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RESOURCE RECOVERY ACT OF 1969

(Part 4)

HEARINGS

BEFORE THE

SUBCOMMITTEE ON AIR AND WATER POLLUTION

OF THE

MITTEE ON PUBLIC WORKS UNITED STATES SENATE

NINETY-FIRST CONGRESS

SECOND SESSION

ON

S. 2005

A BILL TO AMEND THE SOLID WASTE DISPOSAL ACT IN ORDER TO PROVIDE FINANCIAL ASSISTANCE FOR THE CONSTRUCTION OF SOLID WASTE DISPOSAL FACILITIES, TO IMPROVE RESEARCH PROGRAMS PURSUANT TO SUCH ACT, AND FOR OTHER PURPOSES

FEBRUARY 26, 27, AND MARCH 3, 1970

Printed for the use of the Committee on Public Works

AUTHENTICATED
U.S. GOVERNMENT
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RESOURCE RECOVERY ACT OF 1969

THURSDAY, FEBRUARY 26, 1970

U.S. SENATE,
SUBCOMMITTEE ON AIR AND WATER POLLUTION
OF THE COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room 3302, New Senate Office Building, Senator Edmund S. Muskie (chairman of the subcommittee) presiding.

Present: Senators Muskie, Spong, and Dole.

Also present: Richard B. Royce, chief clerk and staff director; Barry Meyer, counsel; Tom Jorling, minority counsel; Leon G. Billings, Richard D. Grundy, and Adrien Waller, professional staff members.

Senator MUSKIE. The committee will be in order.

We have four witnesses this morning. First is Mr. Edwin A. Locke, Jr., president of the American Paper Institute in New York.

Mr. Locke, it is a pleasure to welcome you this morning. We appreciate your interest in testifying and we look forward to hearing what you have to say.

STATEMENT OF EDWIN A. LOCKE, JR., PRESIDENT, THE AMERICAN PAPER INSTITUTE, INC.

Mr. LOCKE. Thank you, sir.

Mr. Chairman, my name is Edwin A. Locke, Jr., and I am testifying for the American Paper Institute, of which I am president. I should like to begin by saying that we greatly appreciate the committee's invitation to present our views at these important hearings. The telegram that we received from you, sir, requested that we come prepared to discuss the technical and economic problems involved in the recycling of waste paper, and the possibility of using more of those wastes in producing paper and paper products. These are matters to which we have long been giving concentrated attention, and we are keenly aware of the importance to the country, as well as to our industry, of furthering sound legislation in this field.

API ORGANIZATION

It may be useful to the committee if I say a few words about the scope of the American Paper Institute, which is the nonprofit national trade association of the pulp, paper, and paperboard industry. Our 200 member companies produce over 90 percent of the pulp, paper, and paperboard, together with most of the converted products from

these commodities, manufactured in the United States. Operating in almost every State, the manufacturing facilities of these companies comprise some 800 mills and 5,000 converting plants, and they employ over 700,000 people with a payroll of about $6 billion per year.

Senator MUSKIE. In how many states do they operate?

Mr. LOCKE. I haven't added them up specifically, but they are in all but two or three, Senator, straight across the country.

In terms of both capital investment and value of production, our industry ranks among the 10 largest in the United States.

Let me say at once that we support wholeheartedly the broad intent and thrust of the legislation now before your committee. The subject is one that has concerned us for many years. The question may arise in your minds, as it often has in ours: Why has not more progress been made in coping with the problem of waste paper? I should like to make it clear that the essential reason for the modest achievement to date is not lack of purpose and effort. It lies in the serious technical and economic difficulties inherent in the situation and which have proved extremely stubborn. I refer to difficulties in the collection of waste paper, in the technology of its reuse in the manufacturing process, and in the marketing of the resulting products.

Since a broad grasp of these difficulties is fundamental to constructive action in this field, with your permission I shall deal with them briefly before going on to describe the work done by our industry in overcoming them, and suggesting measures that might enable us to make further progress.

PAPER USAGE

Last year, 1969, the United States consumed about 58½ million tons of paper and paperboard. A high percentage of that tonnage consisted of paper and paperboard which in the process of manufacture had been combined with plastics, clay coatings, inks, laminates and adhesives. Before it can be recycled, the paper has to be separated from this foreign matter. It must be considered also that at the moment of becoming waste, even products made entirely of paper, such as bags and tissues, are often irreversibly mixed with other refuse.

Even when contamination is not a major technical obstacle, collection presents problems. Much of the waste paper used in recycling comes from used corrugates boxes, the largest single source of supply. These are collected from retail stores and factories by paper stock dealers, who also pick up mixed papers from offices and the waste paper of printing plants and converting plants of the paper industry. While this system yields fair results, the availability of waste paper from the sources I have mentioned often fluctuates widely.

NEWSPAPERS

When we come to the second largest single source of supply, the newspaper, we are confronted by a more complex situation. Clean newspapers are collected mainly from homes by Boy Scouts, students, members of religious and civic organizations, who are able to raise funds by selling the paper collected to dealers who, in turn sort it, bale it and sell it to our industry. At times up to 20 percent of newspapers distributed have been collected, but such efforts tend to be spasmodic.

When the goal of a fund-raising drive is reached, interest and effort diminish; while in periods of oversupply, the prices paid for old newspapers go down, thus reducing the incentive for collection and handling.

In other words, the collection process, as it stands, is by and large, not very efficient. There may be ways to increase its efficiency, and I shall refer to these a little later.

PAPERBOARD

Over 70 percent of all the waste paper collected is used in producing what the paper trade calls "combination paperboard." Manufacturers of this product must contend with difficulties created by the foreign materials found in the waste paper used. The more foreign materials, the greater the problem of maintaining high and consistent quality in the paperboard produced, and to remove these materials is not only costly but results in appreciable shrinkage in the weight of the waste paper. Nevertheless, recycling by this process has proved effective. The resulting paperboard is being used for many purposes.

NEWSPRINT

Newsprint manufactured wholly, or in part, from waste paper has been on the increase ever since the technology was worked out for repulping and deinking old newspapers. Although the producer of the recycled newsprint must adapt his operation to the uncertainties of the supply of waste paper, and this necessity tends to increase his costs, newsprint made entirely from wastepaper has found an increasingly large market.

Senator MUSKIE. How does its quality compare?

Mr. LOCKE. From all I have heard, Senator, it is interchangeable and indistinguishable from virgin pulp. It sells, I believe, at a slightly lower price which is necessary, I think, to break into the market.

I was shown a copy of the New York Times yesterday. It was printed on this recycled newsprint and it looked well and felt well.

Senator MUSKIE. I suppose it would be theoretically possible to keep the newspaper business supplied from its own newspapers.

Mr. LOCKE. Theoretically, I think it pretty nearly would. We don't know enough yet about the fatigue factor, if that is the term, after a fiber has been used and reused and reused, but certainly we can get a great deal more use out of newspaper fibers than we have been.

REUSE PROBLEMS

In sum, problems of collection, manufacture, and marketing now stand in the way of a sharp rise in the level of consumption of wastepaper by our industry. We have, however, made some advance against the difficulties I have mentioned. Since the end of World War II, our industry has considerably increased its investment in research, product development and facilities for the utilization of wastepaper. The result has been a steady rise in the amount of wastepaper recycled: In 1956, 8.8 million tons; in 1966, 10.2 million tons; and in 1969, an estimated 11½ million tons. This compares with 7.3 million tons in 1946. Today some 220 mills, or about 30 percent of the total number

in the country, work almost exclusively with wastepaper, and many more use a proportion of wastepaper in part of their output. We calculate that each ton of recycled wastepaper saves 17 trees, and that the current recycling activity conserves close to 200 million trees annually.

Forty-eight of the member companies of the American Paper Institute, nearly 25 percent of our membership, now manufacture paperboard that consists almost entirely of reused fiber. Last year their total output of combination paperboard used over 8 million tons of wastepaper, equivalent to the annual yield from some 5 million acres of woodland.

I might interject there that this 5 million acre figure is a very, very conservative one. There are a number of my colleagues who think it should be 20 million acres.

NEWSPRINT

The story for newsprint is comparable. We estimate that in 1969 newsprint made from reclaimed newspapers conserved another 200,000 acres of woodland. One newsprint company within the last 8 years has built three mills in different parts of the country to repulp, deink, and recycle old newspapers. Those mills alone now consume about 365,000 tons of waste newsprint annually, to produce 320,000 tons of new product, representing about 11 percent of the total domestic production of newsprint.

I assign great importance to research now being carried on in the field of wastepaper collection. There is no doubt in my mind that if public agencies and our industry, working together, could develop more efficient collection systems, we would substantially increase and stabilize the flow of wastepaper to the industry for recycling, and go far to remedy an erratic price situation that now militates against long-range planning in this field. For that reason we are carefully watching the results of an experiment, a unique pilot project, now being carried on in Madison, Wis. One of the committees of the American Paper Institute, the Paper Stock Conservation Committee, which has been active since early in World War II, is collaborating with civic authorities there to test the extent to which citizens will cooperate in reducing the wastage of old newspapers. The people in the test area have been asked to keep their old newspapers separate from their trash, tie them in bundles, and place them at the curb in front of their houses. The sanitation men put these bundles into separate bins which have been built on the sides of the trucks.

