processing; possible differential effects of capital gains taxes; attitudes of purchasing agents who specify virgin material rather than utilizing a performance specification; and labelling requirements which require designations such as "used oil" and "reprocessed wool"—even though there is no difference in performance of the product.

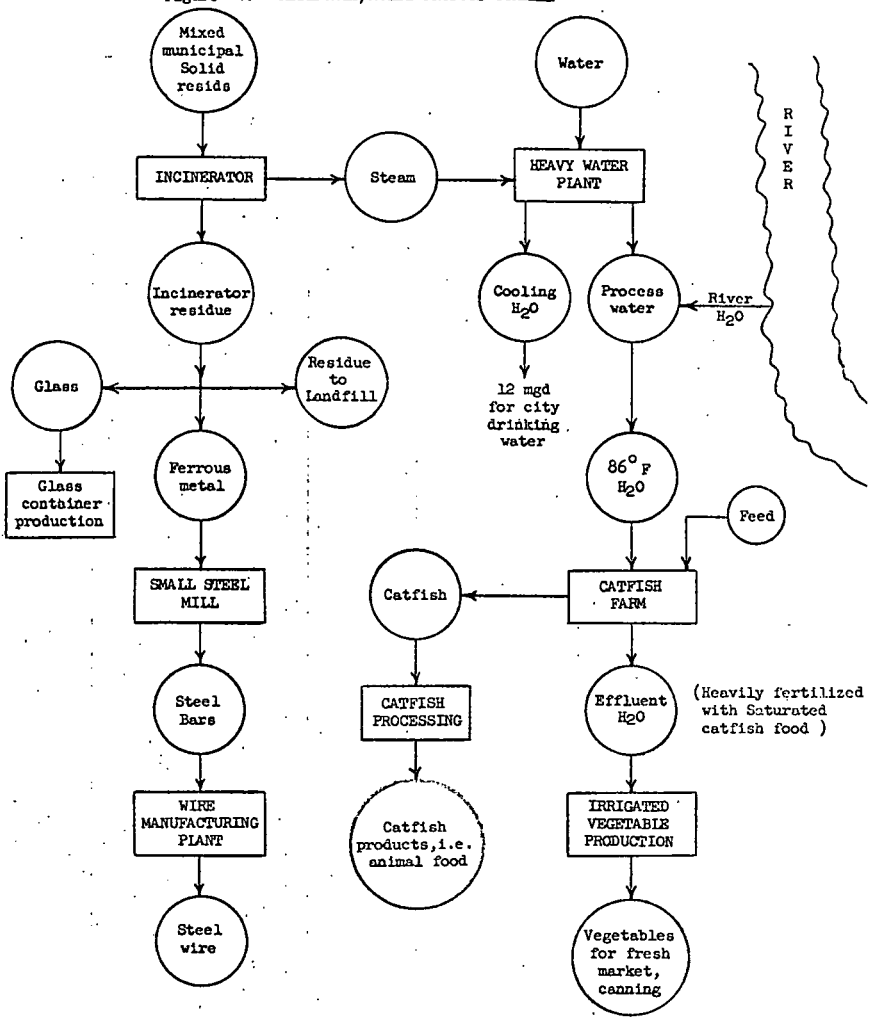
The pervasiveness of residuals, i.e., generated in essentially all economic activities, the finite assimilative capacity of the environment, the necessity for the use of some assimilative capacity as an input into essentially all economic activities, and the substantial damages which can result from the excessive discharge of residuals to the environment, require that much more rigorous analysis be made of the factors which affect the use of society's residuals. Other than by changing final demand—the mix of goods and services desired by society—and changing raw materials and/or production processes to generate fewer residuals, the increased use of residuals is the only alternative for reducing—or potentially reducing—the quantities discharged into the environment.

One approach which may be helpful is analogous to the traditional "industrial complex analysis".[12] This type of analysis looks explicitly at the outputs of multiple processes as possible inputs into other processes, to determine what the optimal mix of activities is for a given location—in relation to alternative raw material sources and markets. Traditionally such analysis has not considered residuals explicitly. But it could readily be extended to take the possible uses of residuals directly into account, along with all transport costs of raw materials, products, and residuals, and the associated energy costs. This approach is reflected in Figure 4. But whatever the approach, far more explicit consideration of the use of residuals is essential.

---

[12] See Isard, W., 1960, Methods of regional analysis: an introduction to regional science, Technology Press MIT and John Wiley, New York, pp. 375–412.

Figure 4: RESIDUALS/MULTI-PRODUCT COMPLEX



Note: Not all residuals streams nor all factor input streams shown.
Source: Based on account in New York Times, 2/21/71/, p.F13

Chairman GRIFFITHS. Thank you very much.
Mr. Dominick, please proceed.

STATEMENT OF HON. DAVID D. DOMINICK, ASSISTANT ADMINISTRATOR FOR CATEGORICAL PROGRAMS, ENVIRONMENTAL PROTECTION AGENCY

Mr. DOMINICK. Madam Chairman, it is a pleasure to appear before this subcommittee today to testify on the economics of recycling solid waste materials.

The generation of waste products is a pervasive element in our affluent society. It is difficult to imagine any activity in the multitude of production processes and consumption patterns which does not result in the creation of some waste. Certainly one of the major aspects of waste generation and disposal in this society is that of solid waste. It touches the lives of every individual—in his home, in his work, and in his leisure.

Solid waste cuts across all the major segments of society. Of the 4.3 billion tons of solid waste generated in the United States in 1969, more than half originated from agricultural crops and livestock. Significant amounts arose from mining and industrial processes. A little under 6 percent, or 250 million tons, was classified as residential, commercial, and institutional in origin.

Although wastes from homes, businesses, and institutions make up a small part of the total load of solid waste produced they are the most offensive and the most dangerous to health when they accumulate near where people live.

From an economics standpoint, solid wastes may be considered as the byproducts of our society which are disposed because the costs of reuse, recovery, or recycling are greater than the value of the byproduct. Wastes generally will be disposed where the cost of recovery for a particular material exceeds the price at which it can be sold.

This is not to imply that much recycling does not take place as a matter of economic sense. The production of many products results in waste which is commonly recycled at the plant. Pulp and paper mills usually reuse trimmings and cuttings of paper that are created during production. Steel mills may remelt extraneous parts of castings.

Consumer goods which have some scrap value may be fed into the reuse process as is done with 80 percent of the Nation's autos. Containers ranging from large drums for industrial use to bottles for domestic use may have sufficient value to warrant reuse in many cases.

The economic nature of waste disposal extends over many areas of human activity. Agricultural wastes were recycled in times past by distribution over acreages, or by composting through plowing into the ground. This was an important way to increase productivity, but now fertilizers and pesticides accomplish the same purpose often at lower expense and time to the farmer.

As a consequence, agricultural waste, particularly from farm animals, is becoming expensive to reuse relative to various chemical methods of increasing production.

In some cases, wastes are generated due to technical shortcomings. For example, early ore mining created large amounts of wastes with tailings that often contained valuable quantities of materials. Now with improved technology for refining ores to allow greater recovery

than under the earlier technologlies, there is recycling of tailings for additional materials recovery.

Another factor in the equation is the price of a byproduct and how it changes over time. The price of the materials may not have been great enough to warrant obtaining the materials. Previously unwanted wastes from iron ore mining are now being handled again due not only to improved recovery techniques but rising prices for steel and its products.

It is useful to distinguish between the generation and disposal of waste. Once wastes have been generated, they may either be recycled or disposed. The choice depends on the relative costs of recycling and disposal as compared to the value of the product recovered.

Consider a choice between recycling a product for $20 or disposing of it for $10. If the product had a salable value of more than $20, we would expect it to be recovered. If the value of the product was less than $20, the economic choice would be disposal.

If the costs of disposal are higher than the costs of recycling, we may also expect an incentive to recycling. Thus, as the cost of disposal falls, there is a reduced incentive to recycle materials resulting in a larger generation of waste. Or, conversely, as the cost of disposal rises, we may expect more recycling.

In addition to relative costs, the size, makeup and stability of the market for recovered materials—the demand side of the supply/demand relation—will impact on the amount of materials recovered or recycled. Markets for such materials cannot be left unscrutinized.

Thus economic considerations are central to solid waste disposal questions and recycling considerations.

The Resource Recovery Act of 1970, which amended the Solid Waste Disposal Act of 1965, and Reorganization Plan No. 3 of 1970, gave the Environmental Protection Agency the primary Federal role to examine the problem of recycling solid waste matter.

One of the major areas of concern, of course, is the economics of solid waste recycling. Several sections of the act deal, in whole or in part, with incentives to further the progress of recycling.

Section 204 of the act, among other things, authorizes the EPA to render financial and technical assistance to appropriate authorities, agencies, institutions, and individuals to promote research, investigations, experiments, demonstrations, and surveys relating to reductions in the amount of solid waste and unsalvageable waste materials, to develop improved methods for processing and recovering materials and energy from solid waste, and to identify solid waste components and potential materials and energy recoverable from such waste components.

Section 205 of the act authorizes the EPA to carry out investigations and studies to determine means of recovering materials and energy from solid waste, recommended uses of such materials and energy, identification of potential markets for recovered resources, impact of distribution of such resources on existing markets, recommended incentives and disincentives to accelerate recycling, and effect of existing public policies on recycling.

Section 208 of the act authorizes the EPA to make grants to appropriate governmental agencies for the demonstration of resources recovery systems.

Two major economic problems of solid waste recycling are the separation of the various components of solid waste, and the establish-

ment of markets for secondary materials. With these problems in mind, we have identified and are analyzing a number of economic incentives and disincentives which could be applied to increase the recycling of solid waste matter. It is, of course, too early to recommend any specific courses of action.

1. Depletion allowances on virgin materials could be lowered or allowances in the form of direct subsidies, including price supports on secondary materials, could be initiated.

2. Reduced freight rates for the shipment of secondary materials could be approved.

3. A direct tax could be imposed on those disposables entering the solid waste stream, the size of the tax being set to reflect the disposal costs of the various materials. Or conversely, a tax credit could be given for those products which utilize secondary materials and which are readily recyclable.

4. A user deposit could be utilized for many packaging products.

5. Government purchasing, at all levels and wherever applicable, could specify recycled materials.

6. Investment tax credits and accelerated amortization for industry-purchased recycling equipment could be provided.

7. The use of tax-free industrial development bonds for financing recycling plants could be approved.

8. Various forms of restrictive legislation could be enacted to inhibit or halt the flow of specific items into the solid waste stream.

It is important to recognize that no single incentive lends itself universally to increased recycling of the many diverse materials found in the solid waste stream, and that combinations of several incentives may be required. This recognition is further amplified when we consider the ultimate goal of attracting major segments of private capital to solid waste recycling, which capital can only be attracted if a reasonable and fair profit is attainable.

We believe the subject of economic incentives is one worthy of substantial administration effort because of its potential applicability to increased solid waste recycling. Evidence to date seems to indicate that the critical factor to increased recycling is demand, not supply.

Hence it follows that, if incentives are to be effective, they should more probably be applied to the demand side—that is, to the users of recycled materials. The demand factor is complex, however, and involves not only economic considerations, but additional factors such as industrial location, organization, and control.

An example of influencing the demand side is the administration's procurement program. The General Services Administration has revised Federal procurement specifications to require the use of recycled paper by Government as a stimulus for further paper recycling. GSA has changed its procurement specifications to require the use of a minimum of 3 to 50 percent of recycled material. Depending on the product, this will affect paper purchasers of over $35 million per year. GSA has revised other specifications to require recycled material involving an additional $25 million in annual Federal purchases. These two actions cover over one-half of the total paper products purchased by GSA.

The Governors of States have been asked to review their purchasing policies and, where possible, to stimulate the use of recycled paper. To

assist them, GSA has established a technical liaison program to provide the States with the revised Federal specifications and with other information on this new program.

In the future we will be exploring more intensively the use of economic incentives for recycling. Designing incentives that are efficient and effective, however, is a complex task. Any economic incentive changes the competitive relationship between materials, institutional relationships, consumption patterns and numerous social and environmental circumstances.

Examination of such incentives involves complex questions of technology and cost, supply/demand relations, and the psychological aspects of consumer preferences. Not until the ramifications of any particular incentive are fully explored can we be confident that a proper allocation and use of resources will result.

The administration will be studying these complex questions.

That concludes my formal statement, Madam Chairman. I will be pleased to answer any questions you or the other members of the subcommittee may have at this time.

Chairman GRIFFITHS. Thank you very much.

Your statements were all very interesting.

Mr. Conable, would you like to proceed?

Representative CONABLE. Thank you, Madam Chairman.

Mr. Padnos, I am quite interested in the obviously sophisticated program that New York City has, and I am interested also in the extent to which this is reproduced in other municipalities throughout the country.

I assume that New York City has unique problems in waste disposal, as it has unique problems in almost every field. Are there other cities to your knowledge that have developed a high degree of expertise in dealing with waste disposal problems? And are these other cities that have made efforts to develop incentives for residual usage?

Mr. PADNOS. Yes, there are, Mr. Conable; there are a number of cities that have been active in trying to find solutions to their solid waste problems. One notable example in the area of figuring out a new way to collect refuse so that it will be more recyclable is the city of Madison, Wis., which has modified the design of its refuse collection trucks so that newspapers can be collected separately from other refuse. At this point they report that they actually break even or make a small profit on the newspaper portion of the sanitation collection.

New York City is trying a similar program. We have not yet modified our garbage vehicles for the collection of newspapers as Madison, Wis., did, but we are working toward a program of that kind. And other cities around the country are investigating similar newspaper programs.

A number of other cities have also gotten involved in the use of recycled paper—the city of Buffalo is notable in this respect. I just happen to be familiar with their situation, because we have been in close contact. They have instituted their own environmental purchasing program. We have worked very closely with them in developing specifications for the paper they use.

A number of other cities and States are studying it, but I am not sure of any others that have started using recycled paper.

Representative CONABLE. In other areas of pollution control, the Federal Government, has usually had to rely on the other levels of government to do the pioneering for them, and that is because the Federal Government has gotten deeply into this area only comparatively recently.

What I was trying to determine was whether or not there is an extensive body of expertise available in solid waste disposal on the local level on which the Federal Government can draw in making its plans for legislation in the future.

You have given us a very sophisticated statement here today, and evidently from what you say there are other communties throughout the country which, to one degree or another, have been grappling with this problem and whose expertise would be available to us.

Mr. PADNOS. In New York City we would be very anxious to work with you. Our legal staff has worked very hard—I mentioned the legal tax package which we have already introduced, which we think will be very effective.

One thing that is necessary is to come up with new techniques for the actual handling of solid wastes. This is an area in which the first breakthroughs are really going to come from scientists.

We in the city are very experienced in handling garbage, but no one yet has really come up with any new system for doing it since the days of the Romans.

Representative CONABLE. Do you have any idea when the recycling incentive tax on containers might go into effect?

You say the legislature has authorized it, and you expect it to go ahead, I assume, New York City. And this would be a particularly interesting development.

Mr. PADNOS. Right. That is an interesting subject actually, and it relates to what I mentioned earlier about the difficulty of removing certain advantages which are already given to certain industries.

The State legislature authorized the tax in its entirety. When it went to the city council, it met with tremendous opposition from various members of the container industry. So at the city council level, only the tax as it applied to plastic packaging was left intact. The tax on plastics is now in effect in New York City.

Unfortunately, the city is being sued by the society of the plastics industry for having imposed a tax which they allege is discriminatory toward plastics.

We plan to reintroduce the entire bill in the future, and we hope that the interest which has been generated in the bill in its first year, and the fact that the plastics industry has made a very substantial case showing that it is unfair just to tax them alone, will encourage the city council to pass the whole bill.

Representative CONABLE. To what extent do you think it will be a self-liquidating tax?

It certainly is not intended to raise revenue, despite the great need that New York City has for revenue.

Mr. PADNOS. We feel that eventually it could be self-liquidating, but at this point we are not certain how long this would take.

Representative CONABLE. You have in your prepared statement quite a bit about the recently developed definition of "recycled paper."

Mr. PADNOS. Right.

Representative CONABLE. And I am wondering, is there any scientific reason back of your having chosen a minimum of 25 percent recycled fibers? Or is that just a figure you pulled out of the air?

Mr. PADNOS. That is not just pulled out of the air.

Representative CONABLE. I notice we always have this problem.

When I was in the State Senate in New York, we had to define what constituted a New York State wine, and we decided that it must have not more than 25 percent juice from outside the State.

Here you have chosen 25 percent——

Mr. PADNOS. What we were trying to achieve in that definition of recycling that would be geared directly toward solid waste utilization. We were more interested in what the companies actually were using than in the great numbers.

There has been a great deal of advertising of 100 percent recycled paper. That is fine with us, but we want to see to it that a company has the kind of equipment necessary to upgrade the lower grade fibers which can be used in various paper products. We chose 25 percent as a substantial amount. But then also, we had to trade that off against the ability of a number of companies to bid. So what we did was to poll the paper industry and find out what they were doing. We then attempted to establish a percentage requirement that would meet our objectives, keeping in mind that at least some papermills would have to be able to meet that requirement.

Representative CONABLE. As recycling capacity goes up, you would expect the definition to become more stringent.

Mr. PADNOS. It could very easily go up.

Representative CONABLE. Mr. Klaff, could you tell me how much staff you have on your commission, and how you are going about organizing it?

Mr. KLAFF. Mr. Conable, we are in the stage of staffing at the present moment. We have an executive director, and we have a deputy director who is present here today. We have, of course, various clericals. We have a man on detail to us from the Department of Commerce. And between now and Friday, it is hopeful that we will have two more experts in various fields on board, because our objective is to be fully staffed within the limits that we have under the act. We are limited to 12 people.

Representative CONABLE. With 12 people, how long do you think it will take you to achieve substantially the mandate of the legislation setting you up?

Mr. KLAFF. We anticipate, sir, that we will have our report in writing the first part of the year of 1973, so that it will be completely ready for distribution to the Congress on the due date.

Now, we are helped by the fact that the act provides that we may call on any Federal agency for any aid that they may be able to give us, and at the same time we can employ outside organizations to make various studies.

Representative CONABLE. That is all right now, Madam Chairman.

Chairman GRIFFITHS. Thank you.

I would like to ask you, Mr. Bower, if we pass laws that require that all bottles be green and all paper towels and toilet tissue and face tissue be brown, what would the estimated saving be?

Mr. BOWER. The estimated savings in total resource or total cost?

Chairman GRIFFITHS. Both.

Mr. BOWER. I wish I could give you an explicit answer to that, Madam Chairman. I would say that in another 6 months I could give you that answer. But the saving unquestionably would be substantial. By that I mean millions of dollars, if for no other reason than the decrease in cost of bleaching chemicals and the residuals management costs stemming from the use of those bleaching chemicals.

Chairman GRIFFITHS. What would the savings be in resources? Would there be savings in resources?

Mr. BOWER. On that I would suggest that the savings would be minimal, for the reason that this oft-quoted number of 17 trees for every ton of paper residual used is not a valid number. It is not valid for several reasons. One of the main reasons is the one I indicated in my prepared statement; namely, that the bulk of the raw material inputs into paper production, at least in the Northwest, comes from wood products residue. Consequently, substituting paper residuals would save only a very small number of trees. The resource costs saved relate not so much to the forests as to the cost of chemicals, the cost of energy for processing—and bleaching is an energy intensive process—the cost of water, and the residual management cost associated with those processes.

Chairman GRIFFITHS. But anyhow, it would be really worth doing, would it not?

Mr. BOWER. I would say very definitely.

Do you not think so, Mr. Padnos?

Mr. PADNOS. Yes.

Mr. BOWER. I say, within 6 months we will have some actual numbers for you.

Chairman GRIFFITHS. Thank you, that will be wonderful.

Now, Mr. Bower, what is the cost of recycling paper as opposed to paper made from wood pulp?

Mr. BOWER. What should be compared are the costs of preparing the raw material as an input to the paper machine in both cases. From the paper machine on, the costs are essentially the same. There is some controversy, I will admit, about that. But the technical people with whom we are working say that essentially one can assume that if the pulp that goes to the head box of the paper machine meets certain specifications, it does not matter what the source is. So we can start and look at the costs preceding the paper machine.

Chairman GRIFFITHS. Yes, look at the costs preceding.

Mr. BOWER. There are two kinds of costs involved, direct costs and indirect costs. The direct costs are those in the case of virgin roundwood of getting the raw material from the forest and producing the pulp.

The costs in the case of the paper residual are those of obtaining the paper residual from, say, the metropolitan area, and the costs of processing. The latter costs together are roughly 50 to 75 percent of the former.

If, in addition, one takes into account—which should be done—the residuals management costs associated with both of those operations, you probably would get an additional differential, but, as I said in my prepared statement, this is not necessarily clear, depending on whether it is more costly to handle the additional amount of suspended solids generated in processing the paper residual as against the gaseous residuals generated in the pulping operation.

Furthermore, we have not included, unquestionably, I think, the extra costs associated with some of our logging operations. These stem both from such forest management activities as the use of herbicides, but more importantly, probably, from the sediment generated in logging operations, and the esthetic impact of some of those activities on the landscape, which can be measured in terms of economic costs, as is being shown by the current controversy over the U.S. Forest Service management practices.

In summary, I would suggest, but only as an order of magnitude based on preliminary estimates—but the costs of processing paper residuals are clear, and those of pulping are available—that there is probably a differential of somewhere between 50 and 75 percent. That is, to use paper residuals to produce a given product costs 50 to 75 percent of using the virgin roundwood.

One other caveat: That differential assumes something about the location of the processing activity. Obviously if you have to ship the paper residual all the way to Seattle from St. Louis, you are incurring substantial transport costs.

Chairman GRIFFITHS. What kind of tax relief would you give to the people who are recycling that would be the equivalent of the capital gains tax for those who are making it from wood pulp, and how would you do it?

Mr. BOWER. I am not sure I would do it; in fact I don't think I would do it.

Chairman GRIFFITHS. What would you do; do away with capital gains?

Mr. BOWER. That might be more equitable.

Chairman GRIFFITHS. And better in many ways.

But I think one of the things that you have to do is be practical.

Mr. BOWER. That is right.

Chairman GRIFFITHS. And you are talking to only two members of the Ways and Means Committee, and there are 23 of them.

Mr. BOWER. Right.

Chairman GRIFFITHS. So that I think you would have to have—even if you started in theory to do away with capital gains, I think you would have to have a fallback.

Mr. BOWER. I think that is true, Madam Chairman.

Chairman GRIFFITHS. So, what would you do?