According to city officials, results to date show that about 20 tons a week, or 40 percent of the newspapers entering the test area have been collected. If this and related experimental work proves that it is practicable to enlarge and stabilize wastepaper collections for reuse, a considerable element in solid waste pollution might be substantially reduced. So far we have received requests from at least 20 other cities for information on how to organize similar wastepaper collection projects.

WASTE SEGREGATION

Another line of research that offers considerable promise is being carried on with the cooperation of the Bureau of Solid Waste Management of the Federal Government. The aim here is to find economical

ways to separate solid waste into reusable components, particularly wood fibers. Several independent research organizations and a number of companies in our industry are involved in this project, with the aim of increasing the practical use of wastepaper previously regarded as unreclaimable.

The entire problem of research in this field is regarded by our industry as so important that we are currently organizing a conference, to be held late this year in Washington, on the subject of "Utilization of Waste Paper Fiber by the Paper Industry." The purpose of this conference will be to enable Government officials concerned with the problem to meet with representatives of management and technology in our industry to explore new and improved ways in which wastepaper can be increasingly utilized in papermill production.

It has occurred to us that one idea worthy of consideration at such a conference might be the formation of technical service teams, in which both government and industry are represented, to provide comprehensive technical counsel to local authorities generating waste paper. Something of this kind is already being done in England by one of the larger British paper companies. Given the greater complexity of the American situation, I feel that a joint government-industry service, including both paperstock dealers and consuming mills, might be even more effective.

The technological aspects of the problem require far more attention, in our opinion, than they have so far had. Especially, there is need to expand the use of machines of the latest types to produce differing grades of paperboard from waste paper. Several new machines of advanced design now permit substantial improvements in the efficiency of the process and the quality of combination paperboard grades. Some installations of this kind have already been made, and others are under consideration by mills. In addition, a number of major companies which have hitherto used solid wood pulp as the basis for most of their paperboard output, have begun to add to their facilities recently-developed equipment designed to utilize corrugated cuttings and boxes more effectively in producing paperboard.

EQUIPMENT COSTS

There is, however, a widespread opinion that in order to justify large additional investments in such equipment, the industry, in cooperation with government, needs to find ways to strengthen the entire economic foundation of the recycling process. We feel that the government has good reason to make it economically more feasible for mills to install the facilities needed for the recycling operation on the scale required. Investments for this purpose will of course be closely related to allowable depreciation practice. Under the existing law, companies installing certain other types of antipollution equipment are permitted to amortize it completely within 5 years. It seems to us entirely reasonable that equipment installed to combat solid waste pollution should be made subject to comparable amortization.

I think I should add that one form of waste paper, at least, is being almost entirely reclaimed and recycled. I refer to the waste paper generated by printing plants and converting plants. The trim from printing plants can often be used in place of primary wood pulp,

and is almost 100 percent recycled. These reclaiming operations are not large compared with the total solid waste stream of the country, but they suggest what can be done with salvaged waste paper where technology and economics permit.

NAS STUDY

In what I have said so far, I hope I have conveyed that our industry is far from complacent about the present situation in waste paper recycling. We are keenly aware that most of the task lies ahead. The chief issue in this connection was well stated by the National Academy of Sciences, in its recent study, "Policies for Solid Waste Management." One sentence from this study is especially worth noting. "The principal solutions to solid waste management lie in providing operational systems that employ physical procedures rather than regulation." I think there can be little doubt that given the complexity of the problem, regulation and penalties in themselves would have little effect. It is the operational system that must be worked out and the people involved in it who must be motivated, in order to increase the flow of waste paper back to the mills where it can be reclaimed, reused, and marketed.

The importance of creating a system that will stimulate effort in waste paper reclamation all along the line becomes especially apparent when we consider the goals which have been proposed in this connection. The National Academy of Sciences has recommended that the paper industry, in effect, increase its percentage of recycled waste paper from the present 20 percent of the total tonnage of paper and paperboard used in the United States in 1969, to 35 percent in 1985. This is certainly a desirable goal, and one which our industry endorses, but the 35 percent figure sounds a good deal more modest than it actually is. The crucial fact is that while tonnage of waste paper being recycled by the industry has been increasing, it has not been increasing as fast as the production of paper from wood pulp. Thus, for many years there has been an actual and prolonged decrease in the percentage of production from waste paper. What is being asked by the National Academy of Sciences, practically speaking, is that this negative trend be reversed and a substantial upward trend in the consumption of waste paper relative to wood pulp be established and sustained.

That is by no means impossible, but to achieve any such goal plainly requires, in our opinion, the introduction of new techniques and new incentives that will swiftly overcome the existing difficulties. A recent research study made by the Midwest Research Institute concluded that "unless salvaging can somehow be made more economically attractive to the participants," it could be "an even less attractive method of disposing of paper-based packaging wastes in 1976 than in 1966." This is unquestionably a real danger, and one that can be avoided only if strong motivations are present at every point in the reclaiming system. The research and development work which would be encouraged by the bill now under consideration could go far to determine precisely what these motivations should be and how to make them effective.

I believe we are safe in predicting that the sharpened attention

now being given to this subject on all sides will result in important forward moves in the years immediately ahead. A combination of penetrating research, effective motivation, and strong cooperation between government and industry could, I am personally convinced, achieve significant results in a relatively short period of time. By helping to open up the necessary lines of action your committee can, and I feel sure will, make a notable contribution to the fight against environmental pollution.

Thank you very much.

Senator MUSKIE. Thank you very much, Mr. Locke. I guess it has been more customary to hear from your industry in connection with water pollution.

Your paper is most informative. It is evident that the industry has been concerned about this problem and has been undertaking, I think, well thought out and effective means of dealing with it. Yet I suspect that, as in the case of water pollution, the industry may be a more vulnerable target than other industries.

PAPER REUSAGE

From your statement, paper seems to be a more easily salvageable product than others. And paper in certain forms, newsprint, for example, is obviously more salvageable than others. Could you give us, by percentage, the total paper waste proportions that are of the more easily salvageable type of papers? If you were able to salvage——

Mr. LOCKE. We use about 9 million tons of newsprint annually in this country. Much of it, about 60 percent, is imported from Canada. So there is still another incentive involved, the balance of payments. In other words, the more newsprint we can recycle and reuse, the less we will have to import.

Senator MUSKIE. How does that compare with the total of paper waste?

Mr. LOCKE. We estimate that in 1969 we used about 11½ million tons of wastepapers—recycled 11½ million tons.

Senator MUSKIE. We were given a chart yesterday——

Mr. LOCKE. Total paper consumption——

Senator MUSKIE. Up to——

Mr. LOCKE. 58½ million, approximately.

Senator MUSKIE. In 1970, 58½ million tons. Of that, approximately 11½——

Mr. LOCKE. It is about 20 percent.

Senator MUSKIE. What percentage of the total paper or of this 11½ million tons is newsprint?

Mr. LOCKE. 11½ million tons is the total wastepaper that we use—or rather reuse.

Senator MUSKIE. Oh, I see.

Mr. LOCKE. That is about 20 percent of the total consumption of paper and paperboard in this country in 1969.

Senator MUSKIE. I am trying to relate the figures you are giving me with this chart that we were given yesterday which shows that the total paper consumption in 1970 will be 58 million tons.

Mr. LOCKE. Yes; that is quite close to our figure.

Senator MUSKIE. That is about right, is it?

Mr. LOCKE. Yes.

Senator MUSKIE. Of that 58 million tons, what proportion of it is newsprint?

Mr. LOCKE. About 9 million tons.

NEWSPRINT

Senator MUSKIE. Would you say that newsprint would be the most readily salvageable of all wastepapers?

Mr. LOCKE. Up to a point. It is the least desirable, too. It is the lowest grade of wastepaper. As you know, it is produced by purely physical, nonchemical means for the most part. But it can be used very effectively as one of our member companies has shown in making it into newsprint again.

COATED PAPERS

Senator MUSKIE. In the opening part of your statement, you referred to the fact that paper—we come to chemical means now—is mixed with various other products, plastics, clay coatings, inks, laminates, and adhesives. What kinds of papers are involved in these kinds of products?

Mr. LOCKE. All coated papers which include the majority of magazine papers. They have a lot of clay in them—up to 20 or 25 percent of the total—that has to be taken out—and which incidentally will create pollution problems by clogging up streams if it isn't very carefully handled.

Various papers used by the advertising world have various kinds of coatings on them and colors and paint and ink and so on. Of course, all paper that is used for writing and printing has ink on it. I might add that we have worked closely over the years with the ink people to get them to supply inks which are easier to take out of paper than was the case previously, and this has been proven quite successful.

Senator MUSKIE. Have you been able to deal effectively with waste papers of these kinds?

Mr. LOCKE. Yes; of course the more contamination there is in paper, the more difficult it is to handle and, of course, the more costly. In the final analysis, this boils down to economics: Which is the most economical? Waste paper as a raw material or virgin pulp?