Mr. BOWER. Let me respond to that by suggesting two kinds of major changes which would increase the use of residuals over and beyond another change which would also increase the use of residuals, which is even more complex, that is the change of land use planning.

First, a major change which would affect the relative cost position would be any of the policies which would push up the costs of virgin raw material in relation to residuals. These would include perhaps a change in the depletion allowance. A more important one, I think, in the long run, would be assuring that all residuals management costs resulting from the activities using both virgin and residual materials are actually imposed on the generator.

Representative CONABLE. Are imposed upon what?

Mr. BOWER. Are imposed upon the residuals generators, the pulping mill, the logging operation, the residuals processor, the secondary materials processor.

Representative CONABLE. So that it becomes part of the price?

Mr. BOWER. That is exactly right, so that it becomes part of the production cost. It is clear that these have not been adequately reflected in the cost of paper products, otherwise we would not have so many white paper products.

So, one of the major factors which would influence the relative price of the two materials would be to insure that all of these residuals costs, externalities to society, were actually imposed generally. And this is a policy, of course, which is currently under consideration.

I think that probably more than any one other direct factor that would influence the relative prices and the uses of the two materials.

Chairman GRIFFITHS. Mr. Dominick, in place of spending the rest of this year and the next studying, why don't you suggest that the administration send a bill up here requiring all bottles to be green and all paper to be brown? What real problem is involved in it? If the administration sent it up here it would have a very good chance of passing.

Mr. DOMINICK. I think, Madam Chairman, that we would have to examine just what impact that would have on our total solid waste problem.

Chairman GRIFFITHS. It is not going to have any; it would really help you with the solid waste problem. The real trouble is going to be with Madison Avenue, I believe. It is going to be with the sellers and can you continue to give that much attention to those people? We are dealing with a very tough problem; and I don't want to be buried in waste. What is wrong with suggesting it?

Mr. DOMINICK. I assure you that none of us at this table want to be buried with waste.

Chairman GRIFFITHS. What is wrong with suggesting it? We have got a really good suggestion for you right here. These men agreed to it; and they are very knowledgeable, obviously.

Mr. DOMINICK. We will certainly be happy to look at that suggestion.

I would point out that that would only solve a very small part of the solid waste problem. We have to attack it at its roots.

Chairman GRIFFITHS. In the last few days another thing that has been made wonderfully clear is this freight rate situation. When is the administration going to attack this problem? This would be just marvelously helpful.

Mr. DOMINICK. Madam Chairman, the Council on Environmental Quality, as well as the Environmental Protection Agency has communicated quite frequently with the ICC on the freight rate problem.

Chairman GRIFFITHS. And what does the ICC say?

Mr. DOMINICK. We have not had much success in getting definitive action from them at this time. It is my understanding that they have this entire matter under review. We would certainly favor, in those instances where there are differential costs or differential charges being imposed on secondary material versus virgin material, and where those differential charges are not reflective of actual costs, that these inequities be eliminated. And we have so communicated that in the past and we will continue to do so in the future.

Chairman GRIFFITHS. When does the next vacancy come up on the ICC; do you know?

Mr. DOMINICK. I don't know.

Chairman GRIFFITHS. Why don't you suggest a scrap dealer for that job? I think that would be very helpful.

Maybe he would really push.

Mr. DOMINICK. Mr. Klaff, I am sure, would favor that proposal, as Executive Secretary of the present Commission. I think that is an excellent proposal.

Chairman GRIFFITHS. Mr. Padnos, what is the cost of garbage disposal in New York City?

Mr. PADNOS. In New York City today we spend about $32 a ton collecting garbage. And it actually went down last year, I like to think, because of new administrative techniques. It costs us $32 a ton to collect it and about $4 a ton to dispose of it, but that $4 a ton is somewhat deceptive. That is because——

Chairman GRIFFITHS. Do you get some recovery? Do you sell any of it?

Mr. PADNOS. Right now the extent of recovery is, as I mentioned, the newspaper program that we are operating. We also have for some time sold salvage rights at our disposal facilities, and people pay us various amounts of money, depending upon the site, for the right to come down there and take anything that looks worthwhile. That is mostly higher grades of steel and nonferrous metals. And that amount of money is not significant.

So, it is $4 a ton for disposal. But, in the new proposals that we are considering for after our landfills fill up, which is in the very foreseeable future, various companies are talking about an area of $10 to $15 a ton for disposal. So our costs of disposal are going to about triple.

Chairman GRIFFITHS. Some small towns use private contractors for garbage collection and disposal. And it is my understanding that in some towns this has been extremely effective, that the contractor has done a very good job and has recovered a goodly amount on the disposal. Is there any possibility for this being used in larger towns, even in New York City?

Mr. PADNOS. That particular question has been a matter of considerable discussion in New York City in the last 6 months. What has been stated is that the private contractors could handle refuse cheaper than the city could, and do it more effectively. We are studying that question right now.

Mr. DOMINICK. I might say, Mrs. Griffiths, that San Francisco does use a private collection and disposal system which is highly successful, both in terms of the efficiency of the operation and in terms of the cost, the cost to the citizens of San Francisco. The cost to the city is much less than many municipal operations.

Chairman GRIFFITHS. What is the cost per ton?

Mr. DOMINICK. I don't have that. We will supply that for the record.

(The following in formation was subsequently supplied for the record:)

The cost of collection and disposal of solid waste in San Francisco is $35.50 per ton: $29 per ton for collection, $4.50 per ton for transportation, and $2 per ton for disposal.

Chairman GRIFFITHS. He says it is $32 a ton in New York City and $4 for disposal. And I would assume that perhaps San Francisco has a smaller cost.

Mr. DOMINICK. It does have a considerably smaller cost than New York City.

Chairman GRIFFITHS. Do you have a pension system attached to garbage disposal people in New York City? Are they drawing pensions in New York City?

Mr. PADNOS. In addition to the $32 a ton there are considerable pension costs that are not included.

Chairman GRIFFITHS. Of course, that is a tremendous cost. How long do they have to work before they get that pension?

Mr. PADNOS. 20 years, I believe.

Chairman GRIFFITHS. So that you are probably paying for at least two-and-a-half people all the time.

Mr. PADNOS. Not only that, we have a new labor contract which should be signed shortly, as soon as the questions regarding wage settlements are settled. This will also raise our costs.

Chairman GRIFFITHS. Mr. Conable is saying to me that garbage men make more than school teachers today; is that correct?

Mr. PADNOS. Yes, to start. I think that is probably true.

Chairman GRIFFITHS. A key element in costs of recycled material as input to production is land use regulations, as Mr. Bower said. Has New York City or any other major metropolitan area tried to impose land use controls from a waste reuse standpoint? Do you know, Mr. Dominick?

Mr. DOMINICK. Yes; we are sponsoring with a number of States the establishment of regional systems for the management of solid wastes in a large enough area to make it efficient, to put in on a self-sustaining basis, and to insure that where we are going to go to recycling and reuse of materials, that there are sufficient materials involved and a sufficiently assured market. We feel that regionalization of solid waste management systems is a very important step for the immediate future. And your emphasis in technical assistance to the States would be in this direction.

Chairman GRIFFITHS. I understand that the GPO says that the reason they do not use recycled paper is that it is more expensive. Would the witnesses agree that recycled paper is more expensive?

Mr. PADNOS. As recorded in the prepared statement that I submitted about our experience in buying recycled paper, we bought some bond paper for use in typewriters, Xerox machines, and so forth, that was slightly more expensive than the lowest virgin paper bid we received. We received two sets of bids, six, I think, for virgin paper, and five bids for recycled paper. The lowest recycled paper bid was the second lowest bid received overall.

In other words, there was one virgin paper bid that was lower and five that were above it. Among those that were higher was the brand of paper that we had bought the year before.

The city of Buffalo used our specification for bond paper recently. The lowest bid that they received was for recycled paper.

Similarly, for corrubated boxes, we received a lower bid this year asking for recycled paper than we did last year when we didn't say

anything about recycling. This is not to say that the recycled paper necessarily sells at a lower price. Virgin and recycled papers have been competing for years in the marketplace without anybody saying anything about recycled paper one way or the other, and they have been selling at a comparable price all along. What might happen now is that in a very short-range situation, as demand for recycled paper is very strong, while the demand overall for paper is fairly weak, you might be able to get a discount for virgin paper.

The basic list prices, however, are comparable.

Mr. BOWER. May I respond, Madam Chairman, to both of these last two questions, briefly, the first one?

In terms of the technical production processes involved in using paper residuals, in contrast to the production processes for pulping round wood or chips from round wood, there is no question but that the basic costs are less for using paper residuals. You are already starting with a material that has been pulped, and you do not have to go through the basic operation of separating the lignin from the cellulose which is all that the pulping operation does. Processing paper residuals is not a very capital-intensive kind of operation, relatively. So that one of the things which is clear, which has happened in the last couple of years, with the interest in so-called recycled products, is that firms which have been using converting residuals since time immemorial, but not saying anything about it, have climbed on the bandwagon and advertised them as 100 percent recycled. In some cases they have increased the price and gotten it, because people think they are doing something great by buying these products, whereas they actually aren't changing anything at all.

Going back to your previous question, I would like to comment that to my knowledge, no one, no agency, regional planning agency, metropolitan area, council of government, or a State agency, responsible for environmental quality management and land use planning has looked in an integrated fashion at the two related problems of residual management in relation to land use, that is, specific patterns of economic activity, in the way that I was suggesting in my prepared statement.

Chairman. GRIFFITHS. Mr. Padnos.

Mr. PADNOS. I would just like to add something to my answer.

Regarding the relative costs of paper, one thing that I want to emphasize is that the whole thrust of Federal policy to date has been to make it cheaper to use virgin raw materials. This policy is exemplified in practices like building roads into a forest, or building a road up to a mine, when the only people that us it are the mining companies. All this in addition to the tax policy mentioned earlier.

Some people have said that there is a limited supply of high quality wastepaper around. But you look at your office buildings, and you see that maybe 80 percent of it is a high grade of waste. The problem is that it is mixed in with other kinds of contaminants. What the people fail to recognize is that the cellulose fiber in a tree is also surrounded by contaminants, the bark and the pitch.

What has happened is that the Federal Government, through organizations like the Forest Products Laboratory, spends a lot of money trying to figure out how to make it more profitable and cheaper to use

trees. If the same kind of money compared to this $4 billion a year that is being spent by the Federal Government on virgin natural resources would have been spent on questions like how to reclaim the reusable cellulose fiber from office buildings, I am sure that a technical solution could be found.

The whole program has been away from that direction.

Chairman GRIFFITHS. Into the natural resources of the country.

Mr. PADNOS. Exactly.

Chairman GRIFFITHS. In your statement, Mr. Dominick, you mentioned some millions of dollars of Government purchases; however, these are very trivial in view of the millions of dollars of Federal purchases. Shouldn't very drastic changes in purchasing be made?

Mr. DOMINICK. We feel that there are moves afoot here which are all to the good. We have reported favorably on the legislation which has been submitted by Senator Moss which would require the use of recycled paper for congressional paper, for the Congressional Record and other purposes. We feel that the Congress should move in this direction and we feel that the experience gained by the GSA procurement practices will indicate answers to some of the questions that you raised; namely, what is the availability of recycled material; what does it cost, and how fast and how far can we push in that direction?

Chairman GRIFFITHS. Mr. Conable.

Representative CONABLE. There seems to be an area of disagreement between Mr. Padnos and you, sir, about what the GSA is doing. I wonder if that could be explored a little. I am not sure how well-informed Mr. Padnos is, but maybe he would like to ask you a question about that.

Mr. PADNOS. What has happened, I think, is that defining these specifications is an evolving process. We write something down and it seems to be clear this is exactly what you want to do. It appears that the only way paper companies will be able to meet these definitions is in an environmentally helpful way. And then the specification goes out, and someone comes back with a question, and you discover that there could be this other interpretation of the requirement, one that doesn't do anything at all. It just changed the name of what the paper mills have been doing. Our policy is to be very strict as to what we include, as strict as possible. And we are trying to tighten up as we go along.

I think that the Federal GSA has been trying to do the same. The dollar amounts are somewhat misleading, at least as far as the present programs are concerned. To my knowledge there is only one specification for corrugated boxes which involve the use of actual postconsumer wastes. The present approach by GSA is to make two distinctions; one they call recycled in general, and one they call postconsumer wastes. As far as our program is concerned, the only thing that makes and difference is the use of postconsumer wastes, because the other stuff would be used anyway. To my knowledge GSA has only applied this definition to one product so far. But they have indicated a willingness to move in this direction.

Chairman GRIFFITHS. Why does the Census Bureau use insoluble inks on their forms?

Mr. PADNOS. Madam Chairman, I think that is an example that no one has ever really thought about before. We just don't think about

what happens when we throw things away. The whole economic process has not been geared to reuse at all. But I think that it may very well be that the people that print these forms, if shown the problem—which has only been recently identified, really—and told to evaluate all their standards with the environment in mind, I would hope that they would be willing to do it.

The American Paper Institute and the Technical Association of the Pulp and Paper Industry have done considerable work in identifying these contaminants which would make it very difficult to recycle, not just inks, but things like the plastic, the clear plastic part of an envelope. There is one way you can do it so that it is okay for recycling, but if you do it another way it contaminates the process.

And then there is the self-sealing glue, where you just press the envelope and it sticks. Those in many cases are contaminants. But, no one has really inquired about it before.

Chairman GRIFFITHS. Mr. Dominick, you and Mr. Klaff have heard about this. Why don't you get this started this afternoon? Wouldn't that be fairly simple?

Mr. DOMINICK. We will certainly look into that, Madam Chairman. We are conducting studies on the specific products, and we will be reporting to the Congress as required in the near future. But I think that if we run off in tangents on this little piece of the problem and that little piece of the problem we will have great difficulty in really solving the problem.

Chairman GRIFFITHS. No, I don't agree with you. I think the thing to do is to solve the problems that are soluble right now. Start with the smallest ones first. If you can take care of them, don't wait a moment.

I would think that you could get that insoluble ink off the Census forms without any trouble at all. I agree with Mr. Padnos, just bring it to their attention; explain to them: "This stuff is not recyclable; we can't use it if you do this; get rid of this," and that will take care of the problem.

Mr. PADNOS. Let me point out, Madam Chairman, I have a sample in my desk of pulp that has been made from Census forms. It is usable only for the lower grades. It could be used for much higher grades if it was deinkable. The problem is that the ink stays with it, so you can only use it for something like the back of the pad here.

Representative CONABLE. You have got almost 10 years to achieve this, Madam Chairman.

Chairman GRIFFITHS. But, still you can get them to start it.

Do you have any questions, Mr. Conable?

Representative CONABLE. I have one or two; yes.

Mr. Padnos and Mr. Bower—incidentally, Mr. Bower, I admired the discipline of your prepared statement. It was well put together.

Mr. BOWER. Thank you, sir.

Representative CONABLE. They were all interesting statements.

But let me ask you: Have you made an estimate if we stay in an economically feasible price level of how much of the virgin paper products used in this country could be recycled? What percentage are we talking about? Are we talking about possibly an upper level of 25 percent, or is it less than that?

I am aware of the fact that this country runs on paper, and that paper products are very widely spread, and that the economic feasibility of recollecting all the used paper is probably pretty slight. I think it is important to keep some perspective on this.

When we talk about the solution of the problem we are talking about actually a solution of only part of the problem. And as you go beyond the economically feasible level, I think probably the cost of our recycling goes up quite sharply, because there are certain things that can be recycled because of concentration of supply, and there are other things that can't because of their wide dispersion.

Do you have any comment about that? What kind of area of possible reuse are we talking about?

Mr. BOWER. You have hit upon a very fundamental point, which is one I didn't give in my oral presentation, but for which I attempted to lay the background in my prepared statement.

In point of fact there are, say, seven major categories of paper products which comprise about 75 percent of total paper products—newsprint, strength papers, linerboard, folding boxboard, corrugated medium, consumer products, and various kinds of printing papers. One can look at the inputs to each of these kinds of products and ask: what proportion of different kinds of paper residuals can be utilized to make each of these products with given specifications? And we have done that. We have analyzed what the technology is and what the physical limitations are. Then the next question which we are addressing is: to what extent are these paper residuals available at costs which would make it economically possible? In other words, what proportion of the total paper residuals generated can, in fact, be collected at costs which would not begin to approach the upper end of the curve?

For residuals like newsprint, it is reasonably clear that a substantially increased proportion of the used newsprint could be recycled say, from 20 percent as now—which may be high—to 40 to 50 percent, within reasonable costs. For used corrugated containers it would be something of the same kind of magnitude. For printing papers, such as computer printouts, bond paper and various other kinds of office papers, some substantial portion of these could, I think, quite clearly be obtained for recycling at minimal costs. What is involved is not so much a kind of a technological breakthrough, but some very simple kinds of changes in our institutional and incentive structures and in the design of buildings. For example: we have looked—and this may sound very mundane, we have looked at the design of apartment houses to see how they are arranged internally to inhibit or stimulate separation of newspapers and used corrugated containers to make it possible to recycle these at small costs.

Representative CONABLE. Mr. Padnos, what percentage of the total solid wastes going out of a city like New York are paper products? Would it be probably 40 percent?

Mr. PADNOS. I think it is probably higher than that. Various estimates run between 40 to 60 percent in New York City. Particularly in New York we have a very large percentage of paper; about 50 percent is the amount that we usually use, just based on the studies which have been conducted.

Representative CONABLE. You can very much extend the life of your landfills if you separate the paper products; can't you?

Mr. PADNOS. Clearly. It would be an incredible savings. The way I like to look at it—we just had a big incinerator that we decided not to build because it was incredibly expensive and had a lot of air pollution problems. That would have handled 6,000 tons a day. It would have cost us $200 million just to build and more than $10 a ton to operate at that 6,000 tons. There are probably at least 10,000 tons of paper in our garbage every day.

So you can see the level of savings that could be achieved.

Mr. BOWER. May I just comment: of that 50 percent or 45 to 50 percent—and in the Washington area, incidentally, the paper residuals amount to about 60 percent of the mixed solid residuals for obvious reasons. The Government is the industry, and the Government runs on paper. We don't produce anything else in Washington, D.C., even those outside the Government. Of that 50 percent one has to remember that some portion consists of containers which are mixed in with garbage, with metal containers, with grass cuttings and with various other kinds of nonpaper residuals. So that what we are talking about is the point which you make; namely, what portion of that 50 percent is what we might call "readily available"? And we are looking at that specific problem, incidentally.

Representative CONABLE. Both of you gentlemen raised the point: if we are going to any sort of a tax subsidy or anything else, we are going to be very careful about the extent to which we give subsidies that might be unnecessary in the area of production residuals. I am aware, for instance, of a major industry in my area that uses a lot of chemicals that have a river polluted badly. They have recently spent a very large amount of money in trying to install some kind of tertiary industrial waste treatment plant which has, in fact, cleaned up the river very substantially, but the major reason for them to do this was to try to reclaim chemicals that they have previously been putting out in the river. They have tried to close the cycle, in other words, this industrial cycle, and avoid the terrible waste of chemicals that were involved in polluting the river.

Now, how are we going to handle this as a matter of legislation without trying to peer into the motives of the industry involved? Certainly there has been a social benefit in their cleaning up the river. Their intention was at least partly to clean up the river. They are concerned about public relations also. But their intention was also to substantially reclaim chemicals previously lost.

Perhaps there is some way of establishing a net value of their right to pollute, if you assume they have a right to pollute, and maybe there is some way of dealing with them that way.

Do you have any comments about this problem?

Mr. BOWER. Yes; I do, perhaps at the risk of saying something which a number of us in our organization have said before. But the first principle is straightforward; namely, to make sure that the activity, whether it is a household or an industry generating the residuals, is made to pay the costs of that assimilative capacity which it is using. One of the ways in which this can be done is to levy an effluent charge on that industry.

Representative CONABLE. The so-called license to pollute.

Mr. BOWER. This is what the industry has called it; that is correct. Another way of looking at it is that it is a price on the factor input

into production, a factor input which is a collective good and which belongs to all of us, and which they have been using in the past at zero cost, and consequently have been using more of than they should have because of externalities.

Representative CONABLE. They would become part of the problem-resolving process as well as part of the problem.

Mr. BOWER. Right. What happens when this is done—and we have a history of this having been done at the metropolitan level with the industrial sewer surcharge—you have them in your own State. There are a number of them in Michigan and in fact there are hundreds all around the country. What, in fact, happens is that it pushes management into regrouping the combination of factor inputs to use less of the assistative capacity than it would otherwise do.

When an effluent charge has been imposed, it has been found in some significant number of instances that the particular operation has been far off the lowest cost point of production. They had been throwing chemicals away; they had been throwing oil away; they had been throwing potatoes away in a potato chip process, and so on. I would respectfully suggest that this is one of the best tools for getting at several kinds of problems at once. And we can compute how much of the cost imposed upon the firm is regained in materials recovered. It may be 100 percent of the cost; 75 percent; or in fact he may make money.

Representative CONABLE. Then perhaps we shouldn't be terribly sensitive about a possible windfall to the industry if the net result is a considerable improvement to the environment.

Mr. BOWER. Absolutely. In fact, if we leave it all in the market system by providing this kind of stimulus to make management respond to get on the most economic cost curve; that is, minimum use of total resources, all society would be better off.

Representative CONABLE. That is all, Madam Chairman. Thank you.

Chairman GRIFFITHS. I would like to thank all of you here. I think it has been a very interesting and instructive hearing. Without too much trouble I believe we can get the ink off of those census forms; and we can make all paper brown and all bottles green. Mr. Conable and I will figure out a tax solution.

Without objection, the following statements are included in the record of our hearings on the recycling of waste materials. These statements were submitted as a result of an invitation included in the press release announcing the hearings of November 8 and 9.

(The statements follow:)

BOSTON ENVIRONMENT INC.,
Boston, Mass., November 12, 1971.

JAMES W. KNOWLES,
Director of Research, Joint Economic Committee,
Congress of the United States, Washington, D.C.

DEAR SIR: Boston Environment is an information center and clearing house: we are non-profit and tax exempt. Our opinions are based upon our research and experience with a wide range of groups, towns and salvage dealers over the last year and a half.

During that time we have witnessed the establishment of over 40 sites for the collection of glass, metal and cans in Eastern Massachusetts. These have been set up by towns, cities and private groups. In addition, 30 bottling companies have agreed to collect glass containers for recycling. Three can companies have established centers for all types of cans (local salvage dealers do not handle steel

and bi-metal cans). All of these sites are in addition to the long established paper, metal and textile dealers in our area.

We have seen one main trend in the various recycling programs and that has been a trend away from volunteer sponsored recycling operations to town sponsored recycling programs. The reason for this is that volunteers have shown that responsible, large scale recycling programs are possible and serve not only to educate the public but to collect a significant amount of recyclable materials. They have shown the local officials that recycling centers do not have to be a sea of paper bags and blowing papers, but rather a group of large metal dumpsters.

Responding to this, several Eastern Massachusetts town officials have seen fit to begin to integrate the recycling operations into their solid waste program, or to initiate recycling themselves. For the most part, the motives for this trend towards municipal programs are clear. Officials realize that recycling can save landfill space and the decreasing availability of suitable land makes this extremely critical. In fact, most officials are not nearly as concerned with saving resources as they are with conserving landfill space.

At this time it is difficult to say exactly how much space is being saved, or to say how long the landfill's life will be extended. In hopes of defining this, BEI has been studying the newspaper programs of 15 towns in great detail; and more recently, the glass and can programs. I would like to submit our Third Evaluation of the Town Newspaper Depot System which sites yearly statistics for participation in the newspaper programs. As you can see, the rate of recycling has risen steadily from 15% to 22% over the last year and shows no sign of leveling off. In fact, Mr. Milton Shaffer, the waste paper dealer who services these towns, tells us that over 250 tons were collected during October 1971—the greatest monthly collection to date.

As for cans, we have calculated that Wellesley has recycled an average of 13.6% of its cans, Concord 11.1%, Needham 7.0% and Lexington 6.7% during the months of June, July and August 1971. These figures are based on weighing data from American Can, the rate of can consumption and the weight of an average can.

With data from Glass Container Corporation, we have determined that the weight of glass brought to this plant (located in Dayville, Conn.) from Massachusetts from August 1970 to August 1971 is equivalent to one entire year's glass container consumption for 14,000 people.

These figures show that even with the economics of recycling as they are now, some towns find it profitable or at least break-even to incorporate recycling into their solid waste system. I am certain that more towns would be able to follow this lead if there existed a stronger market for all secondary materials and thus further alleviating our solid waste burden.

A different aspect of recycling involves the mills and salvage dealers themselves. Our experience has been that many greater Boston salvage dealers are threatened with extinction because of their 'undesirable' nature. In fact, the city of Chelsea, the location of many large and small dealers, will be 'urban renewed', forcing the dealers to relocate or go out of business entirely. Apparently one of the stipulations for the Federal renewal funds is that no salvage dealers remain in the area. This discrimination on the Federal level, in addition to deteriorating markets for secondary materials is unfortunate at a time when the solid waste situation in the Boston area is worsening . . . and the resources of the country are being ravaged.

The local salvage dealers are not the only group that is feeling the discrimination against secondary materials. A representative of one local mill that utilizes the lower grades of waste paper has told us that they were forced to discontinue making recycled corrugated liners due to competition from virgin mills. This mill's production of recycled corrugated medium has been drastically reduced, although not eliminated entirely. Again, it is an unfortunate situation in view of the tremendous amounts of low grade waste paper in our solid waste stream. Somehow this clear trend away from secondary fiber utilization must be reversed. I hope that the Subcommittee on Fiscal Policy will consider the above examples of increasing town involvement with recycling yet at the same time, a decreasing market for secondary materials and will develop guidelines to reverse the latter.

The resources of BEI are available at any time as you review the economics of recycling.

Sincerely,

(Mrs.) Nancy Bellows,
The Recycle Group,
Boston Environment, Inc.

Evaluation of the Town Newspaper Depot System

(Third Evaluation)

One year after the beginning of operation of the first town newspaper depots (August 1970), we at BEI are again reporting on the results of this interesting recycling activity, apparently a phenomenon unique in many respects to Massachusetts. Four three-month periods are defined and comparisons are made between towns and between performance in the four periods. Fourteen towns come under the "Shaffer System" and Andover (in cooperation with Essex Waste Paper Co.) and Framingham (using a different container system) are also encompassed by this study.

By way of explanation of the Shaffer system: specially constructed metal containers which hold up to 10 tons of newspaper are located at the town landfill (in most cases), so that residents may drop off newspapers and magazines separately from other refuse when they make their regular trips to the dump. The town DPW or other sponsoring group calls Shaffer when the container is almost full, and he hauls the paper off for recycling, leaving an empty container so that there is no interruption in use. Our data are based on Shaffer's records for the weight of incoming loads.

The results of our analysis will be presented in three ways:

(1) A Table showing tons per month; tons per month per thousand residents; percentage recycling rate; and other relevant data for each town in Period IV, the June–August period.

(2) A graph plotting tons/mo. per 1,000 capita for all four periods (August 1970 to August 1971) for each town.

(3) A Histogram plotting recycling rate for Period IV.

In order to calculate these results, we have used:

(1) Weighing data from Mr. Shaffer

(2) 1970 census figures for the towns included

(3) Circulation data for all daily newspapers in the area, excluding the Christian Science Monitor, which has no town-by-town circulation breakdown.

The circulation data have been treated more carefully in the present Evaluation, and for the first time we believe that the *percentage recycling rate* results have accuracy comparable with the *tons per month per* 1000 *capita* figures. It is still a matter of personal choice which type of measurement is the most meaningful. Daily newspaper issues have been weighed to determine the average issue weight (averaged over intervals of 2 days to 2 weeks for large circulation papers). Although the new tons-per-month circulation data do not cause a great change in the recycling rate results, the recycling rate figures have nevertheless been recomputed for use in the GRAPH.

We wish to thank Mr. Milton Shaffer and Mr. Bill Weener of P. Shaffer Co. and Mr. Tom Cone in Andover for making the detailed data available. Mr. Cone in turn gratefully acknowledges the cooperation of Essex Waste Paper Co.

The periods to which the results presented in this Evaluation refer are as follows:

I. August 18, 1970 to November 2, 1970—2½ months.
II. November 3, 1970 to February 22, 1971—3½ months.
III. February 23, 1971 to May 30, 1971—3⅓ months.
IV. June 1, 1971 to August 31, 1971—3 months.

Framingham is not included in any figures that represent averages, since our data from Framingham are only approximate.

Discussion of Results and Other Observations

Recycling constantly rising

The Graph shows explicitly how the performance of each town has developed from period to period. Setting the tone is the trend of the mean tons/month/1000 capita (i.e. weighted and averaged over all towns); this has risen in each period and shows no sign of leveling off.

Specific trends

The trends for individual towns contain a good deal of variety. Where there have been dips we are not aware of an explanation, except where the dip occurred in the winter period. But the recent large rises recorded for Wayland, Action, and Westwood (and the more sustained increase exhibited by Concord) must certainly have something to do with the addition of glass and metal recycling to the area at the dump in those towns over the summer. One would expect enhanced visibility for recycling as a whole and thus greater participation in the separation of newspaper. Andover started from the outset with a very aggressive program and has sustained that high yield.

Another type of recycling rate measure

The Histogram depicts the performance of the towns in Period IV in terms of recycling rate (% of circulation recycled). Also shown on this plot are the rates corrected to apply only to that fraction of the town's population which feeds directly to the landfill without a rubbish contractor as an intermediary. To be more explicit—we assume that newspaper will not be separated by contractors, thus families using such a service should perhaps be excluded from the analysis. When the recycling rate is figured in this way a higher figure is obtained.

When the rate is figured as described, Lexington and Billerica are seen to have a more impressive participation than the unadjusted rate would indicate. In fact Billerica leads all towns in adjusted recycling rate.

Limited accuracy and inclusiveness

Direct-dump-usage data were not readily available for all towns. The calculation requires car count data (at the landfill gate) and dwelling unit figures. The resulting adjusted recycling rate figures are to be considered accurate within barely a 10% range on either side. They represent another meaningful measure of performance but not really a preferred measure.

Growth in recycling rate

The (unadjusted) recycling rate has risen steadily over the four periods:

	Percent
I	15.4
II	16.6
III	19.3
IV	22.2

There is no contradiction to the previously reported "winter slump" indicated by the Period II Evaluation; Andover was not included in the previous average. When Andover is included, the slump is liquidated! The recalculation of circulation figures creates minor corrections in previously reported rates.

The rear-stacking problem

We feel that one way to increase the efficiency of the newspaper collection is to stack the papers all the way to the top of the container *in the rear* before beginning stacks in front. This way, the container would be picked up less frequently and would hold up to 10 tons, the capacity of the container.

KEY TO "TYPE OF PROGRAM"

(last column of table)

Location

Location: D—Town Dump; T—Town Hall; P—Shopping Plaza

Dealer: S—P. Shaffer Co.; E—Essex Waste Paper Co.; M—M&H Metal Co.

Sponsorship:

1.—Run by Shaffer

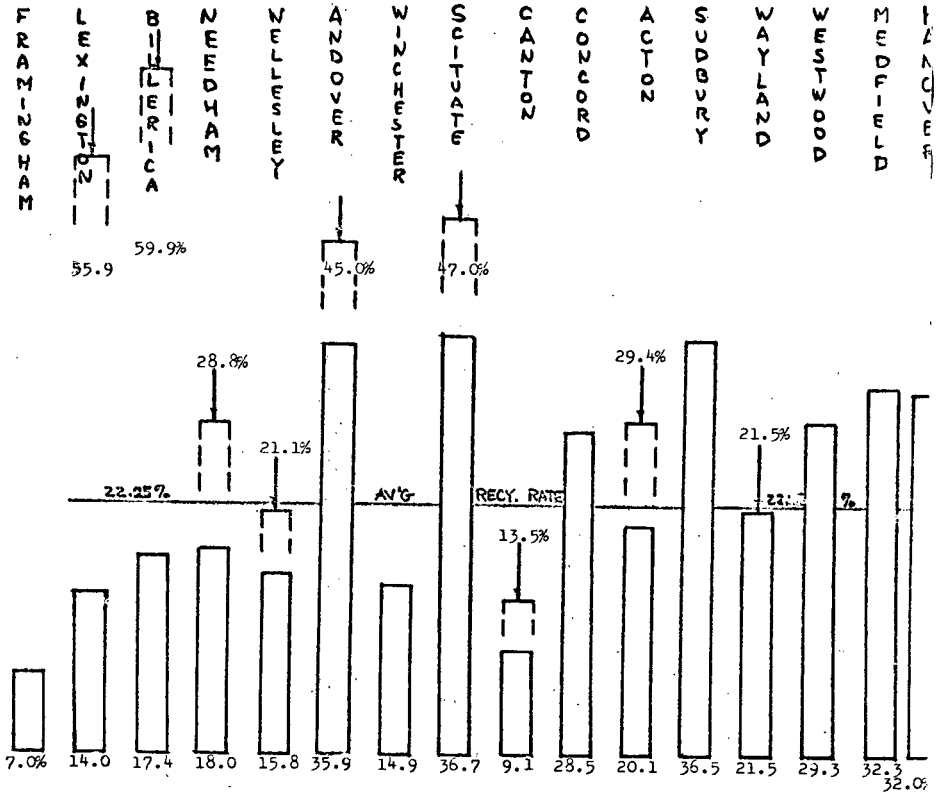
2.—Run by Town DPW

3.—Run cooperatively by DPW and local citizens' group; both contribute resources

4.—Run by local citizens' group; town may provide but not donate some resources

HISTOGRAM

NEWSPAPER RECYCLING RATE: PERCENTAGE OF THE CIRCULATION OF DAILY NEWSPAPERS IN SIXTEEN TOWNS WHICH IS RECYCLED THROUGH THE DEPOT. PERIOD IV



This graph shows the performance of the sixteen towns during the three-month period (Period IV) June-July-August 1971, by relating the number of tons salvaged in a month to the circulation of daily newspapers in the town. The towns are arranged in order of decreasing population.

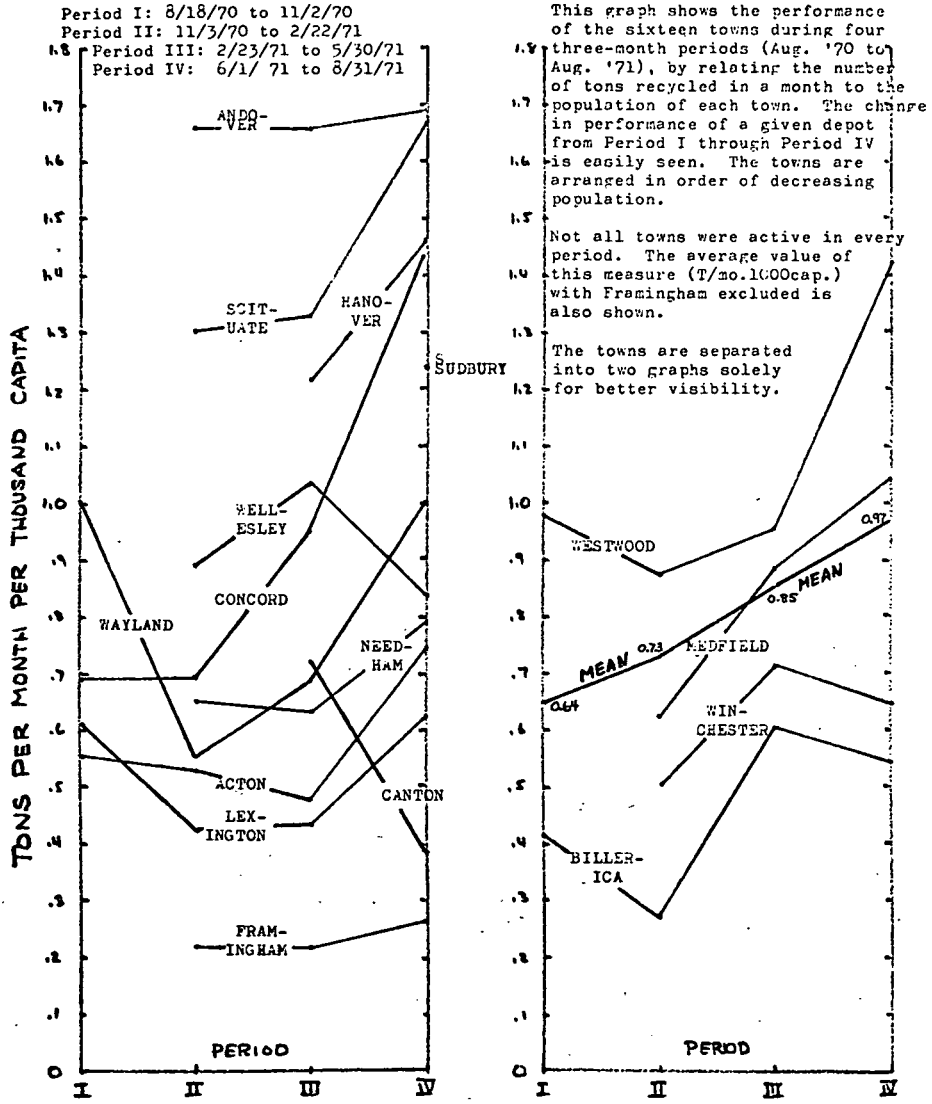
The histogram composed of dashed lines and topped with an arrow indicates the recycling rates calculated when accounting for the number of residents who customarily go themselves to the dump; e.g. if 50% of families in town go directly to dump (no contractor), then the recycling rate becomes twice that based on all residents. Data are based mainly on car counts, compared to number of dwelling units, and are not available for all towns.

Scale: 1" (on original copy) equals 10% rate.

The average recycling rate (Framingham excluded) is 22.1 %.

GRAPH

NEWSPAPER RECYCLED THROUGH TOWN SALVAGE DEPOTS IN TONS PER MONTH PER THOUSAND CAPITA. PERIODS I, II, III, AND IV



Town	Tons salvaged in per. IV (3 months)	Tons per month	Approximate population (1970)	Tons per month per thousand	Circulation (in tons per month)	Recycling rate (percent)	Percent using dump	Modified recycling rate (percent)	Type of program
Framingham		ca. 17.0	64,000	0.265	243.0	7.0			PM4
Lexington	60.3	20.1	32,000	.63	143.8	14.0	25	55.9	DS2
Billerica	52.2	17.4	32,000	.54	100.2	17.4	29	59.9	DS1
Needham	71.7	23.9	30,000	.80	132.9	18.0	63	28.8	DS2
Wellesley	70.5	23.5	28,000	.84	148.7	15.8	75	21.1	DS3
Andover	119.3	39.8	23,500	1.69	110.7	35.9	80	44.9	DE4
Winchester	43.0	14.3	22,000	.65	96.2	14.9			DS2
Scituate	85.1	28.4	17,000	1.67	77.5	36.7	78	47.0	DS4
Canton	19.3	6.42	17,000	.378	70.2	9.1	68	13.5	DS2
Concord	69.7	23.3	16,000	1.45	81.5	28.5			DS3
Acton	33.8	11.3	15,000	.75	56.0	20.1	69	29.4	DS3
Sudbury	50.2	16.8	13,500	1.24	45.9	36.5			DS4
Wayland	39.4	13.2	13,000	1.01	61.2	21.5	100	21.5	DS2
Westwood	55.6	18.5	13,000	1.42	63.1	29.3			DS4
Medfield	31.4	10.5	10,000	1.05	32.4	32.2			DS2
Hanover	43.9	14.7	10,000	1.47	45.8	32.0			DS2
Total	[1] 845.1	281.7	[1] 292,000	[2] .965	1,266.1	[2] 22.25			

[1] Excludes Fram.
[2] Mean.

BOSTON ENVIRONMENT INC.,
Boston, Mass., November 10, 1971.

MR. JAMES W. KNOWLES,
Director of Research, Joint Economic Committee, U.S. Congress, Washington, D.C.

DEAR MR. KNOWLES: In response to your call for statements from interested parties pertaining to the Economics of Recycling of Waste Materials, a subject under study by the Subcommittee on Fiscal Policy, I wish to add my thoughts to the record. These are to be considered in support of the more general statement filed by Mrs. Nancy Bellows of BEI, which represents the official contribution from our group. Since we are a tax-exempt agency we wish to have our opinions entered as testimony rather than as solicitation.

Several fiscal measures have been mentioned in connection with the creation of incentives for increased recycling of resources, among them faster tax writeoffs for amortization of facilities, extension of depletion allowances to waste materials, transportation rate adjustments, grants to towns, groups, companies to develop recycling activity, etc. I think that all of these possibilities should be considered with the following points or reservations in mind:

(1) In some areas of recycling the existence of the salvage dealer has been a great boon (for instance the paper dealer has survived where the cullet dealer has not). Any help to towns or other groups initiating recycling should be aimed in general toward utilizing (i.e. going through) the salvage dealer, where he exists, rather than bypassing him. This I believe will furnish the greatest permanence to an increased recycling activity.

(2) Extension of depletion allowances should be handled very carefully, for the reason that one should avoid letting the virgin/secondary balance in resource exploitation be redefined in terms of who can capture the largest depletion rate.

(3) The issue of transportation rates—as to whether virgin materials enjoy widespread advantages—is to the best of my knowledge an unresolved point. It would be of great value to have a careful study made on rates.

(4) The tax writeoff approach has certain points in its favor, in addition to the fact that it is often a method favored by industry over other possible measures. In certain parts of the country (e.g. New England) paper mills tend to be older and are those which are being taken out of service under the pressure of generally less favorable economics. It is desirable that paper mills be dispersed throughout the country. An incentive which allows new mills to be designed and built to replace the obsolete mills, with full facilities for use of secondary fiber, deinking processes, etc., as well as proper effluent control, is worthy of support in my opinion. Such a fiscal approach could be relatively temporary and would contribute to increased recycling, at least regionally, through normal corporate decision-making procedures.

I also wish to add my support for the idea of assisting cities and towns in incorporating recycling into their municipal functions. An involvement of towns in recycling as an important aspect of their solid waste duties is another way of lending permanence to the trend toward more efficient use of resources. How to provide funds to towns for this purpose is probably a complex question and outside my competence for contributing specific suggestions; I believe it warrants further consideration.

With respect to the testimony to be delivered by Messrs. Kretchmer and Padnos of New York City EPA, I would wish that your committee attach due weight to their statements; I have great respect for their competence.

Thank you very much for affording BEI the opportunity to submit statements to be considered by your committee.

Yours very truly,

JOHN R. GOFF,
The Recycle Group,
Boston Environment, Inc.

STATEMENT OF J. J. WUERTHNER, JR., VICE PRESIDENT-PUBLIC AFFAIRS, GLASS CONTAINER MANUFACTURERS INSTITUTE, INC.

My name is J. J. Wuerthner, Jr. and I am Vice President-Public Affairs, of the Glass Container Manufacturers Institute, an association representing more than 90% of this country's glass container and closure manufacturing capacity.

We applaud the intent of this Subcommittee in exploring the means of reclaiming valuable materials from solid waste and conserving this country's natural resources. We in the glass container industry are convinced that the only viable long-range solution to the solid waste management problem is separation, salvage, and recycling. It is in this connection that I should like briefly to examine with you the work of the glass container industry and GCMI looking to the recovery and recycling of our products.

Some 20 months ago, in the spring of 1970, GCMI started a test pilot bottle reclamation and recycling program in the greater Los Angeles area. We offered to pay a half-cent a bottle or a penny a pound, which is $20 a ton for all used glass containers brought to reclamation centers at the plants of the 8 glass companies operating in the Los Angeles region by citizens and public service organizations. In the first week some 30,000 containers were reclaimed. The volume was soon up to one million a week and is now averaging about two million a week at the eight Los Angeles plants.

The success of the test program was so immediate that two months later in June of 1970 we extended the program to virtually every bottle-making plant in America. Today, reclamation centers are operating at more than 90 glass bottle factories in 25 states. Approximately 565 million bottles and jars have been recovered and recycled. Glass container manufacturers have paid almost $3 million for this glass.

While the reclaimed bottles represent only a small percentage of the industry's annual production. I want to emphasize that this is no one-shot public relations stunt. The bottle reclamation program is a serious first step effort looking to the day when it will be possible to mechanically separate all re-usable components of solid waste at municipal or regional collection centers for recycling into primary and secondary products.

Our bottle reclamation program has several fundamental objectives:

1. To accumulate meaningful volumes of waste glass to develope techniques for recycling large volumes of used containers back into the bottle-making process.
2. To provide a source of waste container glass for secondary products re-use exploration, such as road-building and home construction materials.
3. To help educate the public on the need for and feasibility of recycling waste glass and the other components of solid waste.
4. Finally, to make an immediate—even if a small dent—in the nation's solid waste and litter accumulations.