INCENTIVES

Senator MUSKIE. On that point, Senator Eagleton put a statement in the record yesterday that I would like you to comment on this morning if you can, or later. The thrust of this paper will simply raise some questions. Let me read this part:

> I understand that the elasticity of demand for used paper is great—let me start at the beginning. "Today the average ton of paper products contains only 22 percent of waste paper. In 1946, the figure was 37 percent. In other words, for every five pounds of paper products manufactured today, only about one pound is recycled, while four are simply destroyed.
>
> I understand that the elasticity of demand for used paper is great—that a slight increase in the price of fresh pulp would produce substantially greater demand for used paper.
>
> In 1943 Congress gave the timber and paper industry a special capital gains break which today gives these industries an effective tax rate 10 percent below the average for all industries, excluding petroleum. This tax break, which

amounts to about $100 million a year, was originally conceived as a means of promoting reforestation and conservation, but many authorities question whether it is still the most economical means to this end.

He then goes on to make the point that perhaps this tax break encourages the use of fresh pulp instead of used paper as the source of raw materials.

Would you comment on that?

Mr. LOCKE. I have only been in the paper industry a little over 2 years now. So, perhaps, I can speak with a little more objectivity than you might expect me to.

Almost since the day I took on these responsibilities, I have been critical of our industry for the low return on investment which it has been producing. Out of some 23 basic manufacturing industries in the last 10 years through 1968, paper ranked 22. I think only the steel industry and, temporarily, the rubber industry were below us.

For an industry such as our paper industry that requires enormous amounts of capital, what economists call being "capital intensive," we are extremely dependent on the approval of the financial community for what we do and the results we get. We have to sell stock from time to time. We have to borrow money from time to time. It is absolutely vital for the paper industry to have the respect of the financial community for the results we get.

So, I have been emphasizing strongly this inadequate return that our industry has been getting. I can't agree with the implication that this so-called capital gains treatment of timber is making this an unusually profitable industry.

Senator MUSKIE. I don't think he was challenging that. I think he was pointing to the very question you raised in your paper, the question of motivation.

There are various ways of creating that motivation. For example, yesterday one of our witnesses suggested that the way to get at the solid waste problem was to propose a tax that the manufacturers levy, at a penny a pound for all as a way to induce motivation.

Mr. LOCKE. I was going to add that this $100 million figure that the Senator uses covers all timber, only a part of which is for the paper industry.

But let's be generous and say half of it or $50 million went to the paper industry. We produce over 40 million tons of virgin pulp in this country. This means about a dollar a ton. For a product that sells around $140 a ton, it doesn't seem to me it would make any difference.

Senator MUSKIE. What do you think of the penny a pound?

Mr. LOCKE. That is one of those pat suggestions that sounds easy but I think the more you dig into the practicalities of it, the less sensible it is.

I think one immediate effect of it would be to increase the price of practically everything the consumer buys and in a period of inflation, I would be most reluctant to see the Government do anything that would tend to increase prices any further.

Senator MUSKIE. The President, who is quite inflation-minded, has suggested in his State of the Union message that the cost of pollution cleanup ought to be included in the price of everything we buy.

Mr. LOCKE. I have a great respect, Senator, for the capacity, the ingenuity and the ability of the private sector in our economy to come

up with answers. If they are clearly shown the problem and clearly shown that it is in the national interest and given some sort of incentives—monetary, moral, and otherwise—both, to do something about it——

Senator MUSKIE. It is getting down to the hard core of the problem. It is a different proposition, and I assure you I am open minded, including the penny a pound idea. How do you spread this motivation throughout the economy in all the places where waste is produced. It is very difficult.

I think your paper is an excellent illustration of an industry which I think has made a meaningful and significant effort to deal with the waste paper problem. You have done what would be the inclination of anyone to do—to attack the easiest problems first because they produce the most visible and significant results.

I think that pattern would follow throughout the economy. Then you must go beyond the easier problems into the tougher ones. The argument was made yesterday that doing this by regulation holding, which is dependent upon court litigation, and prolonged enforcement proceedings, would not work in the case of the citizen who doesn't have sufficient influence so that that doesn't work altogether.

Tax incentives would work with some industries and would not with others. It will not work for industries that do not make profits. Hopefully, it would work with industries that do make profits, but, again, with smaller ones, the tax incentive may not be big enough.

You have this problem with all the various means that we have tried to use in the last 7 or 8 years in putting together effective pollution control programs.

We are looking for new ways of approaching the problem. You suggest a tax incentive geared to the objective of encouraging recycling technology. That is a profitmaking technology.

Mr. LOCKE. That is right.

Senator MUSKIE. We have talked about tax incentives up to this point. We have talked about installations of facilities that were not profitmaking—waste plants in the case of water, electrostatic precipitators in the case of air pollution. That is the rationale that this committee has supported in the past—tax incentives for non-profit facilities in the public interest.

When we consider profitmaking facilities, however, I think we are a little more hesitant.

Mr. LOCKE. I think you did a few things of that sort for the railroad industry.

Senator MUSKIE. That didn't come out of this committee.

Mr. LOCKE. There is no simple, magic answer to this. I think it is a combination of a great many things. I do have the very distinct feeling that in the paper industry, with which of course I work very closely, there has developed a much greater awareness coming along in the last few years of the importance of using waste materials than has been the case since the War.

During World War II, of course, we had a tremendous national effort. We were all united. We were all working on this problem and we greatly increased the use of waste paper.

Then, for perhaps 20 years after the war, our results sort of leveled out. Now, they are beginning to pick up again. You can see that we

are so interested we are even working with the municipalities to help them figure out some way of collecting on a consistent economic basis the tremendous amount of paper scrap that is produced in any city.

This is the opportunity, as I see it, for encouraging the paper industry to use a lot more wastepaper. The amount of new paper that goes into a city is a very steady amount. Therefore, the amount that could come out is also very steady, and to run a papermill you have got to be sure that you have a reliable, steady source of supply at reasonably stable prices. The cities offer this opportunity. This is one reason why we are so interested in this problem.

Senator MUSKIE. I would suggest to the paper industry that the paper you produced this morning is impressive in that it suggests a concern and a purpose and an organized approach to the problem which is reassuring. But I would think that the paper industry has an excellent opportunity, using its own initiative and the developed expertise which it has built up, to really attack this problem and show that it can be done. You have a product that I think is especially susceptible to that kind of treatment.

I must leave now. I must meet with a group of Governors and Senator Spong and Senator Dole have consented to go on.

Senator DOLE. I would like to ask one question so I can attend another committee, then I can come back and you can leave.

Senator SPONG. If you will come back, you may go ahead.

VALUE OF PAPER

Senator DOLE. I have read your statement very hurriedly, but I am wondering about the magnitude of the problem, what is wastepaper worth? How many Washington Posts does it take to be worth anything? I just picked that one at random. How many pounds of Washington Post would you have to have?

Senator SPONG. He is speaking quantitatively.

Mr. LOCKE. Senator, there are perhaps 200 different qualities of wastepaper. Newsprint, as I said a little while ago, is the least desirable of the wastepapers. But I feel it offers a great deal of potentiality for its purpose of making newsprint out of it again. The great stumbling block for awhile was deinking and they have surmounted that problem. More recently the limitation, as I understand it, has been reliability of supply.

All three plants of the company which has gone so far and been so successful in making newsprint out of old newspapers, are in a position where they can be quite simply expanded.

Let me say again, however, that they have got to be sure that their wastepaper supplies are going to be coming through with steadiness.

Senator DOLE. You mentioned motivation in your statement. We are familiar with the Boy Scouts' efforts and I understand during the peak period approximately 20 percent of the newspapers were collected.

From the standpoint of compensation for those who collect the newspapers, what is the value to those who collect or those who participate in these drives?

Mr. LOCKE. We have had some figures. I don't recall them off the cuff, but I know of one Boy Scout outfit in a town on the west coast,

which, over a 5-year period, has collected $300,000 from just this kind of exercise.

Senator DOLE. I believe you stated there are 200 different qualities of paper.

Mr. LOCKE. Uncontaminated newsprint would be one of those qualities.

Senator DOLE. That would leave out the Post.

But generally, motivation appears to be one of the problems. If we are going to motivate people——

MADISON, WISCONSIN

Mr. LOCKE. Well, Senator, at one point in this statement I referred to the experiment that is going on in the city of Madison, Wis., and there, on a conservative basis, they are covering half the town with their program and they figure they are recovering at least 40 percent of the newsprint going into that area. They are planning, in another few weeks, to extend this program to the entire city and if it continues to prove out in the rest of the city, it will do a number of things.

It will conserve paper. It will save the city money because the city can sell the old newspapers to dealers and get some income instead of having to spend money because of its increasing cost of waste disposal.

RECYCLING

Senator DOLE. Is there another problem in the recycling? Is there more waste created in that process, in the de-inking, to make it usable a second time. If so, you would then have another disposal problem although the waste is probably less.

Mr. LOCKE. It is nominal compared to the wastepaper used.

Another thing that is happening is this: We are finding that the papermills are getting a consistently much better quality of used newsprint as a result of this experiment. So, it seems to be helping everybody. That is what encourages us.