I am pleased to report that we have made real progress toward these objectives. The glass container industry traditionally has used small amounts of crushed glass, called cullet in the trade, in its furnaces. The cullet facilitates the melting of the virgin raw materials—sand, limestone and soda ash. We have now demonstrated, however, that salvaged glass, properly cleaned and processed,

can provide from one-third to one-half of the raw material mix. This opens a potential market for some 5 million or more tons of reclaimed container glass a year at current production rates.

Such large-scale re-use of container glass would result in meaningful conservation of natural resources, despite the fact that glass is made of the most abundant raw materials on earth.

The chief drawbacks on the use of reclaimed glass as cullet are: that it must be free of foreign matter; it must be sorted by color; and it cannot be economically transported for great distances from its source to glass container plants. For these reasons, the glass container industry is sponsoring a major research effort toward developing secondary products made from salvaged glass in areas remote from glass plants, as well as uses for sub-standard cullet which cannot go back into the bottle-making process.

We have worked closely, for example, with the U.S. Bureau of Mines on the development of bricks and building blocks made with glass salvaged from incinerator residue. We have contracted with Tekology, Inc., in New Jersey, to make bricks—know as Tekbricks—with salvaged glass and resins. Through another GCMI-financed contract, the Colorado School of Mines Research Institute is developing construction panels using very high percentages of salvaged container glass. We are supporting a test project at the University of California, Los Angeles, to make various building materials from salvaged glass and cow manure.

Indeed, building materials promise a very large outlet for reclaimed glass. The products that now seem feasible in addition to those just named, include glass wool insulation, terrazzo flooring, shingles, siding and land tile.

Another large potential use for salvaged container glass is in new road building material known as glasphalt. This is asphalt in which crushed glass serves as aggregate instead of crushed stone. Glasphalt was developed at the University of Missouri at Rolla, with the aid of a federal grant. GCMI has more recently funded further research to determine what amount of impurities can be tolerated in the crushed glass aggregate without impairing the durability of the glasphalt.

A dozen or more experimental strips, streets and roads of glasphalt have been laid in public and private areas in the U.S. and Canada. Reports indicate that the new paving is performing well through all kinds of weather and traffic loads.

Glasphalt alone offers a potential market for salvaged glass far exceeding the availability of low-cost waste glass from solid waste and litter now or in the foreseeable future.

We feel that it is particularly important that the salvaged glass provides positive benefits in many of these secondary products that cannot be achieved with traditional raw materials.

As part of our secondary products research, we recently contracted with Midwest Research Institute to study the economics of producing various secondary products using reclaimed glass under competitive market conditions. The object of this research is to produce knowledge that will be helpful to both government and industry in determining the most suitable uses for salvaged glass in the light of specific local circumstances.

We believe this study will turn up some highly useful information that might make a significant contribution to the economic aspects of waste recycling systems. We will be pleased, Madame Chairman, to make the results of this study available to your Committee when completed.

I might add in this connection that we also are seeking the approval of the Interstate Commerce Commission, through an action known as Ex Parte MC–85, to establish the authority to transport waste glass and other materials by truck in interstate commerce at reasonable rates.

The development of potential primary and secondary markets for salvaged container glass at this time has outstripped the availability of the material. The full realization of these markets, indeed, awaits the development of the mechanical means of economically separating the components of solid waste in large volume. Consistent with our conviction that the solution of the solid waste problem lies in large volume mechanical separation together with development of markets for the salvaged materials, we are working extensively with other companies and groups on the development of various technologies for separating glass from the refuse stream and then processing it for recycling into primary and secondary products.

We do not believe that the answer to this challenge lies in any one system. Local circumstances call for specialized solutions. For this reason, we are working in several directions. For example, we have conducted research with Stanford Research Institute of California on an air classification system of solid waste separation. Members of our industry are working on a so-called dense media system in which the components of waste are separated in a liquid media on the basis of their specific gravity.

Nor have we discarded the concept of home separation of certain elements of waste, such as paper, glass and metal. Separation of solid waste at the source is practiced in some communities today. Others are looking in that direction. It may provide a useful interim solution leading to the development of more sophisticated separation and recycling concepts.

Finally, we are seeking to perfect the techniques for sorting salvaged glass by color so it can be recycled back into glass furnaces. To this end, we are working with the U.S. Bureau of Mines on a high intensity magnetic system and with the Sortex Corporation of America, in Michigan on an optical sorting system. Both show real promise.

Indeed, all these separation systems are producing highly promising results in the laboratory and we are now moving on to the field testing stage.

You will be interested to know that some 10 tons of amber glass separated by magnetic techniques at the U.S. Bureau of Mines laboratory in Maryland is about to be shipped for a trial run in a glass container furnace.

On a more ambitious scale, we are now installing a glass subsystem at the nation's first total waste recovery facility that was opened this summer at Franklin, Ohio. The Franklin facility uses a Hydrasposal system developed by The Black Clawson Company for the separation of paper fibers from the solid waste stream. It produces a glass-rich by-product that also includes metals, ceramics, rocks and other waste matter. The GCMI glass subsystem, which should be in operation by mid-1972, will use the various waste separation techniques I have described, including the Sortex system, to separate the glass and process it for re-use in bottle-making and the production of various secondary products. The other useful components of the glass-rich mixture also will be processed for market.

Meanwhile, we are seeking opportunities to participate in additional pilot demonstration projects to test out other approaches to the mechanical separation of solid waste, as well as the utilization of the glass in various secondary products.

This, Madame Chairman, gives a quick review of the work of the glass container industry designed to help solve this nation's solid waste problems.

These and similar programs are described in more detail in the attached reprint of a paper, "SEPARATION OF GLASS FROM MUNICIPAL REFUSE," given at the Solid Waste Resource Conference, Battelle Memorial Institute, May 13, 1971, by Dr. Robert J. Ryder of Brockway Glass Company, Inc. and John H. Abrahams, Jr., of GCMI. We are also attaching a policy statement of the glass container industry in the solid waste management and litter control fields.

Thank you for your attention and I will be pleased to respond to your questions.

SEPARATION OF GLASS FROM MUNICIPAL REFUSE

by
Robert J. Ryder
Brockway Glass Company, Inc., Brockway, Pennsylvania
and
John H. Abrahams, Jr.
Glass Container Manufacturers Institute, Inc., Washington, D. C.

ABSTRACT

The glass container industry approaches the solid waste problem with the conviction that the only viable, long-range solution is the salvage and recycling of most components of refuse.

Research conducted by glass container manufacturers and their trade association, the Glass Container Manufacturers Institute, Inc., indicates that there are more potential uses for salvaged container glass than there is glass available from the solid waste stream now or in the foreseeable future.

Three broad avenues of research are being followed by the industry. It's aims are:

1. *To develop sound commercial uses for large volumes of salvaged glass containers, such as in the manufacture of new bottles and various secondary products.*
2. *To develop systems and techniques for automatically separating the components of refuse so that they may be reclaimed and recycled by industry.*
3. *To pinpoint and resolve whatever problems, if any, glass containers may create in current methods of waste collection and disposal.*

A number of solid waste management systems are in various stages of development by private industry. One such development, which will soon be given a full-scale demonstration project in Franklin, Ohio, is a unique wet system capable of crushing and separating paper pulp, metals and glass from other refuse materials. A glass subsystem, designed under GCMI sponsorship, will be installed to further clean, refine and color sort the waste glass for recycling in glass manufacturing furnaces.

Continued research in developing effective waste separation systems, the glass container industry believes, is essential. If the components of refuse can someday be economically separated, recycled and marketed by industry, pollution from solid waste will be reduced significantly.

INTRODUCTION

Environmental pollution—and its control—has been a concern of the glass container industry for many years. As long ago as 1953, before the problems of litter and solid waste generally were recognized as threats to the quality of life in our environment, the Glass Container Manufacturers Institute and its member companies were instrumental in the founding of Keep America Beautiful, Inc., the national litter prevention organization. Since that time, the glass container industry has continued to furnish significant financial and service support to KAB for its various education and litter law enforcement programs. Four years ago GCMI broadened its environment-oriented activities by establishing an Environmental Pollution Control Program in order to seek solutions to problems related to solid waste management and air and water pollution. We believe we were one of the first industries in America to organize programs of solid waste management and litter prevention on an industry-wide basis.

This presentation, however, will deal only with the role of glass containers in solid waste and the pertinent programs and research currently being sponsored by the glass container industry. Recent studies show that glass constitutes an average of about six and one-half per cent by weight of municipal solid waste. Of this, about five per cent comes from container glass. In fact, according to a study by the Midwest Research Institute, all packaging accounts for only about 13 per cent of total municipal (residential and commercial) and industrial waste. Thus, glass is a relatively minor factor in solid waste.

It cannot, however, be ignored. Under our present mode and standard of living we find that consumer requirements have created a substantial market for convenience packaging of all types, including non-returnable glass containers for soft drinks and malt beverages. Public demand for one-way beverage containers continues, yet half of the glass containers found in waste disposal systems today are not soft drink or beer bottles. They are baby food jars, peanut butter jars, jam and jelly glasses, ketchup and salad dressing bottles, cosmetic and toiletry containers and the like. These glass packages are now and have always been one-way, no-return convenience items.

It seems apparent, therefore, that convenience packaging has a very real place in our society. Although there is a tenddency to over-emphasize the role played by glass containers in solid waste, the glass container industry is working to reduce or eliminate such problems as may exist. It is important to understand that ultimately a discarded glass container can meet only one of three possible fates:

1. It can be recycled and made into a new package.
2. It can be used as part of the raw materials needed to manufacture secondary products.
3. It can be buried in a sanitary landfill, or disposed of by some other acceptable means.

These alternatives have been stated in their obvious order of preference. In terms of reclamation and resource conservation, recycling is certainly the most desirable method. However, in an area where there is no glass container manufacturing facility available to accept waste glass, the second

choice must be considered. Finally, where the use of waste glass as cullet or as a component in secondary products is not feasible, the third method of disposal becomes the only practical option.

The thrust of GCMI's efforts, therefore, has been in these same three areas:

1. The reclamation and recycling of used bottles and jars.
2. The development of secondary products made from waste container glass.
3. The improvement and modernization of collection and disposal systems.

SEPARATION AND RECYCLING

Recent studies have shown that there are potential uses for every bit of waste container glass available in the country now or in the foreseeable future. As a first step in the direction of total salvage and reuse of waste container glass, the nation's glass container manufacturers are conducting an industry-wide reclamation and recycling program.

Today GCMI member companies are operating a network of nearly 100 bottle reclamation centers in some 25 states. Since the program was inaugurated on an industry-wide basis on June 30, 1970, many tons of glass containers have been salvaged from solid waste and litter. These salvaged bottles, now being reclaimed at a rate of close to one-half billion a year, are being recycled back into the bottle-making process.

Reports by member companies indicated that crushed waste glass, called cullet, can provide 30 per cent or more of the industry's raw material requirements. Our bottle reclamation program is able to supply only a small portion of this amount. Therefore, in order to obtain salvaged glass in greater quantities, GCMI is cooperating with various research organizations and federal, state and local government agencies to develop efficient, low-cost, highly automated systems for separating the components of raw refuse.

One example is at Stanford Research Institute, where GCMI and the U. S. Environmental Protection Agency sponsored investigation of a process known as the Zig-Zag Air Classification System which utilizes forced air currents to separate refuse materials into its components. To date a major separation of paper and plastics from heavier matter has been achieved. Samples containing between 75 per cent and 90 per cent glass have been obtained readily from the heavier fractions. Further separation, however, becomes more difficult because of the similarity of densities of materials in the heavier fractions. More work is needed to test the efficiency of separating waste glass from metals, but the outlook for this research appears promising.

The industry is working also with various organizations to further refine glass from these preliminary processes for recycling in glass furnaces. To this end GCMI is supporting studies at the Sortex Company at Lowell, Michigan, to optimize the means of optically sorting the glass that has been reclaimed from solid waste into its various colors. On a pilot basis this research is producing color-sorted glass of a quality that can be recycled by our industry. When perfected, it will enable glass container manufacturers to consume large tonnages of salvaged glass.

Further, we have been following and working closely with the U. S. Bureau of Mines on its development of a process utilizing standard ore dressing methods to separate usable materials from incinerator residue and high-intensity magnetic forces to sort glass by color. The Bureau estimates that after the salvage of metals the separation of clear or flint glass costs only an additional 77 cents a ton, using figures for its 250 tons-a-day plant. From a practical standpoint, the potential benefits are enormous. Sorted by color and refined, glass from incinerator residue could be used as cullet to make new bottles or used in secondary products.

Also, a number of solid waste management systems are presently in various stages of development by private industry. Some, in fact, need only the opportunity of a full-scale demonstration in a typical community to prove their worth. One such development, which will be discussed in more detail later in this presentation, is a unique wet system capable of crushing and separating paper pulp, metals and glass from other materials at a reported cost of approximately $3.60 per ton of raw refuse alfter allowing for pulp and ferrous metals salvage. This includes operating costs and amortization in a plant designed to handle 500 tons of waste a day. This system is being constructed at Franklin, Ohio, by the Black Clawson Company with the assistance of a demonstration grant from the Solid Waste Management Office of the U. S. Environmental Protection Agency.

SECONDARY MATERIALS

We define secondary materials as those products other than new glass containers that are made from waste glass. GCMI's research on secondary materials has been directed largely toward determining those products which can incorporate waste container glass which is not sufficiently refined to be used in glass manufacturing furnaces. Generally speaking, these secondary products are in the nature of construction materials where the glass must compete with relatively cheap raw materials.

For example, GCMI and the Environmental Protection Agency for several years have supported studies at the University of Missouri at Rolla which show that glass fragments may be substituted for stone aggregate in glasphalt, one of the better known potential secondary products. But the cost of stone aggregate averages around $2 to $4 a ton. In this case it would not be practical from an economic standpoint to pay processing costs in excess of $5 or $6 a ton for the waste glass alone. However, the cost for processing the refuse mix must be distributed proportionally among all of the salvageable components. This approach must be considered for both the Black Clawson system at Franklin, Ohio, as well as for the U. S. Bureau of Mines incinerator residue reclamation system at Edmonston, Maryland.

Initial calculations indicate that glasphalt alone could use up all the waste container glass available in municipal waste systems now and in the foreseeable future. Estimates for waste container glass in refuse today range between 10 and

15 million tons annually, whereas the amount of stone aggregate used in asphalt approaches a third of a billion tons annually. If waste glass were to be substituted for even three or four per cent of the aggregate, all the glass still would be utilized.

Furthermore, GCMI is funding a study at the University of Missouri at Rolla which will evaluate the amount of foreign material which could be tolerated in glasphalt. If a certain amount of metals and organic materials could be tolerated, then less processing of municipal wastes from proposed mechanical separation systems would be needed and the costs reduced.

Another well known secondary product utilizing waste glass is the brick made from glass-enriched incinerator residue. In the U. S. Bureau of Mines process of removing metals for recovery, a mixture containing some 98 per cent glass is left over. This product can be used directly for making bricks using various binders, such as 10 to 30 per cent of regular brick clay. In general, regular brick making equipment can be used.

In addition to these products, GCMI and its member companies have been conducting studies of some 10 other secondary products which are made from waste container glass.

In one process bricks using waste container glass can be made by using high pressure and cement, and certain chemicals such as those developed by the T-A Materials Company. These bricks can be made to such close tolerance that a paste material can be used instead of standard mortar. With this system various shapes of bricks and blocks can be designed.

Blocks and bricks—even large panels—can be made by a variety of other processes. Studies with GCMI support are being conducted by the Colorado School of Mines Research Institute to use waste container glass as the binding medium for panels 4 feet by 16 feet and up to 4 inches thick. The composition is 6 per cent clay, 13 per cent to 94 per cent glass and 0 per cent to 81 per cent rubble, yielding a bulk density of 130 pounds to 140 pounds per cubic foot depending upon the proportions used. The crushing strength was found to be as high as 12,000 pounds a square inch. Panels containing the higher glass ratio can be polished for decorative effect.

Stanford University is conducting studies using glass and silica with cement and other materials to make an expanded or porous material for insulated wall panels.

Furthermore, glass wool insulation can be manufactured using up to 50 per cent waste glass. This is being done by the U. S. Bureau of Mines using glass recovered from incinerated residue and by at least one commercial manufacturer. The Bureau is also making such other products as glass beads and lightweight aggregate from glass rich incinerated wastes.

In the case of the bricks, blocks, and wall panels, each use could easily absorb the waste container glass in a municipality. Preliminary studies show that many of these products using waste glass could compete with standard construction materials if separation systems were utilized and markets developed.

In California, standard 5/8-inch terrazzo flooring has been developed which utilizes reclaimed glass in place of marble chips. In addition to the regular flooring thickness, a second type, also using waste glass but featuring a new matrix, has been created by the American Cement Technical Center. By incorporating small amounts of polymer substance into the product mix, the company has been able to produce a terrazzo finished to a 1/4-inch thickness with two or three times the flexible strength of normal terrazzo. This new product provides a significant weight saving which can be a major factor in high-rise buildings.

WASTE DISPOSAL METHODS

As we have already indicated, glass containers contribute only a small portion of the solid waste mix. However, if glass is properly ground for disposal in sanitary landfills it returns to the soil in almost its original form and the volume is reduced substantially.

The Institute has sponsored independent studies to determine the degree to which glass containers constitute a solid waste problem. These studies have indicated that waste container glass, when properly handled, is not a problem in present municipal disposal systems.

In solid waste landfills, for example, Drexel University determined that glass does not contribute to any physical problems or chemical pollution. When crushed or ground, glass mixed with the soil becomes a permanent and firm fill which will not settle or erode. In addition, there is virtually no leaching from the glass to cause pollution of ground and stream waters.

Similarly, and despite widespread views to the contrary, glass has not been found to be a significant problem in incineration. Glass containers generally break into fragments due to the heat blast in incinerators. Many of these fragments help aerate from the batch and thus enhance combustion, while other fragments fall through the grates.

According to data collected in a recently completed national opinion survey of municipal, county and solid waste management officials, glass containers were found to be among the least difficult of all packaging materials to handle in refuse collection operations. This study was conducted by the Resources Management Corporation of Bethesda, Maryland, in order to determine directly from officials responsible for solid waste collection their views on the role of packaging materials, particularly glass containers.

Among other things, the study found that almost 70 per cent of the officials believe that no packaging material is damaging to collection equipment. Only two per cent of the respondents felt that glass containers would harm such equipment and only 8.1 per cent considered them difficult to handle. Further, the waste management officials indicated that glass containers are the least troublesome of all packaging materials in landfills and incinerator operations, falling behind steel, plastic and corrugated containers.

However, in general the refuse systems in most municipalities are inadequate and antiquated. Only recently have

municipalities begun to look beyond the garbage man and truck concept of refuse collection. The labor intensive collection systems, in fact, account for 75 to 80 per cent of refuse costs. It is hoped that Federal funds may be provided under the Resources Recovery Act of 1970 to finance projects which will upgrade significantly collection and disposal systems.

LONG-RANGE SOLUTION

Consumer demand has established a market for convenience packaging, and part of the convenience of using such packages is the fact that they can be discarded. The refuse mix must be separated, but we cannot necessarily expect the nation's housewives to do this job.

The nation's glass container manufacturers are convinced that the long-range solution to the presence of glass in solid waste can be found in the separation systems and markets for waste glass which are currently being developed. These systems are designed to separate the various salvageable components of refuse, and glass is but one of these. The enriched, mixed colored glass is a by-product left after other materials are separated, and thus it starts with a zero value, or even a negative value since disposal in a landfill could cost several dollars a ton.

As we have seen, two potential markets are developing for this glass mixture. One is the use of waste glass as cullet in the bottle-making process; the other is its use in various secondary products. By using materials handling methods, glass fragments 1/4 to 3/4 inches across can be freed of contaminants and color sorted for remelting and reforming into containers. Less refined or smaller sized fragments are usable in secondary products also. As indicated earlier, the U. S. Bureau of Mines is developing a system using commercial equipment which is capable of separating sand-sized particles by color.

Today there are perhaps three major approaches to separation. These are wet separation, dry separation, and separation after incineration or pyrolysis. The glass container industry is working closely in the development of several of these systems in order to evaluate the quality of waste container glass produced and the potential markets. Systems using one or more of these basic systems are nearing the stage of practical demonstration.

One of the best known systems is the Hydrasposal method developed by the Black Clawson Company of Middletown, Ohio. A prototype of this wet separation system is being constructed at Franklin, Ohio. When fully installed, this plant will be one of the most complete systems in the country for processing the waste products of our society. The Hydrasposal and Fiberclaim systems, manufactured by Black Clawson, are designed to handle nearly all normal municipal residue except bulky items. Coordinated with this is a modern sewage disposal plant to be built soon by the Miami (Ohio) Conservancy District which will serve Franklin and the surrounding area as well and will process contaminated waste water from the solid waste plant.

The Black Clawson demonstration plant is being designed to handle 50 tons of refuse in an 8-hour day, with a salvage potential over 50 per cent of the total tonnage (see Flow Diagram). The process will first crush the refuse into a liquid slurry small enough to pass a 3/4 or 1 inch diameter opening. Heavy materials settle out, and ferrous metals are removed magnetically. Inorganic materials are then removed in a liquid cyclone, which leaves a residue of heavy materials consisting of 80 per cent glass and nonferrous metals. The light organic portion is reduced into discreet fibers with contaminants screened out.

The glass container industry is interested in the heavy portion containing the 80 per cent glass and has designed a system to refine the glass fraction into a material usable in glass manufacturing furnaces. As such, the glass must be clean, uncontaminated, free of metals, and sorted by color.

The glass subsystem has been designed by GCMI and by the Sortex Company to receive this glass-rich mixture from the Hydrasposal and remove all contaminants before or during color sorting. A prototype of this subsystem is planned for installation at Franklin, Ohio, with the funds to be provided by the Federal Environmental Protection Agency and GCMI. Several research methods for removing contaminants will be used, including washing, screening, and air and optical separation. The initial steps will be to:

1. Receive the mixture and remove strong magnetics.
2. Size to separate the glass into the fractions larger than 1/4 inch and smaller than 3/4 inch.
3. Dry before further processing.

The glass fragments larger than 1/4 inch will be processed further in preparation for color sorting with the Sortex machine, and the smaller samples either removed from the system for use in secondary products, or passed through an air classifier in preparation for an experimental high tension electrostatic separator to remove the clear glass.