Senator DOLE. I would say, based on your statement, your institute is making a real effort. I also note that there will be a conference held to study the utilization of wastepaper. When will that be?

Mr. LOCKE. Sometime in the fall, sir. We want to do the job well and not in a rush. It takes time for the preparation.

Senator DOLE. It might be helpful if you could alert members of our subcommittee. We may not have a solution by then.

Mr. LOCKE. Some of your members might even care to participate, and we would be happy to have you do so.

Senator DOLE. Thank you. I will be back.

(Subsequently, Senator Dole supplied the following letter for inclusion in the record:)

U.S. DEPARTMENT OF AGRICULTURE,
FOREST SERVICE,
Washington, D.C., March 9, 1970.

Hon. ROBERT DOLE,
U.S. Senate,
Washington, D.C.

DEAR SENATOR DOLE: This sheet of paper is a matter of particular pride to me and to the research staff of the Forest Service. Thirty percent of the fiber

in this sheet came from the city dump in Madison, Wisconsin. We have reclaimed refuse that is an eyesore and pollution problem in most American communities.

The red-dyed wood fibers that give this sheet its pink color came from that dump; the remaining 70 percent from a kraft pulp commonly used in papermaking. The transformation from rubbish to paper was made at our Forest Products Laboratory in Madison. This seeming alchemy is part of our research on reclamation of urban solid wastes.

The supply of fiber in rubbish is enormous. About half of the rubbish collected by cities is wood fiber, none of which is being reclaimed. Successful recycling of the wood fibers in waste could mean more paper like this, as well as newsprint, building materials, coarser papers, and even new products. It would also mean reduced pulpwood demand, more raw material for industry, less air pollution from burning rubbish, and less cost for waste disposal.

To get the knowledge we need to utilize fiber in solid wastes, we are cooperating with others. The City of Madison, Bureau of Mines, and Bureau of Solid Wastes Management are all concerned and participating in the exploratory research.

President Nixon in his message on the environment ordered "greater emphasis on techniques for recycling materials." We proudly present this sheet of paper as an example of what the Forest Service is doing. The President's budget for 1971 provides for an acceleration of this effort. We believe this is a significant step in learning to re-use resources and to enhance the quality of the Nation's environment.

Sincerely,

EDWARD P. CLIFF, *Chief.*

Senator SPONG. Thank you. I will be looking for you.

I have had an opportunity to review your statement rather rapidly.

EUROPEAN PRACTICES

In your statement, you suggest that the industry might consider at its conference technical service teams similar to those already in Great Britain.

How does the quantity of paper recycled in the United States compare to the percentage in England, or in Europe?

Mr. LOCKE. England—I happened to get into this last year in connection with a talk I had to give over there—is gathering around 26 percent of the paper consumed. They have another urgent incentive over and above the obvious ones and that is they are large importers of newsprint and, thus, to improve their balance of payments, they are using as much internally produced waste paper as possible.

They are hoping to get up to about 30 percent but it all depends on what they can work out with the municipalities, where the big supplies are.

In Holland they get up to about 34 percent, as I remember the figure, and a similar figure in Germany. There is a somewhat comparable figure in Japan, although interestingly, the Japanese percentage is beginning to decline a little as labor is getting scarcer and more highly paid.

All of this indicates, I think, that there is opportunity for us to increase this percentage well beyond where it is today. We can't do it overnight but I think we can gain on it pretty steadily.

Senator SPONG. Has there been any discussion of our percentage here? Am I correct that it is about 20?

Mr. LOCKE. Yes, sir.

Senator SPONG. Are there any European countries or any countries where they have reached 50 percent?

Mr. LOCKE. I don't believe so, sir. Maybe 35 or 36 percent. That seems to be the maximum.

Senator SPONG. In Holland and Germany.

Because of the economic situation, it seems to me that if your industry in the United States is going to double in the next 16 years, you have incentives here as well as in Great Britain.

Mr. LOCKE. We do, indeed, sir, and the availability of prime locations for newspaper mills is considerably smaller today compared to what it was a few years ago.

Senator SPONG. In your statement—you and Senator Muskie had some discussion on this—you have recommended consideration of quick write-off's for solid waste equipment similar to those included in the recent tax reform bill.

In terms of total investment, could you project what is involved insofar as the 200 companies in your organization and your industry are concerned?

Mr. LOCKE. I would have to guess, Senator. We have total plant investment of the paper allied industries of some $17 billion. I would guess that, perhaps, $1 billion or more of that was in equipment that uses, or can readily use, waste paper.

My staff informs me that it would be a guess. It would be a pure guess, Senator.

RECYCLING AND REUSE

Senator SPONG. We had testimony earlier this week from the Reynolds Metal Co. They are beginning, throughout the entire United States, to establish collection centers for the purpose of projects for recycling and reusing aluminum.

Is it economically feasible in any way for the paper industry to do something similar to that on a larger scale than the Boy Scout effort?

Mr. LOCKE. I know what Reynolds is doing and I think it is very, very commendable and I hope it is getting some results.

I think there is a good deal we can do in educating our industry, making them more thoroughly aware of the opportunities in using waste paper and also in educating our customers. There is always a reluctance on the part of someone who has been using a paper made from virgin pulp to shift to using waste paper products.

I believe there is a good deal we can, and should, do in both those directions. The collection of waste paper in the field is handled by dealers for the most part who are all over the country and we could hardly take over their work. There may perhaps be things we can do to work more clearly with them and I have suggested one here in terms of the service teams.

Senator SPONG. This bill, S. 2005, provides, among many things, grants of money for incinerators.

Do you think—you may not care to comment on this—this would have some affect on the motivation to recycle solid wastes? Are we self-defeating in any way in doing this?

Mr. LOCKE. Senator, so many of these things depend upon the way they are done and the degree to which they are done.

Personally—and I am speaking purely as a private citizen—I would be reluctant to see enormous sums of money spent on enormous incinerators because I think we may be leap-frogging, getting ahead of technology, as well as the other considerations to which you refer. I

certainly think some developmental work ought to go on in this connection but there are a great many other things that ought to go on concurrently. Let's see as we feel our way along what contribution each of these activities is making and where further efforts need to be concentrated.

I am a gradualist, in other words, not a revolutionary.

Senator SPONG. I thank you very much, Mr. Locke, and I appreciate having your testimony here this morning. Any additional pertinent material you may want to submit will be included in the record.

Mr. LOCKE. Thank you.

(The following letter was sent to Mr. Locke by Chairman Muskie:)

APRIL 21, 1970.

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

DEAR MR. LOCKE: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide answers to the following questions:

1. What are the different categories of waste paper, and what is the value per ton?

2. What are the costs for de-inking newspaper and reclaimed coated papers?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE, U.S.S.,
Chairman, Subcommittee on Air and Water Pollution.

(The following answers were subsequently received:)

AMERICAN PAPER INSTITUTE,
New York, N.Y., May 23, 1970.

Hon. EDMUND S. MUSKIE,
U.S. Senate, Committee on Public Works, Chairman, Subcommittee on Air and Water Pollution, Washington, D.C.

DEAR SENATOR MUSKIE: I wish to thank you for your letter of April 21, 1970, requesting additional information on the subject of waste paper. I also wish to express my thanks for an opportunity to testify before your Subcommittee.

In answer to your two questions:

1. Question. What are the different categories of waste paper and what is their value per ton?

There are four basic categories of waste paper purchased by consuming mills. They are:

1. Old Newspapers.
2. Old Corrugated Boxes.
3. Mixed papers which are predominately collected from large office buildings.
4. High Grades which are predominately clean white clippings which are used as pulp substitutes.

The Paper Stock Institute of the National Association of Secondary Materials Industries publishes a description of all waste paper grades handled in commerce between the paper stock dealer and the consuming mills. Their most recent publication is entitled, "PS 70" and a copy is attached. (See pamphlet following this letter.)

The American Paper Institute does not collect any information regarding the value per ton for waste paper grades.

Fibre Market News, a weekly trade paper, lists the prices paid by paper stock dealers buying waste paper grades from generators. Enclosed is a copy of the May 4th issue of *Fibre Market News* (the most recent copy). The prices paid are listed on Page 4. (See excerpt following this letter.)

Another weekly trade publication, *Official Board Markets*, lists the prices paid by consuming mills, FOB dealers plant. A copy of the April 25th issue is enclosed.

You will find on Page 1 an article entitled, "A Note on Paper Stock Prices" which will provide background on the subject. (See excerpt following this letter.)

2. Question. *What are the costs for de-inking newspaper and reclaimed coated paper?*

First, I refer to de-inking newspapers. As you know, the process for de-inking old newspapers to make new newsprint is exclusive to the Garden State Paper Company whose home offices are in Garfield, New Jersey. They operate mills in Garfield, New Jersey; Alsip, Illinois; and Pomona, California. The grade of old newspapers they purchase from dealers is carefully sorted for cleanliness and removal of contaminants. For this careful sorting and processing, they are currently paying a premium for higher quality paper stock. The costs for repulping are not disclosed by the Garden State Paper Company, but they must include unloading trucks, warehousing, materials handling, power, water, pollution abatement equipment, pulpers, chemicals, refining equipment, cleaning equipment, washing and processing equipment, before the repulped paper stock is delivered to the headbox on the Fourdinier machine. Of course, this process must be economic to provide an adequate return on large amounts of invested capital.

Other mills using old newspapers—namely combination paperboard mills, do not use the de-inking process. These mills purchase old newspapers and repulp without attempting to remove the black ink. The resulting fibres and paperboard grades are gray in color.

Coated papers are usually purchased, mixed in with mixed papers generated in large office buildings. The cost to repulp coated papers, therefore, is not separated by companies repulping this grade.

The American Paper Institute does not survey member companies for their cost of manufacturing. Therefore, we cannot provide you with specific cost figures covering the repulping of waste paper.

I trust that these answers will be helpful. If I can be of further assistance, please call on me.

Sincerely,

EDWIN A. LOCKE, Jr., *President.*

1883

PAPER STOCK INSTITUTE OF AMERICA

A Commodity Division of

NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, Inc.

Paper Stock Standards and Practices

CIRCULAR PS-70



Effective as January 1, 1970

Issued from
ASSOCIATION HEADQUARTERS
330 Madison Avenue, New York, N.Y., 10017

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

PREAMBLE

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

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

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

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

I. The Purchase Agreement

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

1. Quantity

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

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

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

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

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

2. Grades

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

3. Packing

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

4. Price Units

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

5. Transportation Charge

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

6. Shipping Instructions

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

7. Shipping Period

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

8. Terms

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

9. Method of Invoicing

   Invoicing instructions shall be clearly stated.

II. Fulfillment By The Seller

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

1. Acceptance

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

2. Grading

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

3. Baling

   Each bale must be secured with a sufficient number of bale ties drawn tight to insure a satisfactory delivery.

4. Tare

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

5. Identification

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

6. Loading

   Paper Stock shall be loaded as follows:

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

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

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

7. Shipping Notice

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

8. Invoicing

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

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

9. Rejection

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

a. Order reshipment of the material.

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

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

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

III. Fulfillment By The Buyer

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

Unloading

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

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

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

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

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

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

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

Settlement

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

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

IV. Miscellaneous Practices

1. Ownership

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

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

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

2. Demurrage Charges

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

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

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

3. Switching and Freight Charges

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

4. Weight Discrepancies

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

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

5. Moisture Content

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

6. Replacement of Shipment

a. In the event that any shipment is rejected due to quality,
Whether or not the shipment is to be replaced is to be decided by mutual agreement between buyer and seller.

7. Promptness of Shipment

a. In the event that shipments are postponed,

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

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

8. Outthrows

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

9. Prohibitive Materials

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

b. Any materials that may be damaging to equipment.

FOR EXAMPLE

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

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

V. Arbitration

1. In the event of a total disagreement between buyer and seller, the dispute should be submitted to arbitration by a mutually satisfactory third party.
2. In all cases the cost of arbitration shall be borne by the party found to be at fault.

VI. Grade Definitions

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

Any reference in these definitions to the word "soft" shall refer to short fibered stock consisting of predominantly soda pulp and/or hardwood fibers.

Any reference to the word "hard" shall refer to long fibered stock predominantly sulphite or sulphate made of softwood fibers.

OUTTHROWS

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

PROHIBITIVE MATERIALS

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

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

b. Any materials that may be damaging to equipment.

(See example under Section 9, Article IV)

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

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

(1) #2 — MIXED PAPER

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

Prohibitive materials may not exceed.....2%
Total Outthrows may not exceed.....10%

(2) #1 — MIXED PAPER

Consists of a mixture of various qualities of paper, packed in bales weighing not less than 500 pounds and containing less than 25% of groundwood stock coated or uncoated.

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

(3) SUPER MIXED PAPER

Consists of a clean sorted mixture of various qualities of papers, packed in machine-compressed bales not less than 60 inches in length and containing less than 10% of groundwood stock coated or uncoated.

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

(4) BOXBOARD CUTTINGS

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

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

(5) MILL WRAPPERS

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

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

(6) #1 — NEWS

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

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

(7) SUPER NEWS

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

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

(8) OVER-ISSUE NEWS

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

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

(9) SOLID FIBRE CONTAINERS

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

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

(10) CORRUGATED CONTAINERS

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

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

(11) NEW CORRUGATED CUTTINGS

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

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

(12) NEW DOUBLE KRAFT LINED CORRUGATED CUTTINGS

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

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

(13) NEW BROWN KRAFT CORRUGATED CUTTINGS

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

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

(14) #1 — USED BROWN KRAFT BAGS

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

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

(15) MIXED KRAFT BAGS

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

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

(16) #1 — BROWN KRAFT PAPER

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

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

(17) SUPER SORTED BROWN KRAFT

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

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

(18) NEW COLORED KRAFT

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

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

(19) NEW BROWN KRAFT CUTTINGS

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

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

(20) NEW BROWN KRAFT BAG WASTE

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

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

(21) NEW BROWN KRAFT ENVELOPE CUTTINGS

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

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

(22) MIXED SHAVINGS

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

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

(23) #1 — GROUNDWOOD SHAVINGS

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

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

(24) WHITE NEWSBLANKS

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

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

(25) SUPER WHITE NEWSBLANKS

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

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

(26) PUBLICATION BLANKS

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

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

(27) #1 — FLYLEAF SHAVINGS

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

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

(28) #1 — SOFT WHITE SHAVINGS

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

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

(29) SUPER SOFT WHITE SHAVINGS

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

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

(30) HARD WHITE SHAVINGS

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

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

(31) HARD WHITE ENVELOPE CUTTINGS

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

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

(32) SUPER HARD WHITE ENVELOPE CUTTINGS

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

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

(33) NEW COLORED ENVELOPE CUTTINGS

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

inantly sulphite or sulphate, free from all printing.

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

(34) SEMI BLEACHED ENVELOPE CUTTINGS

Consists of baled envelope cuttings, shavings or sheets of manila-colored papers predominately sulphite or sulphate, free from all printing.

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

(35) SUPER SEMI BLEACHED CUTTINGS

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

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

(36) COLORED TABULATING CARDS

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

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

(37) MANILA TABULATING CARDS

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

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

(38) #1 SORTED COLORED LEDGER

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

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

(39) SUPER COLORED LEDGER

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

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

(40) #1 SORTED WHITE LEDGER

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

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

(41) SUPER WHITE LEDGER

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

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

(42) #1 GRADED MAGAZINES

Consists of a mixture of dry, clean magazines only; free from newsprint magazines, pulpy magazines, novel news, comic books, pocket books, and all coarse or shivy papers. Movie magazines, television magazines, detective magazines and similar publications are not acceptable.

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

(43) #1 BOOK STOCK

Consists of bleached sulphite or sulphate papers, printed or unprinted in sheets, shavings, guillotined books, or quire waste. A small percentage of papers containing fine groundwood adulteration may be included.

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

(44) PRINTED BLEACHED SULPHATE CUTTINGS

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

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

(45) MISPRINT BLEACHED SULPHATE

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

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

(46) UNPRINTED BLEACHED SULPHATE

Consists of unprinted bleached sulphate cuttings, sheets or rolls free from any printing, wax, greaseproof lamination or adhesives or coatings that are non-soluble.

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

[Excerpted from Fibre Market News, May 4, 1970]

Paper Mill Supplies

White pulp substitutes continue to move although dealers claim that they have lost some of their strength. Supplies are coming more and more into balance in these grades and mills are no longer pushing dealers for shipments.

In the kraft grades the export market has quieted down with their needs now being filled. There is no oversupply in double lined cuttings, the problem now at hand is mill-underconsumption. Double-lined has lost its strength because board mills are slow.

In the bulky grades old corrugated boxes have gained shipment strength but prices have remained constant. Here again, board mills are being hit with a lack of orders. "Mixed" and "news" were very soft as both have felt the effect of the depressed state of roofing and board mills.

NEW YORK

(The following quotes represent approximate dealer's buying prices from generators of paper stock.)