In preparation for the Sortex separator, the large fragments (1/4 inch to 3/4 inch) will be subjected to a cyclone air classifier and a zig-zag classifier. These two separation systems will be in service for this experimental subsystem, but the most efficient of the two systems probably would be used in a second generation subsystem. The Sortex optical sorter scans each fragment as it passes through a filtered beam of light and sorts the clear glass from colored glass and contaminants. A second pass of the rejects would then sort the greens from the remaining mixture, until all economically salvageable glass fragments are removed.

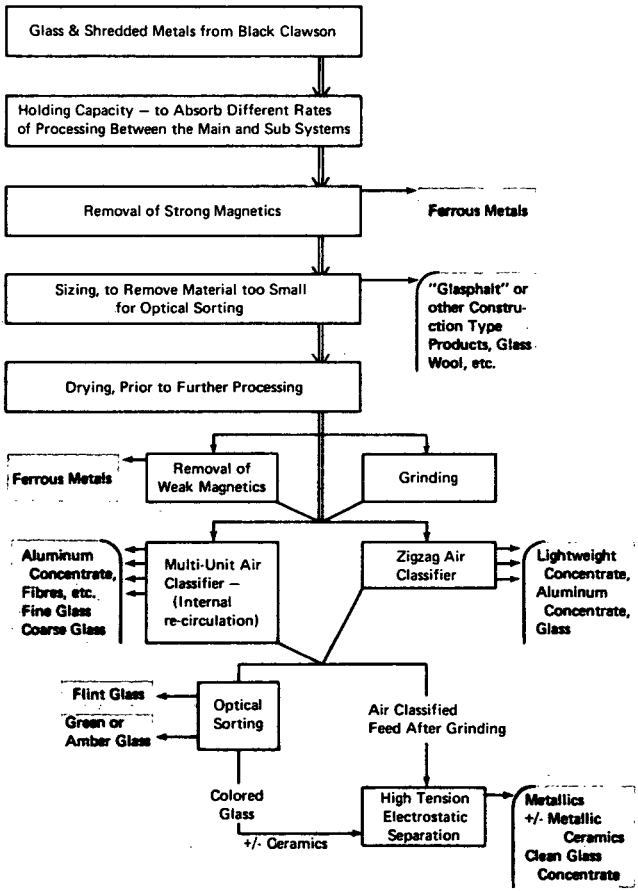
The glass subsystem is an experimental unit designed to determine the effectiveness of various separation systems for glass. It is anticipated that the subsystem, with proper modifications, could be adapted to one or more of the several mechanical separation systems being developed.

CONCLUSION

These, then, are some of the steps that have been taken by the glass container industry to help alleviate its contribution to the nation's growing solid waste problem. The ultimate goal toward which we are working is the eventual separation and salvage of usable waste components and their return to industry for recycling.

Hopefully, future generations will see a nation-wide network of refuse processing stations, perhaps designed along the order of the Franklin, Ohio, pilot project, where municipalities, or even utilities, will separate wastes mechanically and automatically and subsequently sell the recyclable materials to manufacturers or refiners. Such systems, we believe, will result in the much needed conservation of our natural resources and reduce pollution from solid waste.

Essential Details and Flow Diagram of the Proposed Subsystem for the Municipal Separation Plant at Franklin, Ohio.



GLASS CONTAINER
INDUSTRY POLICY
concerning

SOLID WASTE
MANAGEMENT
AND
LITTER CONTROL

GLASS CONTAINER INDUSTRY POLICY

concerning

SOLID WASTE MANAGEMENT

and

LITTER CONTROL

Adopted by the
Board of Trustees of the
Glass Container Manufacturers Institute, Inc.
April, 1971

INTRODUCTION

Glass bottles and jars have been widely used by civilized peoples for 35 centuries. Today, they are the most commonly used of all rigid containers to package foods, beverages, drugs, toiletries and various other essential consumer goods. As a result, the glass container industry and its products have become a vital part of the American way of life and to the preservation of its high standard of living.

Indeed, so basic is the need and so great the acceptance of glass containers, that the industry producing them in the U.S. today comprises some 40 companies operating 112 plants in 27 states. They

employ more than 77,000 people with an annual payroll exceeding $500 million.

America today is faced with litter and solid waste problems of growing national significance affecting the quality of the environment. The glass container industry recognizes that its products, because they are a major factor in present-day consumer goods packaging, contribute to these problems. While glass containers are a relatively small part of the total solid waste and litter (they account for about 6 per cent by weight of solid waste and some 6 per cent by item count of litter), the industry nonetheless has accepted the responsibility for helping to develop the necessary techniques for salvaging and recycling waste container glass.

The industry, to this end, is committed to the proposition that the most effective long-range solution to the solid waste management and litter control problems lies in the collection, salvage and recycling of the many components of refuse through design and application of modern technological systems. The industry holds the conviction that this solution is most commensurate with:

1. Conservation of natural resources.
2. The preservation of environmental quality.
3. Improved efficiency of solid waste management and litter control.
4. The legitimate requirements of our present standard of living.

The industry has concluded on the basis of its long involvement in these matters that its basic objectives can only be realistically achieved through adherence to the following policies:

SOLID WASTE MANAGEMENT

Close cooperation between government, industry and the public is essential to a long-range solution of the nation's solid waste problem.

The role of government should be:

1. *Federal government* – Supporting basic research to develop broad technological capabilities, funding of demonstration projects, dissemination of information on technological progress and market opportunities, and provision of incentives, financial support and guidelines for community and regional waste management systems.
2. *State government* – Planning and fostering development of local, regional and state solid waste management systems, setting and insuring compliance with reasonable standards, and providing coordination between state, federal and community programs.
3. *Local government* – Establishment and operation of improved refuse collection systems and processing centers, within approved federal or state guidelines and standards, and the provision of the community's share of funds for establishment and operation of such systems and centers.

The role of industry should be:

1. Cooperation with government in the development of technology to establish improved waste collection, processing and recycling

systems, such cooperation to be closely oriented to industry's intimate knowledge of the characteristics and behavior of its products in the solid waste management cycle.

2. The development of markets of sufficient magnitude to absorb the various products salvaged from solid waste.
3. Cooperation with government at all levels to foster through appropriate communications techniques public and official attitudes conducive to establishment of modern salvage-recycle systems.

The role of the public should be:

1. A realistic understanding of the problems involved.
2. Readiness to support programs seeking improved solid waste management systems.
3. Willingness to direct the appropriation of funds for such systems.

The glass container industry as a matter of basic policy is dedicated to pursuing the following eight-point program within the framework of responsibilities outlined above:

1. Dissemination of factual information on solid waste with particular reference to those aspects that pertain to used glass containers.
2. Cooperation with other industries, individual companies and government in the development of innovative waste collection, separation and processing systems designed to close the salvage-recycle loop.
3. The conduct and support of research that will contribute to the efficient separating and processing of glass containers in solid waste management systems.
4. Continued development of technology and commercial enterprises making possible recycling the maximum volume of used container glass back into production of new bottles.
5. Further development independently and in cooperation with other industries and government to identify and determine the commercial feasibility of secondary products using waste container glass.
6. Continuation as an interim measure of appropriate bottle reclamation and recycling programs of the type being conducted at glass container plant locations throughout the country to demonstrate the recyclability of waste glass containers and to provide individuals and community groups a means of participation in such programs.
7. Encouragement and support of legislation at the federal, state, or local levels that will advance attainment of these objectives in the solid waste management field.
8. Adherence to the proposition that the nation's solid waste problem cannot be resolved through legislation that seeks to ban, discriminately tax or otherwise restrict the use of specific products that appear in the trash accumulation.

LITTER CONTROL

The glass container industry, as the result of many years of involvement in anti-litter activities is firmly dedicated to the concept that effective litter control can be attained only through a three-point program of:

1. Public education.
2. Enactment, enforcement and publicizing of adequate anti-littering laws.
3. Provision of adequate devices for collection and disposal of litter, such as equipment for picking up litter, trash receptacles and litter-bags.

The industry is equally firm in its conviction that littering cannot be controlled through legislation that outlaws, discriminately taxes or otherwise restricts the use of specific products that appear as part of litter.

The industry is further convinced, as in the case of solid waste management, that meaningful solutions to the litter problem lie in cooperation between government and industry and the public.

Government's responsibilities include:

1. Enactment, enforcement and publicizing of adequate anti-littering laws.
2. Provision for and servicing of sufficient litter receptacles along streets and highways, on beaches, in parks and other public places.
3. Removal of litter from streets, highways and other public property.
4. Cooperation with industry, civic groups and schools in conduct of educational programs designed to dissuade people from littering.

The responsibilities of industry include:

1. The sponsorship on its own, and in cooperation with civic groups and government, of educational programs to stop littering by the public.
2. Cooperation with and encouragement of litter prevention organizations at the national, state and local levels.
3. Cooperation with and encouragement of state and local government in their efforts to enact and enforce anti-littering laws.

The responsibilities of the public are:

1. To refrain from littering.
2. To cooperate with and encourage government and industry in the broad spectrum of litter prevention activities.

The glass container industry is committed to these basic policies in the litter prevention field through the following activities:

1. Major support of Keep America Beautiful, Inc., through contribution of funds and services.
2. Support of state and local litter prevention organizations.
3. Promotion of the industry's bottle reclamation program as a means of reducing the volume of glass in litter and to serve as an educational device to discourage people from littering.
4. Conduct of the GCMI Industry Litter Prevention Program in which Institute members engage in a variety of litter prevention and clean-up projects in their plant communities.

5. Continuation of dialog and communications with government and the public to create better understanding of how the litter problem can best be resolved and of what the glass container industry is doing to this end.
6. Support of effective anti-littering legislation at the state and local levels.
7. The conduct, sponsorship or encouragement of research that will contribute to development of more effective litter control, removal techniques and equipment.
8. Cooperation with government, litter prevention organizations and other industry groups in the development and execution of programs that seek to solve the litter problem through the principles of the "three E's" – education, enforcement, equipment.

* * *

The glass container industry is committed to pursuing these policies. Further, the industry will continue to seek within the limits of its resources viable new ways to eliminate litter and alleviate the nation's growing solid waste disposal problem.

70-422 O - 72 - 12

NATIONAL FORESTS PRODUCTS ASSOCIATION,
Washington, D.C., November 18, 1971.

Hon. MARTHA GRIFFITHS,
Chairman, Subcommittee on Fiscal Policy, Joint Economic Committee, New Senate Office Building, Washington, D.C.

DEAR MADAM CHAIRMAN: The National Forest Products Association is extremely interested in the recent hearings held by your Subcommittee into the subject of recycling of materials.

Since the witness list was already established at the time your hearings were announced, we were unable to testify. Therefore, we respectfully request that the attached statement be included in the record of your hearings.

Sincerely,

JAMES R. TURNBULL.

STATEMENT OF JAMES R. TURNBULL, EXECUTIVE VICE PRESIDENT, NATIONAL FOREST PRODUCTS ASSOCIATION

Madam Chairman and members of the committee: My name is James R. Turnbull. I am Executive Vice President of the National Forest Products Association which is a federation of 21 regional, species and products organizations representing manufacturers of lumber, plywood and other wood products throughout the United States.

Some observers might wonder why manufacturers of lumber, plywood and other solid wood products seek to be heard at hearings related to the recycling of paper. Their answer lies in the excellent definition for recycled materials for paper-making which was released August 2 by Robert L. Kunzig, Administrator of the General Services Administration.

I ask, Madam Chairman, that Mr. Kunzig's statement to the press on this subject and the GSA definition be placed in the hearing record at this point.

Mr. Kunzig's statement goes directly to the point of the use of residual materials generated in the process of primary wood product manufacture. My segment of the forest products industries endorses the GSA definition and Mr. Kuznig's clear explanation. He said:

"Post-consumer wastes include materials which have passed through their intended use and have been collected from homes, offices, factories, or municipal solid waste. The remainder will be of manufacturing wastes, forest residues and other wastes."

This last reference is the key to my appearance here today. The GSA definition, at Paragraph C of Part II, includes:

"C. Fibrous by-products of harvesting, manufacturing, extractive, or wood-cutting processes, flax straw, linters, bagasse, slash and other forest residues."

This definition takes full cognizance of the fact that the pulp and paper process affords a principal outlet for residues from lumber and plywood manufacture and enables the conversion of valuable wood fiber into useful secondary products. I urge that this Committee similarly recognize the importance of using wood and forest residues.

In the Pacific Northwest, the sawmills and plywood mills generate wood residues in the form of bark, shavings, chips and sawdust which are the principal raw material to support a growing pulp and paper manufacturing industry. Even in the South which enjoys an abundance of round wood to meet the demands of pulping facilities, residues from sawmill and plywood mills constitute 20 percent of the total raw material consumed in pulp and paper processes.

Residues from lumber and plywood operations used to be a serious disposal problem. Accumulated wastes either had to be burned or buried because there were relatively few economic uses to absorb them. Today forest industry efficiency and technology has advanced to the point where in many timber producing states more than 80 percent of these residues, which were formerly a disposal problem, are put to use. Examples of these new products, in addition to a wide range of paper products, are particleboard, hardboard, roofing materials, molded products, plastic fillers, fertilizers, soil conditioners, decorative ground cover, chemicals, fuels, agricultural litter, charcoal, insulation and concrete additives.

It is clear that the forest products industries are already deeply involved in the disposal of waste in a positive and effective manner which not only overcomes pollution, since wood products and their residues are biodegradable, but which extends the timber resources harvested for the manufacture of essential basic materials such as lumber and plywood.

The GSA definition of recyclable materials properly takes into account the wastes from sawmills and plywood plants as well as the substantial quantities of wood fiber which are increasingly recovered from branches, limbs, stumps, bark and even needles which were previously left on the ground after harvest.

Any legislation or other action which would oblige papermakers to depend heavily upon waste paper as the basis for their production would simply be transferring pollution problems from the wastebaskets of the nation to the yards of sawmill and plywood manufacturers. Accumulations of waste wood fiber which now move into pulp and paper consumption would literally inundate mill sites. The only options would be to revert to the primitive practices of burying or burning this valuable wood fiber. Such a course in times when the nation is deeply aware of the need to conserve its resources to the utmost would not be in the public interest.

It must be recognized as well that burning of these wastes, which was until recently an accepted practice in most areas of the country where volumes were excess to potential consumption, has now been severely restricted by Federal, state or local air pollution regulations.

Residuals from sawmill and plywood operations have, moreover, become a substantial source of revenues for individual companies and for the nation as a whole. In 1953 the State of Oregon was able to use only about six percent of sawmill residues for paper and composition boards; by 1967 that percentage had risen to 60 percent and the total volume for domestic and export use rose to six million tons. Two years later the volume was eight million tons. These residues have become a cash crop from wood manufacturing operations.

The direct cash benefit to the nation as a whole must not be overlooked. The export of wood residues in the form of chips have become a significant factor in the U.S. balance of trade picture. In 1969 about 1.7 million tons of wood chips were exported to Japan from Oregon alone and helped substantially to alleviate the American deficit trade position.

While the exclusion of wood residues from the recycling definition for paper manufacture might accelerate the flow of chips to foreign markets it would not be in sufficient volume to offset the reduction in usage domestically.

In summary, I want to urge this distinguished Committee to take into account the direct relationship between solution of the pollution problems involving waste paper and the daily generation of thousands of tons of wood wastes which are overcome by having pulp and paper operations as a market for economic utilization. The stretching of our timber resources by putting this former waste material to good use is of obvious benefit. The significant contribution the wood chip market makes to our balance of trade picture can be adversely affected if the volume of disposable chips mounts to a point where the export market is glutted and the value of the chips diminishes to a point where actual income to the United States might decline even though the volume of chip exports rises.

I have had my staff prepare a brief brochure which illustrates the scope and significance of wood residues in these three critical areas and I ask that it be made a part of this hearing record.

GSA TAKES NEW STEPS TO SPUR PAPER RECYCLING

The Federal Government is taking still another step in its drive to encourage the use of recycled waste paper, the General Services Administration announced today.

Administrator Robert L. Kunzig of GSA which does most of the Government's buying, said that effective immediately his agency will require the inclusion of "'post-consumer" wastes in the corrugated fiberboard it buys to line package cartons.

The specification change will require at least 35 percent waste fibers. Of this at least 10 percent must be post-consumer wastes. Post-consumer wastes include materials which have passed through their intended use and have been collected from homes, offices, factories, or municipal solid waste. The remainder will be of manufacturing wastes, forest residues and other wastes.

In announcing the change, Kunzig said, "GSA's new definition will be applied to only one product at this time. If this first step is successful, the requirement for a minimum percentage of post-consumer wastes will be continued and expanded to other specifications wherever possible.

This program is in furtherance of the President's program to promote recycling of post-consumer wastes and thereby help alleviate already overburdened municipal waste disposal systems. It also encourages the maximum utilization of forest residues and manufacturing wastes.

GSA also announced that on all paper specifications requiring reclaimed fibers a breakdown of the types of wastes used in the product will be required in accordance with the new definitional breakdowns attached.

Kunzig also said "we laud the paper industry's efforts in this area to date, but much more needs to be done. Therefore, we will work closely with industry and other concerned agencies in revising all our specifications to spur the maximum use of post-consumer wastes and all other wastes consistent with our capacity to utilize them."

GSA DEFINITION

The paper stock shall contain not less than — percent by weight of reclaimed fibers as listed in Part I and Part II, but not less than — percent by weight as listed in Part I. A certificate shall be submitted with each bid indicating compliance with these requirements. The certificates should identify the types of reclaimed fiber to be used in the material listed in the invitation.

PART I

A. Paper, paperboard, and fibrous wastes from factories, retail stores, office buildings, homes, etc., after they have passed through their end-usage as a consumer item including:

1. Used corrugated boxes.
2. Old newspapers,
3. Old magazines,
4. Mixed waste paper,
5. Tabulating cards, and
6. Used cordage.

B. All paper, paperboard, and fibrous wastes that enter and are collected from municipal solid waste.

PART II

A. Dry paper and paperboard waste generated after completion of the papermaking process* including:

1. Envelope cuttings, bindery trimmings and other paper and paperboard waste, resulting from printing, cutting, forming, and other converting operations;
2. Bag, box, and carton manufacturing wastes; and
3. Butt rolls, mill wrappers, and rejected unused stock.

B. Finished paper and paperboard from obsolete inventories of paper and paperboard manufacturers, merchants, wholesalers, dealers, printers, converters, or others.

C. Fibrous by-products of harvesting, manufacturing, extractive, or woodcutting processes, flax straw, linters, bagasse, slash and other forest residues.

D. Wastes generated by the conversion of goods made from fibrous materials, i.e., waste rope from cordage manufacture, textile mill waste and cuttings.

E. Fibers recovered from waste water which otherwise would enter the waste stream.

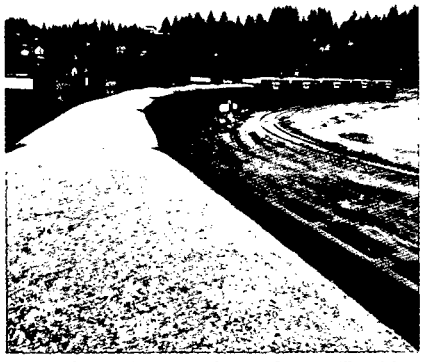
---

*The papermaking process is defined as those manufacturing operations up to and including the cutting and trimming of the paper machine reel into smaller rolls or rough sheets.

Increased Wood Utilization Offsets Pollution

- Adds Valuable Dollars to U.S. Balance of Payments
- Conserves Forest Resources
- Creates Employment for Forest Based Communities

A man-made mountain of wood chips was created from sawmill, plywood plant and timber harvesting wastes that once were burned creating air pollution problems. Now these wood chips become useful products for export or for domestic manufacture. Particleboard, hardboard, roofing materials, molded products, plastic fillers, fertilizers, soil conditioners, chemicals, insulation and scores of other products use wood waste materials.



A train of wood chips moves from an Oregon mill to deliver chips to pulp and paper mills. Oregon's pulp and paper industry gets half its wood requirements from chips made from the leftovers in lumber and plywood manufacture. Disruption of rail service can deal a serious blow to the forest industries.

Not many years ago, only a small proportion of residues accumulated in the processing of wood were utilized as by-products. Today the forest industry's efficiency has reached the stage where in many timber-producing states more than 80 percent of these residues are put to use.

Bark, shavings, sawdust and other leftovers no longer are disposed of by burying or burning. Burying takes up valuable space. Burning is wasteful and contributes to pollution of the air.

Instead, wood residues now are utilized in new forms, contributing not only to the efficiency of the industry, but to conservation of resources, to enhancement of the environment, and to the U.S. balance of payments through export trade.

Examples of these new products include paper products of all kinds, particleboard, hardboard, roofing materials, molded products, plastic fillers, fertilizers, soil conditioners, decorative ground cover, chemicals, fuels, agricultural litter, placing materials, charcoal, insulation and concrete additives.

Based on the processing of 40 billion board feet of timber annually, mills in the United States

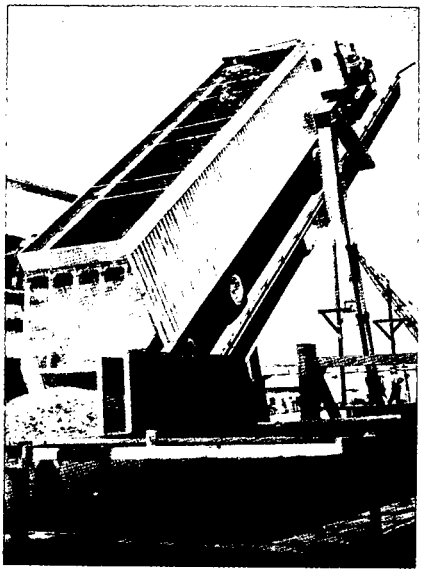
each year produce some 14–16 million tons of bark, six million tons of sawdust, 2.5 million tons of planer shavings and 20 million tons of coarse residues, including trimmings and slabs.

Finding uses for bark has increased at a slower rate than those for wood fiber. But even here, a third of this type of residue is put to use as fuel and another five to 10 percent as soil conditioners, mulch and decorative ground cover.

The manufacture of particleboard is often the first possibility considered by a manufacturer in facing the task of utilizing his wood residues. The market for this material has grown tremendously since the first American plant was established in 1945.

The rate of expansion in particleboard manufacturing has been explosive due to fast developing technology and new uses for the product. Particleboard is made from a spectrum of wood residues ranging from dry sawdust to green solid wood in chip or flake form. The bulk of particleboard is used by the furniture trade and as core material for the manufacture of hardwood veneer and plywood.

Consumption of wood chips similarly has increased tremendously. High quality wood chips are used for both paper and hardboard.