No. 1 hard white envelope cuttings	$55.00–$57.50
No. 1 soft white shavings	35.00– 40.00
No. 1 hard white shavings	35.00– 40.00
No. 1 hard colored cuttings	18.00– 20.00
Soft white shavings, uncoated	37.50– 42.50
Soft white shavings, coated	30.00– 32.50
Bleached unprinted sulphate cuttings	60.00– 65.00
New Manila envelope cuts, ground wood	40.00– 45.00
New Manila envelope cuts, containing ground wood	35.00– 40.00
New northern Kraft envelope cuttings	50.00– 55.00
White new cuts, miscellaneous	27.50– 30.00
White new cuts, No. 1	30.00– 35.00
Books and magazines	2.00– 4.00
No. 1 books and magazines, free of groundwood	(nom.)
Ledger stock, white	25.00– 27.50
Ledger stock, colored	17.50– 20.00
Triple sorted, kraft	16.00– 18.00
Manila tab. cards	45.00– 47.50
Colored tab. cards	32.50– 35.00
No. 1 old kraft	20.00– 22.00
Paper flour and sugar sacks, all natural kraft only	25.00– 30.00
Fly leaf, sulfite (free of ground wood)	16.00– 18.00
Fly leaf shavings, No. 1	8.00– 10.00
Fly leaf woody, No. 1	9.00– 10.00
Fly leaf woody, No. 2	8.00– 9.00
Mixed colored shavings	7.00– 8.00
Chemical bags, natural corrugated kraft cuttings (kraft only)	10.00– 15.00
Double-lined new corrugated kraft cuttings (misc. med.)	27.50– 32.50
Double-lined new corrugated kraft cuttings (chem. med.)	35.00– 40.00
New jute corrugated cuts	17.50– 20.00
No. 1 overissue news, large size black and white, free of heavy ink	11.00– 12.00
No. 2 overissues, newsstand returns, large size	9.00– 10.00
No. 2 overissue tabloids	15.00– 16.00
Rotos	(nom.)– 6.00
Folded news, super special	17.00– 19.00
Folded news, special	16.00– 18.00
Folded news, ordinary	11.00– 12.00
Old corrugated boxes	10.00– 12.00
Mill wrappers	2.00– 4.00
Box board cuttings	(nom.)– 3.00
No. 1 mixed paper	(nom.)– 2.00
*No. 7 office waste	(nom.)– 1.00

CHICAGO

(Chicago area dealers buying prices)

No. 1 hard white envelope cuttings	$50.00–$55.00
No. 1 hard white shavings	35.00– 40.00
Ledger stock, white No. 1	22.50– 25.00
Folded news, super special	17.00– 19.00
Manila tab. cards	35.00– 40.00

Colored tab, cards	$25.00–$30.00
Mixed books, magazines	2.00– 4.00
Old corrugated	11.00– 13.00
Folded news	16.00– 18.00
Super mixed	2.00– 3.00
No. 1 mixed paper	1.00– 2.00

PHILADELPHIA

(Philadelphia area large packers buying prices in carload quantities, f.o.b. Phila.)

No. 1 hard white envelope cuttings	$55.00–$57.50
No. 1 hard white shavings	37.50– 40.00
No. 1 soft white shavings	32.50– 37.50
Mixed books and magazines	2.00– 4.00
Manila tab, cards	35.00– 40.00
Colored tab. cards	32.50– 35.00
Natural Kraft paper, flours, sugar sacks	22.50– 27.50
Ledger stock, white	30.00– 32.50
Ledger stock, colored (repacked)	18.00– 20.00
New Manila envelope groundwood	40.00– 42.50
No. 1 white news cuts	30.00– 35.00
Old corrugated boxes	10.00– 12.00
No. 1 mixed	(nom.)– 1.00

(Following are prices being paid by dealers for news packed to mills' specifications.)

Regular baled news	$18.00
No. 1 baled news	$20.00– 22.00
Special news (replacement for overissue	22.00– 25.00

BOSTON

Folded news	$12.00–$13.00
No. 1 mixed	5.00– 6.00
Old corrugated	12.00– 13.00

PITTSBURGH

No. 1 hard white shavings	$47.50–$52.50
No. 1 hard white envelope cuttings	52.50– 55.00
No. 1 soft white shavings	25.00– 30.00
White news cuts, No. 1	20.00– 22.50
No. 1 magazines free of groundwood	8.00– 10.00
No. 1 books and magazines	3.00– 5.00
Ledger stock, white, No. 1	27.50– 30.00
Ledger stock, colored	25.00– 27.50
Manila tab, cards	45.00– 47.50
Paper flours add sugar sacks, kraft only	25.00– 27.50
Printed kraft tissue	35.00– 40.00
Double-lined new corrugated kraft cuttings (misc. med.)	22.50– 25.00
Double-lined new corrugated kraft cuttings (chem. med.)	25.00– 27.50
Folded news, ordinary	8.00– 10.00
New jute corrugated cuts	12.00– 14.00
Old corrugated boxes	10.00– 12.00
No. 1 mixed paper	4.00– 6.00

PACIFIC COAST

(Pacific Coast area dealers buying prices)

No. 1 hard white shavings	$50.00–$60.00
No. 1 soft white shavings	25.00– 30.00
No. 1 hard white envelope cuttings	67.50– 75.00
Ledger stock, white No. 2	27.50– 35.00
Ledger stock, colored	15.00– 20.00
Manila tab cards	45.00– 52.50
Colored tab cards	35.00– 42.50
Mixed Books and Magazines	(nom.)
Regular News	9.00– 14.00
Special Pak Overissue News	12.00– 16.00
Mixed Paper	9.00– 11.00
Corrugated boxes	12.00– 16.00

A NOTE ON PAPER STOCKS

Among regrettable ramifications of the "tight money situation" brought about by official anti-inflation measures has been a sharp drop in packaging, hence in paperboard output—and in construction, hence in building materials, including those normally using much paper stock.

As a result, we are reliably informed, the "bulk" grades of secondary fiber materials are in "gross oversupply" in many areas. It is reported "almost impossible to sell a poor mix" of these grades, and many dealers expect to be running out of storage space very soon, if they haven't already, forcing the destruction of surplus material.

We have been asked why, in these circumstances, the Official Board Markets listings do not reflect the price "collapse" presumably inevitable in the face of this great over-supply. The answer has been, and is, that there has been no such collapse. Although consumption in these grades has such collapse. Although consumption in these grades has dropped greatly, the prices reported to us by dealers and purchasers of the "currently representative tonnage" of *such material as is being transacted* have not changed.

For one example: In this week's report, two of the Midwest area's largest consumers of No. 1 Mixed paper show tonnage purchases down more than 50% from the first of the year. But for *that tonnage*, such as it is, their prices remain unchanged. Similar conditions, to the best of our careful inquiry and knowledge, appear in other areas.

This being the case, we draw attention to the definitive heading above our Paper Stock Prices column. It would be small service to those who depend upon our price listings, and who temporarily are being forced to purvey their products at "spot" or "distress" prices—if we were to allow the record of those prices to depress such market as remains, or to retard its recovery.—*F.A.S.*

ANNOUNCED PAPERBOARD PRICES

[Delivered prices, for week ended previous Tuesday. Where 2 prices are shown, they indicate a range, or larger is ton price and smaller (below $10) is 1,000-square-foot price]

Market areas	New England	Middle Atlantic	South and South central	North central	West Coast
CONTAINER BOARD GRADES					
42 No. Fourd. Kraft test liner [1]	$2.68	$2.68	$2.68	$2.68	$2.68
Range	127.50	127.50	127.50	127.50	127.50
26 No. .009 semichemical [1]	1.56	1.56	1.56	1.56	1.62
Range	120.00	120.00	120.00	120.00	124.25
22–26 No. .009 chip rolls [1]	110.00	110.00	110.00	110.00	----
Range	----	----	----	----	----
BOXBOARD GRADES					
Plain chip sheets	105.00	105.00	105.00	110.00	110.00
No. 50–90 10-ton-lots	110.00	110.00	110.00	117.50	117.50
Filled news sheets	105.00	105.00	105.00	117.50	----
No. 50–90 10-ton-lots	110.00	110.00	110.00	122.50	----
.020 white lined cyl. sheets:					
70 bright [2]	6.78	6.78	6.78	6.78	7.29
50-ton-lots	165.00	165.00	165.00	165.00	177.50
60 bright [3]	6.00	6.00	6.00	6.00	6.30
50-ton-lots	150.00	150.00	150.00	150.00	157.50
Mach. clay-ctd. cyl. sheets 80 bright:					
.020	7.17	7.17	7.17	175.00	----
50-ton-lots	175.00	175.00	175.00	180.00	----
.015	5.68	5.68	5.68	175.00	----
50-ton-lots	175.00	175.00	175.00	180.00	----
.015 solid Bl. F. Kraft, 78 bright	[4] 8.39	[4] 8.39	[4] 8.39	[4] 8.39	[4] 8.39
66 No. sheets. 50-ton lots	252.00	252.00	252.00	252.00	252.00

CONTAINERBOARD NOTES

Other Fourd. Kraft Liners: 26 No. (.009 or liner), $1.85; 33 No., $2.27; 38 No., $2.48; 47 No., $3.00; 69 No., $4.40; 90 No., $5.96. Other .009—Bogus 26–28 lb., $1.48/1.50. Premium 21 lb. Chip, $115/ton.

BOXBOARD NOTES

[1] Subject to generally known discounts.

[2] Equivalent to former W.P.C. News.

[3] Equivalent to former B.M.L. Chip. Added per ton for smaller quantities (other than solid bleached grades): On 50-ton-lot base—$5 for 25/50 tons; $10 for 10/25 tons; and $17.50 for 3/10 tons. On 10-ton-base—$2.50/5.00 for 3/9 tons; and $5.00/10.00 for 1–3 tons. 80 Brightness (G.E. or equiv.) is based on other than solid kraft boards—with 70 Bright less $10/ton; 65 Br. less $15/ton; and 60 Br. less $20–25/ton.

[4] Other calipers—.012, less $1.47/1.48; .020, plus $2.30/2.36; .026 plus $5.28/5.30. In rolls, 24" minimum diam., less $0.66/0.70 per M. Sq. Ft. ($30.00 per ton). Uncoated, 21" or wider.

(The following article was subsequently furnished for inclusion in the record by Senator Dole:)

[Reprinted from the American City, March 1970]

Bagged Refuse Brings Better Service and Keeps the Street Neater on Collection Day

(By James McFeggan)

Do you really want to improve refuse collection, get rid of blowing papers, and keep unsightly cans off the street? You can, but be prepared to work for it. We took our time in instituting the sack system, doing surveys and evaluations as we moved along because we wanted to be absolutely right.

Don't misunderstand me. Our operation is not perfect and no doubt never will be. In fact, we're making changes so fast that by the time this article can be published we'll have new ideas at work.

BAGS REPLACE CANS

By ordinance, metal cans are out in Rolling Meadows. Instead, the city furnishes each householder with a refusesack holder (but maintains ownership) and an unlimited supply of paper sacks. This change from metal cans to paper sacks permitted us to make the following change in our collection system without increasing the cost to the householder.

OLD SYSTEM

Three 20-gallon cans, twice a week, tightly covered with no refuse on the ground outside of containers. Brush, trimmings and trash picked up twice a year.

NEW SYSTEM

Once a week curb service with no limit on the number of sacks collected, with twice a week service during June, July and August. All bulky trash (except rock, dirt and debris from extensive remodeling), boxes (if flattened and tied) and newspapers (tied) can be placed alongside sacks at curb for collection on any regularly-scheduled collection day.

SURVEYS DESCRIBED

Before jumping to the conclusion that changing from twice-a-week to once-a-week collection is a reduction in service, let me briefly describe our surveys. the results and the acceptance by the public.

The conversion program had its birth in 1966 when I observed the custodian at city hall emptying papers in the garbage cans. He always had spillage because of the wind, and it was a never-ending job trying to keep the refuse-can area clean. I contacted the St. Regis Paper Company and purchased one holder and a supply of paper sacks for use in the utility room. The problem immediately disappeared. I then purchased another holder and more sacks for the city garage because at this location we always seemed to have several open cans sitting around that didn't get emptied as often as they should. Again the problem disappeared. I then tried the paper-sack system at home, and this led to the surveys.

Before people can be persuaded to make a change they must be told what is wrong. So as a starter I drove through a typical residential area on collection day, ahead of the truck, noting the number of containers at each stop, improper containers, open bag or cartons, refuse outside of containers, and blowing papers. From this experience we devised a simple method of recording conditions that could be filled out while riding in a collection truck, and conducted the first survey of the entire city from December 18–21, 1967. Table I shows the results.

TABLE I.—RESULTS OF CITYWIDE PICKUP SURVEY, DEC. 18–21, 1967

	Number of stops	Number of containers	Improper containers	Improper lids	No lids	Refuse outside containers	Refuse above containers
Actions	3,137	6,938	530	546	1,291	316	1,160
Percent of total number of containers			7.64	7.87	18.61	[1] 10.07	16.72

[1] Percentage of total number of stops (not containers).

NUMBER OF CONTAINERS PER STOP OR PICKUP

	1	2	3	4	5	Total
Stops	505	1,519	1,060	50	3	3,137
Percent of total	16.10	48.42	33.79	1.59	0.10	100

This survey led to the formation of a study committee and the selection of a test area to determine the cost of conducting one or more tests using paper sacks in place of metal cans. After several studies and numerous investigations, the committee selected the St. Regis Paper Company as the supplier of paper sacks and holders and scheduled a test to begin on June 10, 1968. All residents in the area received a letter explaining the test and giving instructions. And while waiting for delivery of materials we surveyed the test area (using cans) for three weeks.

The tests using paper sacks ran for 8½ weeks. However, we made two evaluations; one after three weeks to compare with the three-week evaluation using cans, and a final evaluation. Table II summarizes the data.

TABLE II.—3-WEEK COMPARISON STUDY, TWICE-A-WEEK PICKUP

	Total stops per week	Total containers per week	Pickup time
Cans	549	1,305	6 hours 30 minutes.
Paper sacks (3 weeks)	565	1,042	4 hours 16 minutes.
Paper sacks (8½ weeks)	622	1,153	4 hours 29 minutes.

TOTAL NUMBER OF CONTAINERS PER STOP PER WEEK

	1	2	3
Cans	71	234	222
Paper sacks (3 weeks)	225	230	91
Paper sacks (8½ weeks)	256	288	101

Note: Figures are averages per week for the 3-week period and the 8½-week period.

EVALUATION OF CONDITIONS, BAGS ONLY, AVERAGE PER WEEK FOR 8½ WEEKS

	Improper containers	Broken containers	Open containers	Refuse outside containers	Refuse above containers
Number	98	5	53	68	15
Percent of total	8.49	0.43	4.68	10.93	1.39

REDUCTION IN STOPS

Comparing Tables I and II, note the reduction in refuse above containers and open containers (versus no lids) when bags were used. Also, note the small number of broken bags. I woud also call your attention to the large reduction in the number of stops requiring three containers (222 for acns and only 91 for sacks). We attribute this to the larger size of the paper sacks (30 gallons versus 20 gallons for cans) and the fact that all of the room in the bags can be used because they can take the shape of the material or containers placed in them. Cans frequently have voids.

Near the end of the 8½-week study we sent a letter and evaluation card to all the residents in the test area. The letter informed the people that the switch to bags reduced pick-up time by 35%; almost eliminated open containers and scattered paper, and returned the neighborhood to its normal appearance at an early hour on collection day. The evaluation cards asked for name and address, whether or not the resident liked the sack system, if it should be adopted, and several other questions. It also had space for comments.

We were overwhelmed by homeowner reaction long before all the cards were returned. Our planning had not gone beyond the test period as it was our intention to move slowly. But the howeowners began running out of bags and besieging the office by phone and in person asking for more. Some had discarded their refuse cans and others were not about to go back to them. To satisfy these people we began selling paper sacks at cost and the committee hurriedly held meetings to plan the next steps in the program. A tally of the evaluation card showed that 94% of the people in the test area accepted the paper sacks.

The committee decided to continue and add another area that had never used paper sacks. However, this time we changed the service from twice a week, three-can limit, to once a week, unlimited service. Extending the test to a new area would help us determine whether or not we could switch to bags and change collection frequency and rules with nothing more than one advance letter of instruction and explanation. The total test area now comprised 751 homes as against 352 homes in the initial test.

SECOND TEST

The second test began October 10, 1968 and extended to January 9, 1969. Although it ran for 14 weeks, we used only 12 weeks in the record. The first pick-up occurred in the second half of the twice-a-week system and during one week we had a mixup in record keeping. Once again we were pleasantly surprised with the results, and homeowners response was again overwhelmingly for the system. Table III lists some of the data derived from this test and Table IV summarizes homeowner response.

TABLE III—TOTALS FOR TWO AREAS TESTED PROJECTED ON A WEEKLY BASIS

Number of stops, 713	Number of containers, 2,070	Average containers per stop, 2.9 (percent)
Improper containers	68	3.28
Broken bags	12	.59
Open bags	242	11.64
Refuse outside containers	237	33.29

Note: Collection time—7 hours 53 minutes for 90.6 stops per hour.

TABLE IV—HOMEOWNER RESPONSE, 2D TEST

Area 1 and 2 combined	751 homes	Jan. 21, 1969 tally (percent)
Total returns	404	53.79
Curb service	379	93.81
Back door service	25	6.19
Selected bags	374	92.57
Selected cans	30	7.43
Animal damage	25	6.19
Odor	11	2.72
Once a week—Yes	315	77.97
Once a week, Yes—with comments twice a week summer		14.85
Bags—Yes—Twice a week all year	21	5.20
Difficulty with system—Yes	23	5.69
Difficulty with system—No	356	88.12

At this point we began planning city-wide service by sending a letter to all homes informing the occupants of the city's intention to install the paper sack system and inviting them to a public meeting. Strange as it may seem, most complaints that we heard came from areas not under test, and rumors circulating among this group were always incorrect.

Practically all of the approximately 150 persons who attended the meeting arrived in a bad mood. However, this changed to one of "we will try it" once we explained the facts to them.

On May 1, 1969, following the adoption of a new refuse-collection ordinance, every householder received a lengthy letter from Mayor Roland Mayer again explaining the test program, answering frequently-heard questions and stating that the new system would go into service within a few days.

PERSONAL OBSERVATIONS

Probably the most difficult step in converting from cans to sacks is convincing the homeowner that it will work. All his thinking is based on his experience with cans (which is wrong) and he simply cannot comprehend the bag system. So if you are looking for rapid success, place the system at his disposal in a painless manner and he will proceed to convince himself. We did this by supplying the material at no direct charge to the householder.

City officials must also decide how they want their community to look. Ordinances alone will not work. Ours called for containers kept in good condition, tightly covered, and nothing outside the containers. But what do we find on our first survey? Battered or opened cans and plenty of debris. And then, because we collected trash only twice a year, mountains of the stuff accumulated during those two periods. Indirectly the city was responsible for this mess because of ordinances the homeowners could not comply with—and the city could not enforce without tremendous difficulties.