Trucks are picked up bodily to deliver their loads of chips.

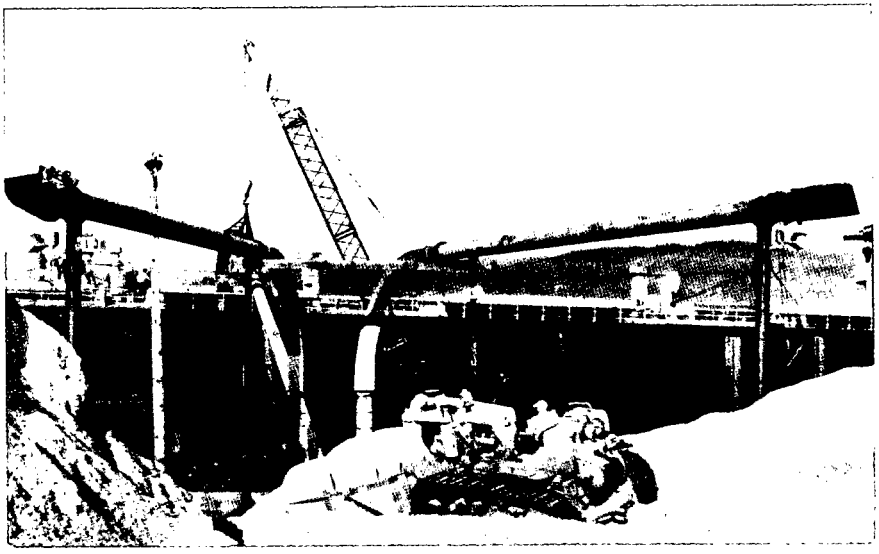
Nationwide, mill residues account for about 30 percent of the 64 million cords of domestically produced virgin fiber consumed in pulp mills. In the South, mill residues account for 20 percent, and in the West, mill residues are the major supply to pulp mills.

Finding new uses for wood residues is part of the progress that has been made in the past three decades to use more of the total tree. This drive has accelerated since portable barkers and chippers have been taken into the woods. At the mills, too, barking the logs and chipping slabs and trim means greater revenue along with elimination of the disposal problem.

The extent of utilization of residues has grown tremendously in recent years.

Nationwide, in 1967, by-products made from wood residues, not including bark, totaled the equivalent of 2,362,171,000 cubic feet of hard-

Railcar containing more than 70 tons of wood chips can be unloaded with this modern roll-over unloader in 90 seconds.



A bulldozer cruises in a sea of wood chips at ship loading point. Chips bound for export make a substantial contribution to U.S. balance of payments and employment at mills and port facilities.

woods and softwoods. Unused residues, which had to be disposed of by burning or other means, totaled 886,349,000 cubic feet or only about one-third of all nonbark residues.

The Southern California lumber industry has attained a utilization record hard to beat. By 1968, utilization of both wood fiber and bark there had reached 99 percent. The Lower Columbia area of Washington State used 94 percent of its wood fiber residue that same year.

The forest products industry is drawing close to the time when it can say it uses everything in the timber but the whine of the saw.

The National Industrial Pollution Control Council has stated that increasing utilization of residues is among the most important factors in the reduction of solid wastes.

For example, the State of Oregon in 1953 was able to utilize only about six percent of sawmill residues for paper and composition

Barges, too, are used to move chips, here being loaded for transport. Dock strikes can have serious economic consequences.

Chips are propelled into position for storage. There is constant movement as an inventory of wood residues await utilization as pulp, kraft paper and container board for export and for domestic manufacture into bags, containers and wrapping paper.

boards. By 1967, some 60 percent of residues were utilized when the rise of domestic use and exports reached six million tons. This total reached approximately eight million tons in 1970.

In 1969, about 1.7 million tons of wood residues were exported to Japan from Oregon alone. This export trade points up another advantage resulting from increased utilization of residues – it gives a substantial boost to the nation's balance of trade. Export of chips and other wood residues means more money coming into the United States.

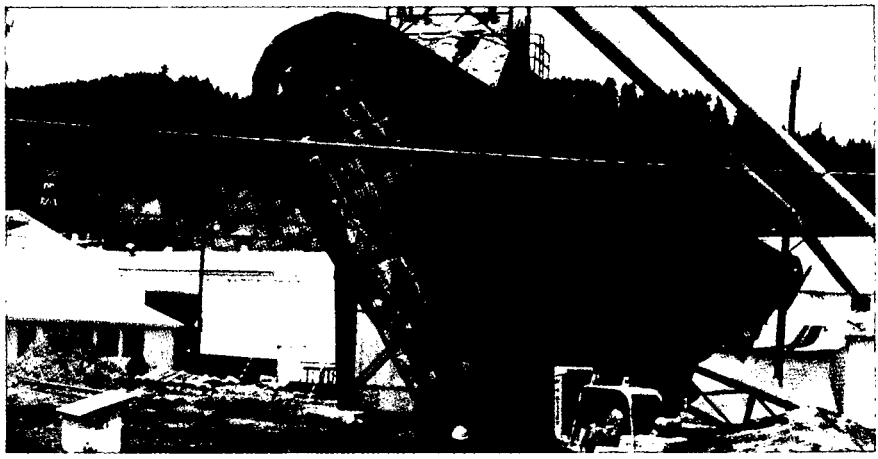
The volume of chips and wood residues amassing at sawmills and other forest products installations is so great at any one time that delays in shipments can have a disastrous impact.

Interruption of the normal flow of traffic out of a wood industry plant by rail, ship, barge or truck can cause a shutdown of the entire operation. Accumulation of the residue in time exhausts scarce storage space. With storage space gone, no more lumber or plywood can be produced. In addition, many mills face deficit operations by not being able to move their chip production.

Just such a predicament occurred with the West Coast port shutdown by a longshoremen's union strike and by the United Transportation Union's strike against the railroads. Chips could not be moved from sawmills via the rails and could not be moved from port cities to overseas markets.

The simultaneous labor disputes literally gave the wood industry, in boxing parlance, the old one-two. The forward-looking forest products industry will bounce back but the seriousness of the situation underscores the threat to the economy posed by breakdowns in the labor negotiation field.

The industry, however, looks to new and more complete utilization of forest products and their residues in the future through further technological advance and more efficient operation. This will include utilization of limbs, branches and defective trees now left at the harvest site.



"Crunch" went this "wigwam" waste burner as it was pulled down. This was a typical sight in the Pacific Northwest several years ago as the forest products industries fought pollution. New uses have been found for wood residues which formerly were burned. In two Oregon counties the mill waste volume was reduced 77 percent from 1955 to 1965. Another Oregon county had 200 burners operating in 1956 and only 11 remained in 1970.

Prepared by:

FOREST INDUSTRIES COUNCIL

1619 Massachusetts Avenue, N.W., Washington, D.C. 20036

STATEMENT OF THE ASSOCIATION OF PETROLEUM RE-REFINERS

THE FACTS ARE THESE:

Every year, more than one billion gallons of used lubricating oil is drained at service stations, garages, airfields, railroad yards, bus, truck and auto fleet headquarters, and industrial plants. All of this valuable oil could be recycled if collected—yet 75% of it according to recent studies—is wasted. Worse yet, it is not just wasted; it becomes a pollutant. The 750 million gallons not recycled are dumped indiscriminately or just allowed to drain down into the water supply . . . or, burned. If burned, for whatever purpose, may contribute millions of pounds of metallic oxides into the environment. But it can be saved—and with it the environment—through a re-refining process . . . just as the Petroleum Re-Refiners have been doing for years. But there are problems, and only you can help solve them.

WHY ISN'T ALL THIS OIL RECYCLED AND RE-USED?

Because the economics of the collection and re-refining of used oils in the face of obstacles which have been imposed on re-refiners prevent marketing of the recycled oil on a competitive basis.

WHAT ARE THESE OBSTACLES?

1. There are no standards by which oils, new or re-refined, can be evaluated for a given use even to determine whether or not they will lubricate a motor. We have tried for years to have comparison tests run and standards set, but to no avail. But the Federal Trade Commission insists that all re-refined motor oils be labeled "previously used". This implies an inferior product which effectively chokes off consumer sales.

2. Internal Revenue Service returns the excise tax of 6 cents per gallon originally paid by OFF-HIGHWAY oil users when they have purchased 100% new oil, but IRS refused to refund the excise tax paid on new oil *if that new oil is blended with re-refined oil to meet user viscosity requirements.* Thus, the re-refiner not only loses the 6 cents per gallon differential but is penalized an additional 3 cents per gallon if he uses a 50–50 blend of new oil with his recycled oil.

3. The major oil companies set prices that we must compete against. In a very real sense, therefore, the re-refiner can not set the price of his own product, regardless of his costs.

As a result of all these problems more than half the re-refiners have been forced out of business in the last 5 years.

SO WHAT . . . ARE THE RE-REFINERS REALLY THAT IMPORTANT?

This is a fair question, and one that we have to be able to answer for ourselves. Frankly, until ecology became a popular subject, nobody *did* care, but in the last couple of years there has been a marked—and welcome upsurge in concern about dumping and other improper forms of used oil disposition and a growing interest in recycling, as a preferable alternative.

U.S. Oil Week on January 25, 1971 quotes Harold Bernard, of the Federal Water Quality Administration as saying on page 4, "We polled (FWQA's) regional directors. Six of the nine indicated that used oil, dumped into sewers, is a serious problem in the sewerage treatment plants and has caused fires in these plants, as well as caused treatment upheaval".

A UPI report from New York, dated December 26, 1970, tells this story: "The city environment protection administration says that city gasoline service stations are creating a serious pollution problem by illegally dumping waste oil into sewer systems to avoid paying a fee for removing it to re-refiners . . . Another agency spokesman (the UPI report continues) said there are only three re-refiners left in the area now because recycling has become too expensive to be profitable. A major factor, the spokesman said, was additives the oil companies have added that makes it more expensive to clean the oil . . ."

In an address to the National Petroleum Council a year ago last January Walter J. Hickel spoke about the missing millions of gallons, and said: "The hero of this action used to be the re-refiners, who would collect the waste oil and make something saleable and useful out of it. But the re-refiner is decreasing in

numbers, and the sanitary sewer system is taking his place as the collector of waste oils in all too many cases."

A telegram from Hans G. Tanzler, Mayor of Jacksonville, Florida, was received on February 19, 1970. It read, in part: ". . . we were faced with an insurmountable problem of the disposal of waste oil from service stations, garages, and so on, in that no one would pick the oil up, and waste oils would be disposed of through our sewer systems, both storm and sanitary, creating fire hazards and pollution problems in the St. Johns River and its tributaries. The disposal of waste oil in any sizeable urban area is a vital point in environmental control that must not be overlooked."

The events leading up to this telegram were typical—a re-refiner closing down in a large urban area, leaving a potentially virulent pollution problem. What was NOT typical was the quick and intelligent action taken by the Mayor in appealing for help to have some other re-refiners take over in Jacksonville, in this case Seaboard Industries, Inc., from neighboring Doraville, Georgia.

One immediate solution is to burn used oils instead of recycling it. This would reduce or eliminate water pollution caused by dumping such oils—but there is a hitch.

Perhaps the single most significant development in the growing concern about disposition of used oil without pollution has been the recent work of the task force on used oil disposal set up by the American Petroleum Institute, the organ of the new oil major refining industry. The final report of the task force published last fall favored burning over the recycling of waste oils. But, they admit in the Report's foreword that "the amount of used lubricating oil in the fuel blend should not exceed 25%," and in the next sentence, they argue that this blend policy will "obviate any health problems which might otherwise result from air contaminants". But there's a hitch in this happy solution . . . several hitches, in fact.

1. Walter C. McCrone Associates, Inc., of Chicago was asked to analyze the combustion products present in waste oils before they are re-refined . . . There are the oils recommended for burning by API. As the attached summary shows, more than 1,000 *pounds of metal oxides* are released when 10,000 gallons of waste motor oils are burned. Consider this alongside estimates of waste oil collectors that 260 million gallons last year were indeed burned. (This total related only to waste oil picked up by truck; the remaining non-recycled oil cannot be traced.) Simple arithmetic leads to the conclusion that at least 26 million pounds of metallic oxides would have been released into the environment just last year by burning!

2. The January 1971 issue of *Fortune* included an article . . . Metallic Menaces in the Environment . . . which quotes Dr. Henry A. Schroeder of Dartmouth Medical School as pointing out:

> "Pollution by toxic metals is a much more serious and much more insidious problem than is pollution by organic substances such as pesticides, weed killers, sulphur dioxide, oxides of nitrogen, carbon monoxide and other gross contaminants of air and water. Most organic substances are degradable by natural processes; *no metal is degradable.*
>
> "Little wonder that we are now witnessing the beginning of restrictions on metallic pollutants. Federal authorities will suggest criteria this year for permissable amounts of lead in the ambient air. (If you'll check the McCrone figures you'll see that in all areas sampled, lead amounts to at least half the oxides released by burning oil.) Guidelines for beryllium will follow next year. Later on cadmium, copper, manganese, nickel, vanadium, zinc, chromium and air-borne mercury will come under control. Similar restrictions on the disposal of these substances in water are either already in effect or soon will be."

3. Apart from the above there is a serious problem of physically burning the oil—whether or not it can be burned effectively and safely. Mr. Harold Bernard of FWOA is again quoted by *U.S. Oil Week* as saying: "How can one be assured that the oil will be used in the prescribed ratio of 1 to 3? How can such a system be enforced without bringing public agencies into the picture?" He took out a plastic tube filled with pieces of oil burner deposit. "Here is an example of the results of using crankcase oil as a fuel without proper safeguards. They were rodded out of fire tubes . . . after only a few days of operation. Even with proper safeguards, the long term effects are unknown. Many metals are added during use. What happens to them in the burner?"

4. Quoting from the A.P.I. task force itself, they quote major oil companies: Humble says, "Nozzles seemed to plug up in burner barrels and wasn't easy to

remove". American says, "Heavy deposits in tubes (averaging 1/16 in. and 1/2 in. at openings) were enough to shut down boiler once every two weeks for a day, a situation that could impose problems, particularly in the winter". Gulf's tests. "In burning 25% waste oil and 75% distillate at 3 gph up to 28% of the lead in the blend was found in fuel gas emission." Shell—"Using waste oil in a 3 to 1 ratio to normal refinery fuel, found burners were plugged four times during month long test; normal plugging rate is once in two months. Burner tips were clogged with small bits of rubber and metal shavings".

IT APPEARS, ONCE AGAIN, THAT WE RETURN TO THE BASIC TRUISM:

A gallon of oil saved by recycling is worth MORE than the original gallon because it is prevented from polluting the environment and causing extensive damage.

Last year, despite unwarranted or unjustified obstacles planted in their way, the petroleum re-refiners recycled 120 million gallons. We can lick the *billion* gallon problem if permitted adequate profit incentives.

POUNDS OF COMBUSTION PRODUCTS PER 10,000 GALLONS OF DRAININGS[1]

	Jackson, Miss.	Oklahoma City, Okla.	Washington, D.C.	Doraville, Ga.	San Carlos, Calif.	Dearborn, Mich.	St. Louis, Mo.	Houston, Tex.	Lyons, Ill.
Zinc	36.0	46.0	58.0	33.0	54.0	45.0	32.0	32.0	44.0
Copper	1.1	.9	1.4	1.2	1.6	1.4	1.2	1.3	1.5
Aluminum	4.6	5.1	2.6	5.1	4.4	4.8	4.5	4.4	6.3
Barium	43.0	25.0	57.0	20.0	31.0	9.3	33.0	45.0	38.0
Calcium	136.0	220.0	162.0	131.0	220.0	147.0	120.0	162.0	168.0
Nickel	.2	.3	.3	2.4	.5	.6	.3	.9	.7
Chromium	2.6	2.9	4.8	1.5	3.8	2.6	2.2	2.9	1.2
Iron	34.0	32.0	17.0	30.0	28.0	36.0	32.0	30.0	42.0
Silicon	29.0	22.0	13.0	24.0	24.0	27.0	64.0	19.0	24.0
Lead	650.0	650.0	400.0	570.0	480.0	720.0	650.0	570.0	650.0
Tin	.6	.6	.6	1.0	.9	1.0	.9	1.3	.9
Phosphorus	225.0	225.0	255.0	211.0	173.0	264.0	189.0	189.0	173.0
Boron	3.6	3.6	2.8	4.3	3.6	5.9	3.6	3.8	5.9
Magnesium	23.0	10.0	23.0	36.0	19.0	31.0	25.0	61.0	25.0
Total	1,188.7	1,243.4	997.5	1,070.5	1,043.8	1,295.6	1,157.7	1,122.6	1,180.5

[1] Calculated as oxides.

DRAFT BILL

PROPOSED NEW AND ADDITIONAL EXCISE TAXES ON LUBRICATING OILS

We propose that the law (section 4091 of the Internal Revenue Code) which imposes an excise tax of six cents per gallon on lubricating oil (other than cutting oils) be amended to:

(*a*) increase the tax to nine cents per gallon; and

(*b*) subject cutting and hydraulic oils to such tax (as increased).

We further propose that section 6424 of the Internal Revenue Code, providing the purchaser of lubricating oil (other than cutting oil and oil which has been previously used) for off-highway use with a refund or tax credit of six cents per gallon, be amended to:

(*a*) decrease the refund or tax credit to five cents per gallon; and

(*b*) make available such refund or tax credit to—

(1) purchasers of cutting and hydraulic oil for off-highway use; and

(2) re-refiners with respect to the tax paid on virgin oil used in blending re-refined oil for off-highway use.

The effect of this proposal would be as follows:

1. Annual revenue collections would be augmented by approximately $60 million;

2. Pollution of rivers and streams from waste oil would be substantially eliminated. This would occur through a private market place mechanism: effective functioning of the petroleum re-refining industry, the business of which is to recycle for reuse used oil;

3. Natural oil resources, now consumed to the extent used for lubricating purposes and disposed of in rivers and streams, will be preserved.

BACKGROUND

The re-refining industry acquires, through its own or independent waste oil collection facilities, used lubricating oil from automobile crankcase drainings and various non-automotive sources. It then refines this waste oil, by use of physical and chemical processes substantially similar in nature though not in scope to the initial crude oil refining processes, into lubricating oils identical to the original virgin lubricating oils by removal of all or substantially all of the contaminants acquired during its prior use. These re-refined lubricating oils, with or without additives as appropriate for the various lubricating uses for which they are designed, are then sold for the same lubricating purposes, automotive and non-automotive, as the original virgin oil products.

Since the re-refined and virgin oil products are substantially identical in utility and purpose, the re-refined oils would normally be sold of necessity at prices competitive with those of virgin oils. In fact, however, both because of significantly smaller quantitative availability, and the traditional but nonetheless real prejudice against "used" products, re-refined oils must be sold at somewhat lower price levels than those of virgin products.

The cause for the price differential relate to the mandatory labeling requirement imposed by the Federal Trade Commission, the impact of the present six cents per gallon excise tax on lubricating oil for off-highway use and the adverse administrative application of the refund or tax credit therefor, and the additional complexity and consequent expense of the re-refining process.

An explanation of the manner in which the tax on lubricating oils for off-highway use and the refund or credit thereof presently operates is pertinent to the proposed additional tax. An excise tax of six cents per gallon is imposed upon virgin oil. With respect to oil for off-highway use, the purchaser is entitled to a refund of or tax credit for the excise tax paid thereon. The effect of the credit or refund of the tax to off-highway users such as railroads has reduced the cost to such users by the amount of the tax, thus competitively forcing even lower the market price of used oil to such users.

Moreover, the process of re-refining necessarily involves the use of virgin oil in blending re-refined oil. However, as a result of Treasury Department construction of section 6424, the re-refiner is not entitled to a refund or a credit for the tax paid on virgin oil used in blending re-refined oil, and the purchaser of the re-refined oil is not entitled to a refund of or a credit for the excise tax paid by the re-refiner. By reason of having to pay the excise tax without being able to either receive a refund or credit therefor or to pass such refund or credit to his customer, the re-refiner is placed at a further competitive disadvantage.

As a result of the foregoing circumstances, it has become increasingly difficult for a petroleum re-refiner to operate in an efficient or profitable manner. The number of such companies has been reduced from approximately 150 to 50 in the six years since passage of sections 4091 and 6424. Under present technological circumstances, functioning of the petroleum re-refining industry is the most effective means for eliminating oil pollution of water, rivers and streams. Whereas prior to 1965, it was profitable for a petroleum re-refiner to purchase or otherwise acquire waste oil from automobile service stations, factories, and similar facilities, such collections are not any longer presently feasible. Businesses generating waste oil simply discard the oil in the least expensive but most polluting form: dumping the oil in the sewers; dumping the oil on land or in the fields (where it seeps to the natural water sources); or, at some expense, burning such oil. While burning of such oils eliminates pollution of the water, it creates a far greater hazard of pollution of the air, since metal oxides present in waste oil are not consumed in the burning process and are among the most poisonous elements presently circulating in the atmosphere.

Passage of the proposed legislation would create a market place incentive for the re-refining industry to function, thus creating a self-generating anti-pollution industry; an industry which will totally disappear unless the present artificially imposed Federal tax and regulatory imbalances are removed.

OTHER PROPOSALS

I. To encourage the collection and holding of used oil drainings at service stations and car agencies for RECYCLING purposes. It is proposed that these companies be given a TAX CREDIT of 3 cents per gallon for used oil drainings picked up at their establishment by those licensed to pick up used oil for RECYCLING.

The amount of the tax credit to be limited to 50% of the number of gallons of taxable oils produced. The limit of 50% is based on the premise that only 50% of taxable oils sold come back as drainings.

II. That the government set up standards for RECYCLED taxable oils. That this standard include a minimum standard of quality for oils that would not need to be labeled "previously used."

III. That the government set an example for RECYCLING by requiring that 25% to 50% of their oil purchases be RECYCLED oils.

[From "New Directions in Solid-Wastes Processing," 1970, Technical Guidance Center for Industrial Environmental Control, University of Massachusetts, Amherst, Mass.]

Present and Future Possibilities of Reclamation From Solid Wastes

(By David G. Wilson, Massachusetts Institute of Technology)

SUMMARY

This is a review of the sometimes distorted economics of reclamation from urban solid wastes, of the revisions needed in laws and attitudes to encourage more recycling; of some possibilities for incentives; and of new technology which is under development at MIT and in many other places for mechanizing sorting from mixed solid wastes.

INCENTIVE LEGISLATION

At present, reclaimed materials have to compete against so-called "virgin" materials with two economic penalties. The first is that the reclaimed material has to be collected and sorted from a multitude of contaminants, in the way that a junk car must be collected from a country roadside and then must be separated into all of the components which man has ingeniously combined to make into an automobile. In contrast, iron ore, for example, can be mined in huge quantities in one place, and the sorting-separation process to win the iron from the ore can be highly mechanized.

The second economic disadvantaged is that under Western laws of property, someone buying land owns everything beneath the surface of that land and can remove it. Since this is a virtually new concept, there does not seem anything particularly wrong with it to our myopic vision. You can imagine what we might be telling our children if the Romans or the Babylonians or the ancient Chinese had taken their civilizations a little further. We might have said that in those days there were wonderful sources of raw materials called oil and coal and gas which were all taken out of the ground and burned; and the copper and manganese and tin were found in rich ores which were so easy to remove and extract that they were all exploited in the course of a mere century or two. This is the legacy which we are reserving for our children.

We desperately need a new law which would provide a tax fund for the future. The tax would apply to all materials, whether or not they are considered to be resources, which are removed from the earth, water, or air, and are not replaced by natural or man-induced processes. The tax rates would be different for different materials. The uranium tax might be twenty dollars a ton, the copper tax, five dollars a ton, and so on. Just as important, there would be a tax on the removal or overburden of soil unless it were replaced in substantially the same form as it previously existed. There would therefore be a powerful economic inducement to reclaim materials and to design in the first place so that reclamation is easy; and in addition there would be an incentive to restore land after mining operations to as near as possible its original condition.

Reclamation Subsidies

Another area where present economics seem to discourage the public benefactor and encourage the despoiler is when the reclaimed materials do not find a ready market. The reasons for the lack of market might be connected with the argument given above—that it is cheaper to extract virgin material when it is virtually free than to collect and transport and sort out contaminated materials. However, another economic distortion can enter the picture. It is the distortion of externalities. I believe the most graphic case is that of a compost plant. The entrepreneur who designs, builds and operates a compost plant brings large benefits to the

community. Instead of dumping city trash and garbage where it will have a strong likelihood of forming breeding places for rates and insects and of polluting the ground water, the entrepreneur, at great difficulty and expense, sorts out the inorganic from the organic materials and produces something that can benefit, not pollute, the soil. But the value to the public is principally in the absence of pollution rather than in the presence of compost, and the price which the public is willing to pay for compost does not recover the production cost. I believe that the public should pay something for the absence of pollution, the external benefits the public receives from a compost operation. In other words, the compost operation should be subsidized.

In some countries, this subsidy is arranged by simply having the compost plant run by the municipality. This may be a very good solution as long as the taxpayers acknowledge all of the benefits being received and do not simply look at the lower visible costs of a dump. In this country, we prefer to use private enterprise where possible because by so doing we can maintain incentives on productivity. In the salvage area, there is a very simple way of using private enterprise to the physical benefit of the public. In Cambridge, Massachusetts, and in many other cities, there are several entrepreneurs who drive the streets in pickup trucks and station wagons in advance of the city refuse-collection trucks. Their goal is to collect clean newspaper.

Operating to apparently random schedules and routes, they find it worthwhile to collect newspaper and to sell it to the dealers at, currently, between six and fourteen dollars per ton. They are regarded as scavengers, and some communities pass laws again this practice. However, in Cambridge, the cost of collecting and disposing of all refuse is between $30 and $40 per ton, most of this being from collections. The paper in the trash causes the greatest costs and nuisance in disposal, because it is either burned in an old, inefficient, and expensive incinerator, or it blows around the dump, occasionally catching fire. Accordingly, the benefits which the scavengers of newspaper are bringing to the city are in excess of the average $30 to $40 per ton. Of course, this benefit cannot be realized unless the collection of newspaper is scheduled and sufficiently substantial for the number of collection trucks and crews operated by the city to be reduced by one, although there is always some savings in that the life of the landfill is prolonged.

Accordingly, the Cambridge City Manager has agreed to try an experiment. Newspaper collectors will be invited to bid on a contract in a test area of the city. The city will pay them a bonus of X dollars per ton over and above the income received from selling the newspapers. The city will also police the area to ensure that other scavengers stay out. The contractor will guarantee to pick up all newspapers which the set out on the curb in bundles on a designated day each week.

An important part of the proposed scheme is that the collector must make a joint proposal with a public-relations organization. The residents will not be required, but merely asked, to separate and bundle newspapers. The function of the public-relations firm is to encourage this salvage by means of advertising, through-the-door leaflets, distribution of special bags, prizes, and any other gimmick which might have a payoff. It is possible that a separate contract may be made by the city with the public-relations firm whereby the firm would be paid a separate amount per ton collected by the contractor over a certain minimum. If this experiment is successful on the test section of the city, it will be extended to the rest of the city and possibly to the salvage of bottles and other materials.

Such an approach seems to offer advantages over the combined collection and salvage which is practiced in many places in Europe and has been found sufficiently beneficial in Madison, Wisconsin for that city to continue with newspaper salvage after a Public-Health-Service-financed demonstration. Combining salvage with general refuse collection involves breaking the rhythm of the collectors to the extent that the whole crew and the vehicle are slowed in their collection tasks. The refuse truck must be equipped with separate containers for newspapers: in Europe trailers are often used, and in Madison sacks slung on the side of the vehicle are employed. The separate containers involve obvious drawbacks in maneuvering, filling, and entry. Furthermore, the refuse truck has to make a separate stop to discharge its newspapers, a stop which again involves the whole crew and the vehicle. In contrast, the independent contractor collecting newspapers only usually has an inexpensive pickup truck, a one-man crew, and can operate with great flexibility. In particular, since newspaper col-

lection is quiet, he can start early in the morning before the streets are clogged and can complete a route in twenty percent of the time needed for the municipal refuse truck.

Perhaps the major advantage which this scheme offers over municipal salvage is that is appears to be the one way of encouraging residents to separate salvageable materials from other refuse. While occasionally residents, particularly in upper-income dormitory suburbs have been successfully urged by local governments to separate for salvage, the general experience in this country has been typified by Los Angeles where the citizen reaction against being required to separate refuse for salvage at home was so strong that Mayor Yorty's first successful campaign included a promise to eliminate this unpopular regulation. The American temperament is one that responds much better to economic and psychological inducements by private enterprise than to exhortations by government.

THE POSSIBILITIES OF CENTRAL-STATION SALVAGE

If separation at home can be successfully carried out on a widespread basis, the problem of contamination, which has an overriding effect on the economics of salvage, can be largely avoided. But salvage must be confined to the major bulk items such as newspapers and bottles. We can never expect the householder to sort into the five or ten categories which will be needed if 75% of our solid waste is to be reclaimed. This separation must be carried out in bulk, probably after collection, at a central station which can be regarded as taking the place of an incinerator or transfer station. It may be possible to limit contamination by providing householders with, perhaps, light plastic bags of different colors for different materials—white for newspaper, blue for bottles, and so on—so that materials may be easily sorted, manually or otherwise, even though all the material is thrown into the same ash can for general pickup.

However, the eventual answer must be completely automated methods of sorting for salvage. A great deal of activity is presently underway to produce sorting mechanisms. I would like to review some of these approaches very briefly and to give the present status of our work at MIT which is being carried out with the aid of a grant from the Public Health Service.

Lone Star Organics

The principal example of central-station reclamation in this country is the Houston plant of Metropolitan Waste Conversion Corporation, Lone Star Organics. It is more fully described in Reference 1.

This plant is similar to, but larger than, many European plants in that mixed refuse is fed to a traveling belt from which useful components are removed by hand, with the exception of the ferrous materials which are removed magnetically, and are baled in presses located on a lower floor below hoppers. Non-compostable materials, for instance automobile tires, are also removed by hand and the remainder is pulverized and composted. A pneumatic system of proprietary design has recently been installed to remove paper automatically, and glass fragments are separated at the end of the composting process by bouncing the material off a vibrating belt.

Mail Sorting

A further development of this traditional system might be to adapt a technique which has been developed for the U.S. Post Office (Ref. 2). In this sorting system, materials are also distributed along a belt, but a man is used merely to identify—or code—each packet according to its destination or zip code, and it is subsequently switched mechanically. This system could be applied immediately to the sorting of domestic solid wastes, so long as individual items can be distributed along a single high-speed belt (Fig. 1). The human coder would sort the stream into perhaps nine categories by pressing any of eight buttons as each item passes into the coding area.

This system is obviously suitable only for the larger items of refuse from perhaps the soft-drink-bottle size upwards. For the smaller components of mixed refuse, or for general refuse after pulverization, we shall need either bulk sorting or methods which identify individual particles with great rapidity. Some present approaches in both directions will be mentioned later. First, some work at MIT into the possibility of replacing the human coder with a mechanical device will be described.

Mechanical Coding

There are many possibilities of binary coding, many of which are already in use in different industries. The magnetic belt is an example of binary coding and sorting. There are methods to differentiate between conductors and nonconductors; radioactive and nonradioactive ores; dense and light materials, and so forth. To substitute for the human coder described above, a decision must be made among many categories, and there are no known methods of accomplishing this step on a material so heterogeneous as mixed refuse.

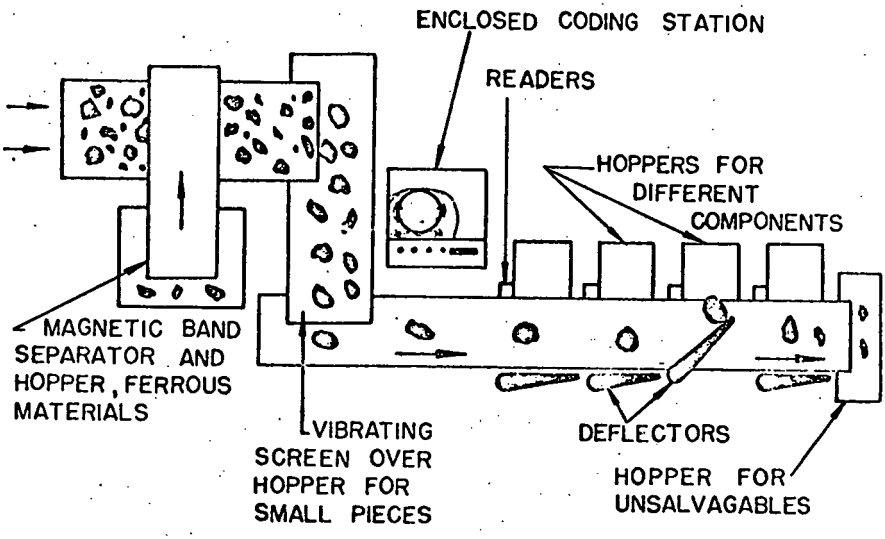


Figure 1

HUMAN CODING, MECHANICAL SWITCHING

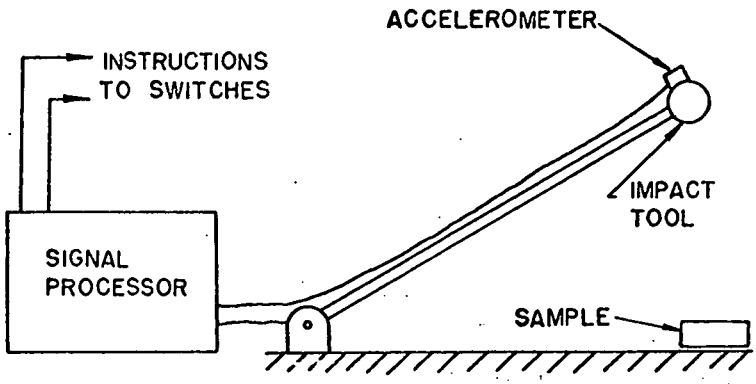


Figure 2

IMPACT SIGNATURE SENSOR

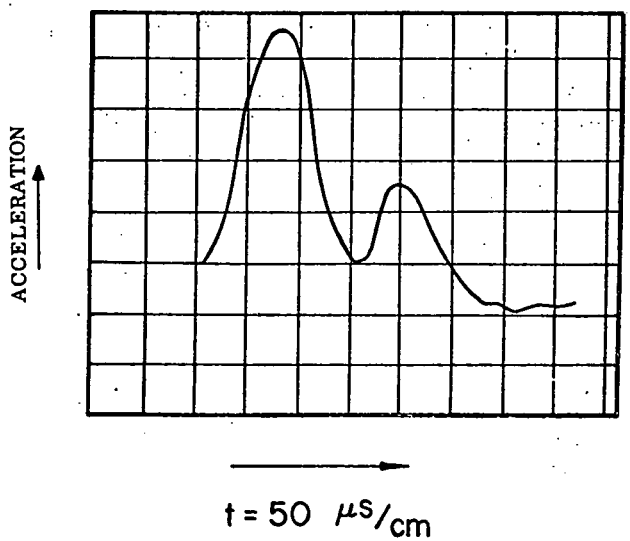


Figure 3

SAMPLE ACCELERATION RESPONSE

One method being investigated at MIT is to take a so-called "signature" from each large item. One method of obtaining a signature is by measuring the deceleration pattern of a tool which is projected against, or allowed to fall on, or vibrated against, the item of refuse (Fig. 2). A sample response is shown in Figure 3, and it has been found that a large amount of information can be retrieved from such signatures. We are not yet certain whether the information is sufficient for accurate coding to be achieved, but there are many other types of instruments which could be used in parallel.

Another example is the use of reflected electromagnetic waves. Such a technique may be used on either large, discrete, items of refuse (e.g. a bottle or a can) or on shredded particles carried individually past a sensor in an air stream, since the particles need not be contacted. Work by my collaborators, Dr. Stephen Senturia and Dr. Frank Winkler, has shown, for instance, that strong identification of paper and plastics, even when in sheets of similar thicknesses, can be accomplished by infra-red reflection.

Bulk Sorting

The major activity in automatic separation for reclamation is being carried out on pulverized or shredded refuse in bulk. In general, the sorting is achieved in binary steps.

At Stanford Research Institute, a series of zig-zag air classifiers, more usually employed for the cleaning of food beans, is being used for the separation of pulverized refuse, particularly paper (Ref. 3, Fig. 4).

Sorting in this case is carried out by sensing primarily the density, but secondarily the aerodynamic drag, of each particle. Accordingly, particle shape is important. An attempt to reduce the influence of the drag coefficient in a binary sorting process is being made at the Warren Spring Laboratory in Britain in a fluidized bed (Ref. 4, Fig. 5). The refuse particles must be shredded to within size limits which will permit fluidization and yet will allow them to be filtered from the bed medium.

At MIT we are trying to develop a many-branched system using density and drag by injecting the particles into a stepped vortex chamber, Fig. 6. By suitable shaping of the walls of the chamber, it is theoretically possible to provide well-separated regions where particles of different densities and drag coefficients will come into stable orbits. From these orbits they may be periodically removed. Some success with small-scale models has been achieved.

The two most highly developed automatic-sorting systems presently being experimented with apply differing technology from other industries. One of these is the plant which has been set up by the Bureau of Mines in Rockville, Maryland to use the methods of ore separation in the extraction of metals and glasses from incinerator residue (Ref. 5). It is a complex sequence of successive size-reduction steps, screening, from flotation, settling of high-density particles, and the use of intense magnetic fields and is achieving a degree of recovery which, according to predictions, would yield an immediate economic benefit.

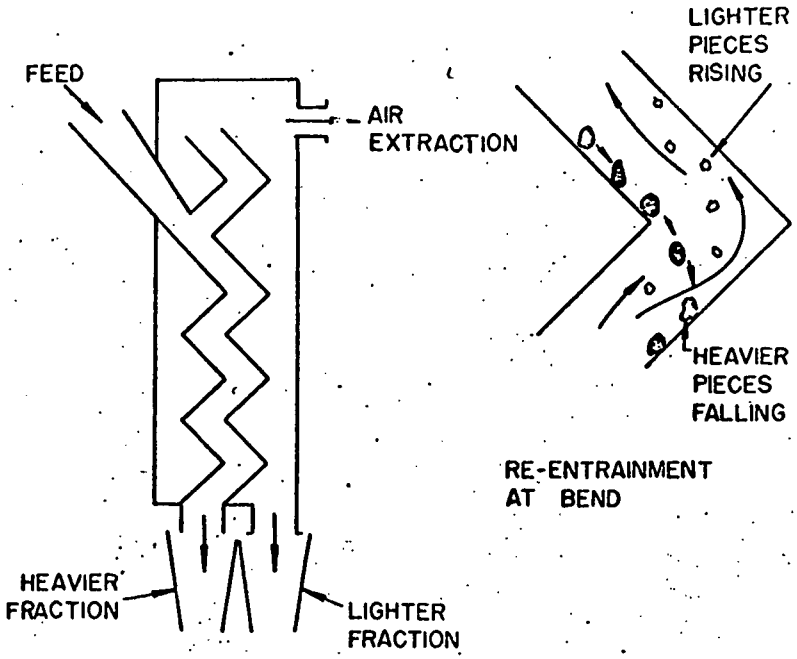


Figure 4

SRI ZIG-ZAG CLASSIFIER

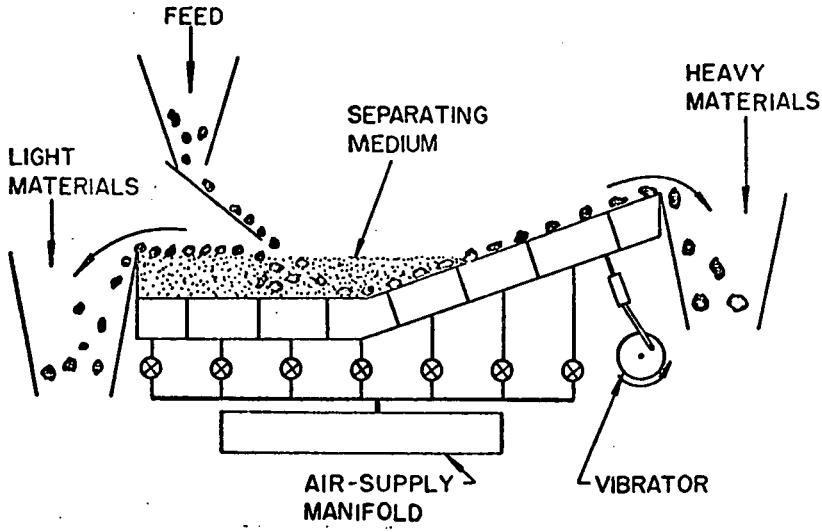


Figure 5

WARREN SPRING FLUIDIZED BED

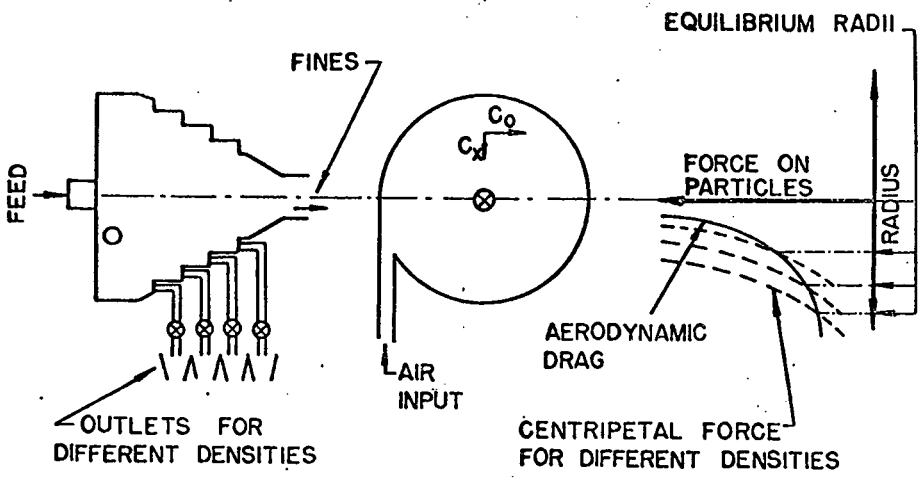


Figure 6

VORTEX CLASSIFIER

A system using paper-making technology has been installed as a pilot plan by Black-Clawson at Franklin, Ohio where mixed municipal refuse is fed to a fairly standard pulper (Ref. 6). The fibrous material, particularly paper, is pulped and successively screened and washed until a usable pulp is obtained. The pulp is dewatered, compressed, and baled for shipment to paper mills. Ferrous metals are removed magnetically, and glasses and other metals are taken out by density separation.

These last two processes have proved themselves workable using real municipal trash, and the last system has been operating outside the laboratory using some of the refuse from the town's daily collection. Municipal refuse is so irregular and inhomogeneous that the ultimate test of an automatic separation process has to be the test application in the field.

Overall Economics

The separation of material from a stream of mixed refuse produces not only the income from the sale of the material but a reduction in the cost of disposal of the remainder. This is particularly true if the decomposable or putrescible materials, such as cellulose and garbage, are first removed since the remaining material to be disposed of is more acceptable in landfill.

However, since the best examples of sanitary landfill cost between $1.50 and $2.00 per ton, no method of automatic separation or salvage seems economically justifiable when there are landfill sites close by the area to be served.

For many of our large metropolitan areas, nearby landfills are rapidly filling, and municipalities are facing the prospects either of building transfer stations for long-distance road or rail haul, or of building and operating an incinerator. The treatment costs (over and above the primary-collection cost) can then be from seven to fifteen dollars per ton. "In these circumstances, a plant which can separate a substantial proportion of the incoming material, say 25 to 50%, can show a large benefit even if the separated materials are just removed free (Ref. 7). If an assured income is possible, then plants in such areas should be profitable, because the capital and operating costs should be well below those for a comparable-sized incinerator. Therefore the economics are not always dependent on the price which can be obtained for the salvaged materials.

The Economics of Purity

This price is heavily dependent on purity. Paper dealers and mills will refuse otherwise clean newspaper if a shipment contains just a few pieces of plastic film or wax cartons, for instance. Some bottle manufacturers are willing to run their plan on 100% cullet if the incoming bottles are sorted by color, and all metal caps, retaining rings, and foil labels are removed. Glass not so sorted fetches a far lower price in a very uncertain market for such uses as roofing materials.

However, the secondary-materials market is a highly uncertain one, and the prices even for consistently high-quality materials fluctuate widely from month to month. The experience of many salvage organizations depending for income on the price of salvage materials has been unhappy and tends to deter others from entering this field. This would be an excellent area for government inquiry. There are strong suspicions of illegal manipulations in some secondary-materials markets. There is also the strong and justifiable wariness of large raw-material-consuming industries to commit large funds to the building of plants which depend on a very uncertain flow of secondary materials, especially in thoes cases where raw and secondary materials cannot be simply treated as alternative inputs. An increasing commitment on the part of municipalities and private industry to build reclamation plants, particularly in areas where the price received for the separated material is not the main income, would lead to a greater assurance of a constant supply and hopefully would remove some of the wilder oscillations of the market price. A very helpful step would be for the government to become a purchaser of last resort by fixing guaranteed minimum prices at which it would buy and sell various grades of second materials.

The long-term future of reclamation is extremely bright; the short- and medium-range prospect is exciting and challenging, and, if enthusiasm is tempered by caution, it could be very rewarding.

REFERENCES

1. Victor Brown, "Segregation systems for processing heterogeneous solid-waste materials for resource recovery", Proc. Nat'l. Ind'l. Solid-wastes Management Conference, Houston, Texas, March 1970.
2. M. L. McKenna, "Sorting technology and its application to materials management", ASME paper 69–MH–14, 1969.
3. Richard A. Boettcher, "Air classification for reclamation processing of solid wastes", ASME paper 69–WA/PID–9, 1969.
4. E. Douglas, T. Walsh and A. Whitehead, "The development of equipment for the dry concentration of minerals", Warren Spring Laboratory, Herts, UK, Aug. 1967.
5. M. H. Stanczyk and J. A. Ruppert, "Continuous physical benefication of metals and minerals contained in incinerator residues", Second Mineral-Waste-Utilization Symposium, IIT Research Institute, Chicago, Ill., 60616, March 19, 1970.
6. Robert F. Vokes, "Extraction system for paper fiber reclamation from municipal wastes", Nat'l. Ind'l. Solid-wastes Management Conference, Houston, Texas, March 1970.
7. David Gordon Wilson and Ora Everett Smith, "Mechanical reclamation from municipal solid waste", Nat'l. Ind'l. Solid-wastes Management Conference, March 1970.

DISCUSSION

Kenahan: Dr. Wilson mentioned the Bureau of Mines' plant at College Park, Maryland and talked about the sorting machine for separating clear glass from colored glass; it is a Sortex machine. Of course the clear glass is worth more money than colored glass, but there is a market for color. In Baltimore they will pay $24.00 a ton for clear cullet, yet we are dumping approximately 15 million tons of glass yearly. The plant at College Park is designed to handle the residues from municipal refuse, 1000 lbs. per hour. It has been designed and constructed from conventional ore-dressing equipment; there is much to learn from the mining industry in the processing of these solid wastes. With a combination of screening, crushing, grinding, and magnetic separators, the plant will separate out tin cans, iron products, aluminum, copper, zinc, and lead, and as Dr. Wilson pointed out, even the clear glass and colored glass.

The preliminary cost data on operation of the plant are promising. We have scaled up the data from the pilot plant to a plant that would process 1000 tons of residues a day, or the equivalent of about 4000 tons of raw refuse, and we think that we can process about a ton of refuse for about $2.50. The iron values there are worth about $25.000 a ton, the clear glass—$24.00 a ton, the aluminum—scrap aluminum sells for $200.00 a ton, copper about 60 cents a pound, and tin for about $1.50 to $1.60 a pound. Therefore, the economics of the process are very promising. We also have an air-classification system which separates most of the plastics and the paper from raw refuse. The remaining materials are tin cans, iron products, and the glass which can all be thrown right into existing power plants for subsequent treatment as residues. This kind of development will at least solve some of the problems.

Schoenberger: Dr. Wilson is certainly involved in an important aspect of future solid-waste-management systems. Collection and disposal are being investigated by others, but the recyling aspect is just beginning to come into its own. I knew an operator of a Philadelphia landfill who received just the residue from the city's incinerator and nearly matched his salary throughout the year by salvaging copper from each day's operation. Although Dr. Wilson has discarded human separation in favor of machines, it is an area which requires more examination. Possibly there should be a compromise between the two. I am not ready to exclude home separation yet, because it is still the cheapest sort of labor that we can utilize. Here, I do not think that financial incentives would be necessary. If collection is refused unless discards are separated into bottles and cans, etc., people would soon learn to comply with this type of incentive. The home system represents one part of the system that should be scrutinized. If we convert to separation on a mechanical basis, the collection system will need a serious overhaul at the same time since this is about 80% of the total cost of municipal solid-waste treatment.

Weaver: After listening to Dr. Wilson's remarks, one can take an idealistic or a practical approach. I will tend to be practical, at this time, to stir up a

little more thought for discussion. Although we talk about the depletion of our natural resources, realistically, there are some instances where we are not causing this depletion. To be truly serious about the ultimate goal of reclamation, we must go one step further than merely saying "depletion of natural resources." We must talk about, for example, conservation of natural resources which is quite different. Perhaps one of the speakers will go into this later—this matter of planting enough trees so that we are not really depleting our total resource while we continue to use prime material for our products.

In this business of home refuse, it is very important to understand the total community solid-waste-burden concept; that is, if we are talking about 10 pounds per capita in an urban area as a total community solid-waste burden, we must never forget that this heterogeneous mixture coming from our homes is probably the most severe problem for many municipalities. There is much that we can give attention to concerning long-range separation and recycling which would lend itself very well to the total problem. To make some progress initially, we might not be able to tackle the most difficult aspects from this point of view.

Finally, in terms of the glass manufacturer who is willing to go to 100% use of broken glass, as I recall it, I am certain that this is correct. But I also think that if we recycle all the glass in our refuse today, we would inundate the market. Where we need to begin, I suggest, is not necessarily with how to separate the glass, as important as this is and needs work, but with what to do with the material after it is separated. I submit to you that if the economics of this could be worked out, the rest would follow.

Kupchik: I am in agreement with Dr. Wilson; solid-waste management is basically a materials-handling problem. The question of how and where one handles this material is not easy to resolve. I am not inclined to agree with Bob Schoenberger who thinks that we can force the consumer to separate at home. This was tried many years ago. Only one bad apple in a clean batch spoils the whole thing; it is not possible to trace a greasy piece of paper in an otherwise good bundle, for example. Separation has to be done carefully and willingly, not by coercion but by incentive. There are a sufficient number of consumers who would be willing to participate in this sort of thing on a voluntary basis, but I must question seriously whether it would be of significant scale to affect a municipal operation. This is one of the reasons why we find two or three scavengers picking up paper. It seems to work on a small scale, but would create many, many serious problems for a large municipal operation. Can you tell us, Dr. Wilson, who did the bundling of those papers which the scavengers picked up from the top of the refuse? Certainly, home separation would be ideal, but I do not have too much faith in it. We can separate a few items in the home to make some sort of impact on the total waste-collection process but not to resolve the entire issue.

We then come to central separation where we have run into very serious problems. Central separation truly requires separate collection systems. We cannot collect bulk materials and garbage along with industrial scrap or anything else in the same vehicle. Routing of trucks must be rather restricted, and each load must be particularly categorized otherwise we do run into tremendous problems in sorting at a central location. This would also be true if were to pulverize. In other words, if we are less careful about our collection operation, and then throw everything into a pulverizer grinder expecting a more-or-less homogeneous material, we will find most of the pulverizers will balk at accepting a very mixed refuse. We cannot throw rubber tires in with garbage, nor can we put wire hangers, electric irons, or certain plastic materials, or ropes, in with paper, garbage, refuse, etc. The pulverizer must be built to crush almost everything, and we have to get into some large sizes for this purpose. However, when they are that large, they will not really do a good job on the small soft items; this is a problem, but it probably can be resolved technologically.

The question of composting has been discussed considerably. One of the key reasons for failure all over the world is that there is not a market for the compost. It would be a very good solution to dispose of our refuse by composting, but we should remember that about 40% to 60% of the wastes would have to be rejected before being composted because they are not compostable. Even for the remainder, a market just does not exist. Arid countries, such as Israel, should be able to use compost. In the United States, which is affluent and does not need it for agricultural survival, it would be very difficult to dispose of compost, even to give it away. Considering economics, we must pay someone to haul it away and hopefully use it, not dump it.

The idea of the bottle collection, this jackpot scheme, was quite seriously considered in New York City as a method of collecting bottles but was abandoned mainly because we could not be certain that only bottles would be inserted in this device. For example, we have found that where containers on parking lots were used to collect clothes for such organizations as the Salvation Army, they ended up with all sort of garbage; this destroyed confidence in getting a single type of item. One last word—the economic value is extremely important. When the supply of some of these items is low, prices are high; but when the supply becomes plentiful, the price will drop.

Black: I will try to weave in my comments among the others here. I do not know how many of these people on the platform have been checking with their wives lately, but I do know that if I should go home and insist upon having the trash separated into four classes of refuse, I would have to look for another place to live. It will not hapepn. But I do seriously think that a lot of material from industrial and commercial sources has been overlooked. Also, we need to say, and it has been hinted at a couple of times, that we are talking about a product, or a by-product really, which has a negative value. This is a large part of the whole problem. We usually try to get someone else to pick up the tab; as a people this is what is going on, and the sum total is that we are only very careful in our own houses and businesses. Certainly we have all seen the small shopkeeper very carefully sweep the front of his premises into the street and let the city worry about the rest.

Ledin: Dr. Wilson's separation methods will eventually develop, but I wish to point out the high degree of training which will be required by personnel. Mr. Black stated that 75% of the incinerators in the country today are inadequate. My first comment is that these incinerators have been designed over a period of time to earlier criteria. Secondly, due to poor operation and maintenance, these incinerators have deteriorated. Today we recognize a requirement for manpower training: an up-grading of the jobs involved directly wtih this particular problem. If we work on that immediately, we will accomplish with existing facilities, facilities that are currently acceptable, a direct impact on this growing problem. As our natural resources deteriorate and our economics change, developments such as Dr. Wilson has brought about will become more economic. Concerning separation—I know that my children, who are on a hot-lunch program in school, are taught to separate their waste-paper products, their silverware, their glasses, or whatever else may be involved. If this is a prerequisite for a first grader, and continued, then education of the public has been achieved.

Newcombe: No one has considered the home owner, and how to simplify separation in the home. Plastic bags, perhaps different colored plastic bags, would make it easier. There are three basic wastes from the home: paper, garbage, and cans and bottles. The real problem, contamination of garbage onto the other two, would be greatly reduced if simple separation practices were pressed.

Wilson: Thank you very much. My notes are getting long; let me answer Dr. Schoenberger and Mr. Newcombe first. I would not advocate regulations in hope of bringing about separation in the home. Former Commissioner Dan Finn of Boston has shown us pictures of apartment houses in Boston where trash is piled up against the corners of the houses. The local apartment houses, he said, were of the sort where you are not allowed to cook, but all the occupants cooked on little gas burners. Since they could not put their garbage in the wastepaper basket because the janitor would report them to the owner of the building, they took it out in a paper bag and while passing the building dropped the bag at the corner. Commissioner Finn has a shot of a very atractively dressed secretary doing this. That is the problem with penalizing legislation. As you know, we have not yet developed any measurements or meters to instantly give somebody a ticket for throwing a bottle out a window. Some separation schemes have worked in upper-class areas, or dormitory suburbs, and the League of Women Voters is doing a good job on education. What Mr. Ledin says is true; education is needed, and we need much more of it, but in today's world, it is too much to ask people simply to be good guys. The carrot is good and the stick is bad, because we can get away from the stick.

Dr. Weaver mentioned planting trees, and the exact purpose of such legislation as I proposed would be to tax any resource which is not replaced. Many of the paper companies claim to be planting trees faster than they are cutting them down. That is great; do not tax them a cent! But if companies are digging copper

out of the ground, you tax them for the copper. You would tax them more for the earth if they did not put the earth back; this would get them moving. Although this is what I propose, it will not come about until people are educated to accept the fact that our resources are disappearing fast.

Dr. Kupchik brought up the scale of recycling, and questioned who would operate a large plant. The operation should be commercial, not municipal. In a typical city, Cambridge, the dump was pronounced full almost ten years ago, and it is still increasing in height today. Paper causes the greatest nuisance; it blows around everywhere. They try to take the paper to an incinerator built in 1939, which broke down in 1940, without being fully repaired since. As Mr. Ledin mentioned with regard to city incinerators in general, it is typical in being now a poor incinerator run inadequately. The incinerator is not necessarily to blame, as those of you who build incinerators may know, but as often as not, it is the people who are running them who in turn may not get the support they need from the city and the citizens. At the incinerator near my former home in England, the men wear white coats, and they have a cafeteria to which they invite their wives. If we tried this approach, if we suddenly gave the employees a new deal, the system might work better. This is the point in the separation scheme that I am proposing. Give the operator an air-conditioned cubicle and $15,000 a year because it is worth it. I know someone who has operated a trash collection business and has paid his drivers an average of $13,000 a year; yet he made more money than most other people. It is a question of giving the right incentives.

I will add one point about our bottle-sorting machine. We foresaw the problem of people throwing in things other than bottles and simply arranged for it to sort them out and throw them back.

Chairman GRIFFITHS. At the request of Hon. Hale Boggs we are including an article by Donald Markstein on the use of agricultural waste in the manufacture of paper. Mr. Markstein's timely article appeared in the October 10, 1971, issue of Dixie, the Sunday supplement of the New Orleans Times-Picayune.

(The article follows:)

BAGASSE: FROM WASTE TO PAPER

(By Donald Markstein)

American industry produces countless tons of waste material. But don't think of this as pollution. Set your sights a little higher than that. Think of it as a vast untapped resource.

Untapped? Let's change that to "partially tapped." What one company looks on as potential landfill, another sees as raw material.

Nestled among the bayous of Southern Louisiana is the Valentine division of Litton Industries, which makes use of one of the waste products of the sugar industry—bagasse, the stuff that's left when you squeeze all the sweetness out of the cane.

What's bagasse good for? Well, aside from boiler fuel, animal litter and several other things, it's good for making paper. That's what Valentine does with it.

In 1955, soon after Valentine began this particular phase of its operations, a company official remarked, "Any fool can make paper out of bagasse—but not any fool can make a profit on it."

Indeed, the technology has existed for almost a century. The first paper mill to use bagasse operated in St. Bernard Parish, 'way back in 1879. Ten years later, plants up North were making paper out of Louisiana bagasse. But by the turn of the century, all of these had either gone back to wood or had gone out of business. They just weren't making it economically.

But Valentine has been making it for 16 years now, and gives every sign of continuing. In fact, since its acquisition by Litton Industries (which took place in May 1970) the Lockport mill's operation has expanded.

Bruce Pope, Valentine's president, says, "I don't want to paint any glossy pictures of the future, but we did just complete an overhaul of the mill to speed it up. I'd say our productive capacity has been increased by about 15 per cent. This was necessary because of our expanded market."

Bruce Pope, Valentine's president, says, "I don't want to paint any glossy pictures of the future, but we did just complete an overhaul of the mill to speed it up. I'd say our productive capacity has been increased by about 15 per cent. This was necessary because of our expanded market."

Areas into which Valentine has expanded since the first of this year include checks, trading stamps and business reply cards. Among its newer customers in the federal government's General Services Administration, which uses paper from reclaimed fiber—like bagasse—for legal pads.

Letter-size paper—8½"x11"—is being produced by Valentine for the first time in several years. "This is something we think could really take off in a few years," says Pope. And coated stock (paper with a coating to give it a different finish, making it better for some types of printing) is being produced there for the first time.

Without realizing it, you may even have bagasse paper in your home. Only an expert with expensive laboratory equipment can detect the difference between bagasse paper and wood paper—and even the expert is sometimes fooled.

As if to show confidence in its new subsidiary, Litton plans to print its 1971 annual report on Valentine's paper. Pope says, "The entire paper industry is starting to realize what high quality we can produce. It's now recognized that you don't have to make inferior quality paper from waste."

Even so, "All of our competition comes from wood pulp. Ours is the only plant in North America making pulp from bagasse."

Making paper from bagasse is surprisingly similar to making it from wood. The only major difference is the depithing process. Pith is a spongy substance, useless for making paper, that must be removed. This is done with a hammermill type of affair which slices the raw bagasse into smaller pieces, rubs the fiber free from the pith and separates the two.

Currently, the pith is used as landfill. But someday soon, there may be a commercial use even for it. Pope notes, "There's a corporation looking into the feasibility of using the waste material from this process for other products. But to say anything specific along these lines would be premature."

Pith contains proteins, fats, waxes and carbohydrates, so there's no question that a use can be found for it. Whether an economically feasible use can be found is another matter.

All the other noticeable differences between Valentine's operation and that of any other paper mill come before the paper making process itself. For example, bagasse decomposes a bit more readily than wood, so steps must be taken to see that a supply remains usably fresh between cane-cutting seasons.

Another, says Pope, is, "This stuff isn't quite as easy to transport as wood. You can float a log down a stream, but this has to be transported by truck, bulky as it is." This isn't as serious as it could be, since Valentine is located in the middle of cane country.

From the de-pither on, making paper from bagasse is just like making it from wood. A conveyor belt carries it to a washer, where some impurities are removed. From there it goes to the digesters, or "cookers."

The cookers are, basically, big ovens. Their purpose is to remove the material lignium—that binds the fibers into bundles, leaving a mass of pulp instead of chunks of vegetable matter. There are two major techniques to this—one involving large quantities of sulphur and the other involving caustic soda. Valentine uses the soda method.

Dr. James Matters, technical director at Valentine, says, "By the time the fiber has reached the point suitable for processing, no raw caustic soda remains In fact, everything that comes out of the plant—including the effluent—meets all state requirements for pH, (acid or basic strength) toxicity and B.O.D. (biochemical oxygen demand)."

Next comes another bath. The dull brown bagasse pulp going in at one end comes out light tan at the other. The bleaching that follows immediately leaves it is white as the driven snow.

At this point, a small amount of wood pulp is added to give it a bit more strength. Usually, not more than 15 per cent of the finished product is wood, and even that is added only because the bagasse fiber isn't quite as strong as wood fibers. The wood itself is about 33 per cent reclaimed—usually from sawdust, chips and such.

Matters notes: "We're looking for ways to remove more waste material from the environment—for example, such post-consumer fibers as boxes, discarded

paper and the like. If we did that, the only big difference would be that we'd have to add it in farther back, where it would go through the cleaning and bleaching processes."

The pulp—a wet pasty mass—is piped to a Fourdrinier press (named after a 19th century paper manufacturer). Out of the press comes a wide, thin continuous sheet. From there on, all that's necessary is to dry it out. The sheet runs through a long series of steam-heated rollers, the end result of which is a solid, dry roll of paper.

Each roll is tested to see if it comes up to standards and meets the customer's specifications. The cutting room shapes it into sheets of the size needed. From there, trucks wait to ship to all ports of the country.

From de-pither to cutting room, the average particle of bagasse fiber spends about 16 hours being sliced, mashed, cooked, drenched, bleached, stretched and rolled.

Matters notes, "The paper coming out is essentially sterile. The drying kills any germs it may have had at the beginning. Also, all materials used in the process are cleared by the Federal Drug Administration for contact with food."

The outcry against pollution—industrial and otherwise—rages on. But Valentine has been sitting on Bayou Lafourche for 16 years, turning a potential pollutant into a useful product—and making good money doing so.

(Whereupon, at 11:55 a.m., the subcommittee adjourned, subject to the call of the Chair.)

(The following article was subsequently supplied for the record by Representative Widnall:)

[From the Star-Ledger (New Jersey), Nov. 1, 1971]

EFFORTS COULD OFFER ECONOMIC BENEFITS

(By Ella Filippone[1])

The economics of recycling will begin to show an impact on our society as they take on greater proportions in the cycle of solid waste management.

To date, the collection of glass, cans, and paper have primarily been through voluntary effort. However, these services have a value, and this must begin to be phased into an analysis of recycling efforts.

Of course, the volunteers who are dedicated to their efforts usually do not recognize their work other than as a civic "labor of necessity." We must begin, however, to analyze the value toward our environment, taking these efforts into perspective and what they can and should lead to.

It is a well documented fact that the natural resources supply of certain goods is diminishing. For example, almost all of the tin used in the United States must be imported—hence we will begin seeing the price of this commodity rising and also have already seen the substitution of aluminum and steel in the use of cans.

In order to appreciate a total recycling effort, we can assign values rather simply.

For example, if we consider Bergen and Hudson counties, we have a combined projected population in 1975 of approximately 1.6 million people. If the usage rate of eight pounds per person of garbage per person is our base, Bergen and Hudson counties in 1975 will generate 2.3 million tons per year of solid waste.

If an effort were made at recycling cans, bottles, and paper, the amount of solid waste could be diminished by somewhere in the neighborhood of 50 per cent, considering that the solid waste mix in New Jersey is well over 50 per cent paper and paperboard products.

Any recycling effort in quantity can begin to show a profit. If a comprehensive program, involving the interrelationships of society were formulated, recycling could become a vital part of the economy of the state as a whole. This could be accomplished by a program which includes a coordinated formula of educa-

[1] Mrs. Ella Filippone of Basking Ridge, who represents several conservation commissions throughout the State, just completed a recycling study in Bergen and Hudson counties. This is her report.

tion, solid waste management, and implementation of an integrated progam using the public and private sector.

The development of any meaningful propect for the long term will depend on a dedicated assistance program by the state of New Jersey and the federal government.

Within the various statewide efforts by the people of New Jersey to organize recycling programs, it is quite clear that a mandate is being given to the state to commit more funds and move faster in the direction of establishing a variety of natural resources reuse programs.

Portions of these plans can begin to take form using various management techniques which have been in the past used in the production processes to give to the public a more efficient product. Now these concepts can begin to search out and implement uses for waste products.

For example, slag, which once presented a serious disposal problem in the steel industry, has become a valued by-product.

Therefore, the efforts of recycling of our solid wastes should begin to receive:

Greater recognition from the state and federal government in the form of funds for research and pilot projects.

Greater incentives to find alternate uses for solid waste and liquid waste products.

Place a top priority emphasis toward a total recycling concept—phasing out all landfill operations and incinerators in the state (this would be an ultimate goal).

The more efficiency that can be placed into a recycling operation, the more benefits can be returned in the long run. When evaluating environmental benefits, we must look to the long run, which in this case would mean the continued reuse of valuable natural resources, a lowering in the cost of waste disposal, lower costs of certain products, the provision of new jobs (since a new industry would be established or expanded), and the addition of other benefits, which arise within the free enterprise system, as an industry grows.

A coordination of the efforts of all the recycling must begin so that we can achieve the maximum benefits from all their efforts, and to do so, there must be more cooperation from those portions of government which have jurisdiction over the broader areas.

U. S. GOVERNMENT PRINTING OFFICE : 1972 O - 70-422