At the outset the packer trucks—geared to cans—had difficulty keeping up with the speed of the sack system. Since emptying cans is relatively slow, the time involved and packing method employed by any given truck does not appreciably effect lost labor time. However, working with sacks the crews rapidly fill and often overfill the receiving hopper. But after a little experience, the men learned to pace themselves and the equipment to refuse sacks. However, since converting to the sack system we have taken over collection duties using three Kuka Shark refuse bodies mounted on Mercedes chassis. To our knowledge Rolling Meadows is the first city in the United States using this type of refuse-collection body. While it is too early to report operating staistics, we expect great performance from it.

PICK-UP TIME REDUCED

In our tests we reduced pick-up time by 35%, and I believe we can and will improve this figure. During the tests it was not unusual for a two-man crew, working the once-a-week schedule, to load a 20 to 25 yard packer truck in 1½ to 1¾ hours making 220 stops and loading in excess of 600 sacks. (The lots in Rolling Meadows probably average 65 feet in width, so the stops are not close together.) Over the ten-week test period the crew average 90 once-a-week stops per hour and peaked at 148. A spot check on one route using cans (under limited service) showed an average of 93 stops per hour. But the same route had to be collected a second time each week.

With statistics like these I must say that the sack system is far superior to the can system. It only needs to be properly instituted.

During our studies, the idea dawned that perhaps we could handle our own pick-up service rather than continue with contract collection. We made the decision and have been in this phase of the operation for three weeks as of this writing. Operating records for the three weeks show the container count still ranging between 2.4 and 2.8 per stop; refuse outside of container occurs at 25% to 40% of the stops.

The stop load ratio on individual loads has reached 190.80 stops per hour. Over a complete year this figure should average out between 150 to 170 stops per hour.

The men hired for this work all live in Rolling Meadows and none had any previous experience. Their first load tallied at 120.20 stops per hour, and this figure has been rising ever since. Our continuous-load trucks are working very well. Diesel fuel consumption averages about two gollons an hour. The men have learned how to load hard goods in the trucks so they take washers, dryers, furniture, beds, refrigerators and just about anything else one encounters on an unlimited pick-up route.

In January we mailed a final information letter to the residents to be followed with a decal to be placed under the lid of the bag holders to keep the residents always advised of any pertinent information pertaining to the scavenger-type service.

Our next studies will evaluate the feasibility of night time pickup. With our truck operating at 800 RPM and loading bags, noise is at an absolute minimum. Refuse sacks all but solved the sanitation problem and improved considerably the aesthetic impact on our residential neighborhoods. We believe the sacks combined with Kuka Shark packers on a once-a-week pick-up achieves the highest economy of operations. It then follows that if night time pick-up proves to

be practical, the citizens would hardly know a scavenger operation is going on; and yet they will have received all the various benefits of this type of service. The cost need not always be greater.

Senator SPONG. Our next witness is Mr. Walter Mercer of the National Canners Association.

Mr. Mercer.

STATEMENT OF WALTER A. MERCER, NATIONAL CANNERS ASSOCIATION, ACCOMPANIED BY AUSTIN T. RHOADS, ASSISTANT DIRECTOR, GOVERNMENT-INDUSTRY RELATIONS DIVISION

Mr. MERCER. Thank you very much, Senator.

My name is Walter A. Mercer. I am a professional staff member of the National Canners Association whose headquarter offices are located at 1133 20th Street NW., Washington, D.C. I am director of the association's western research laboratory located in Berkeley, Calif. The association's division of research laboratories maintains two additional laboratories—one in Seattle, Wash., and the second within the Washington headquarters.

With me today is Mr. Austin T. Rhoads, the Assistant Director of the association's division of Government-industry relations.

The National Canners Association is a nonprofit trade organization whose canner membership produces annually from 80 to 85 percent of the total canned food production of the Nation. In 1968, the production of canned foods totaled approximately 1 billion cases.

Canners of beer, soft drinks, and animal foods are not members of my association. Therefore, I am not able to speak for these segments of the total canning industry.

The staff organization of the National Canners Association neither produces, buys, nor sells canned foods. Its purpose is to insure, for the mutual benefit of the industry, and the public, the best food supply that scientific knowledge and human skill can produce.

The professional services of the association staff are varied and reflect the many facets of canned foods production, distribution, and consumption. In this regard, the efforts of the three research laboratories of the association are directed into three major categories of activity: (1) Insuring the safety of canned foods; (2) protecting the quality of canned foods; and (3) researching environmental pollution problems.

It is in connection with the latter activity—seeking solutions to environmental problems—that you have invited my participation in this hearing.

I am pleased to have been given this privilege and I am authorized by the association officers to offer you my cooperation and technical assistance in any way in which you feel this would be helpful to you. Economically feasible means of solving the alarming and critically serious environmental problems which face us as an industry, and as a Nation, must be found.

Since food-growing and food-processing operations invariably produce and accumulate waste materials, it is pertinent to the purposes of this hearing to attempt, first, to outline in some detail the current problems of solid waste handling in the food industry; then, to attempt to foresee how future changes in food growing and processing will affect

solid wastes generation and handling; and, finally, to suggest some approaches to prevention and/or solution of these solid waste problems.

CANNING IS AN AGRICULTURAL INDUSTRY

In the beginning, it must be clearly understood that the problems associated with solid wastes generated in food processing are only one facet of an overall problem of greater magnitude and seriousness. Any consideration of solid food wastes must also include the waste produced in the growing and harvesting of the raw crops transported to the food canning plants of the Nation. Proposals for reducing or preventing environmental problems, created by these wastes, must recognize the interdependence of the grower, the processor, and the consumer of canned foods.

The location of the bulk of the canning industry, in or near to farming areas, highlights the fact that canning is esentially an agricultural industry. Much of the canning industry's annual production is packed from crops grown under contract, insuring the farmer a market for his entire production at a price agreed upon before the crop is planted. Other raw foods are selected at the point of production for their particular fitness from the standpoint of variety, ripeness, and quality.

A large part of the fruit and vegetable production of the Nation is marketed through the canning industry whose plants are located in 49 of the 50 States. Approximately one-half of the vegetable crops grown, and nearly one-half of the fruit production, is used for processing.

More than 80 percent of all tomatoes harvested in the Nation are canned; more than 90 percent of the beets; and 60 percent of the peas, green beans, and sweet corn are canned. By canning and freezing, about 75 percent of the production of asparagus, lima beans, and leafy vegetables are preserved.

The canning industry provides the major market for the grower of perishable fruits. About 70 percent of all apricots, cranberries, and pears and 50 percent of the peaches and cherries are canned. In the Appalachian area where apple canning was pioneered, almost 40 percent of the apple crop is canned; and in California, nearly 90 percent of the olive production is canned.

A very large proportion of the total catch of certain fish is canned: 99 percent of the tuna, 90 percent of the sardines, and 85 percent of the salmon.

The tremendous production and preservation of foods described above is essential to the economy of this Nation, to the well-being of the American consumer, and the feeding of the hungry nations of the world.

DEFINITION OF THE INDUSTRY'S SOLID WASTE PROBLEM

The location, number, and size of the Nation's canning plants is determined by the location and extent of production of the agricultural or ocean area from which the raw product comes. Because of the pattern of today's urban society there is—despite their interdependence—a wide separation of the activities of food growing, food processing, and food consuming.

As pointed out by Professor P. H. McGauhey of the University of California, it is unfortunate that solid waste disposal has followed the same pattern of evolution. The result, today, is that municipal wastes, industrial wastes, and agricultural wastes are generally considered as separate, discrete, and unrelated problems. I agree with Professor McGauhey that nothing could be farther from the truth, either in actual practice, or in developing satisfactory solutions.

Agriculture is, by far, the producer of the largest mountain of solid wastes. The most significant of these are crop residues and animal manures. A task force from the University of California has reported survey results which indicate that 16 million wet tons of manure are produced annually. The study team found that most manures are disposed of by being incorporated into farm land. The question asked by the University team is: "How much land will continue to be available, from standpoints of agricultural land use, water pollution, and problems with air and odor pollution, near population centers?" The answer is not now apparent.

Like the dairyman and the livestock grower, the food crop farmer is also faced with a mountain of solid wastes. The tonnage of stalks, leaves, and cull fruit left in the field or orchard far exceeds the tonnage of harvested crop hauled to market. The ear of corn is but one-third the total plant weight. Tomatoes actually harvested are but one-fourth the weight of residue left in the field—and so it goes for all food crops.

Since about 150 million tons of plant crops are harvested each year in this Nation, the accumulation of field wastes is enough to give each family 8 tons of decaying fruit and dead plants to go with the 25 cubic yard share of the Nation's production of animal manure.

Because the consumers of this Nation demand the abundance of foods produced by the agricultural industry, an inevitable consequence is the production of vast quantities of solid wastes.

To process but 100 pounds of raw food for the American housewife requires, on the average, that 36 pounds of waste materials be produced at the cannery. Again, on the average, 19 of the 36 pounds of waste may be recovered as animal feed or as a byproduct. Of the 36 pounds of waste, 17 pounds must be handled and disposed of as a wet, solid waste.

May I add, Senator, that, were it not for the canners role in preparing and preserving raw foods for the housewife, this same ratio of solid waste would be generated in the household. Instead of a more than 50 percent recovery of solid waste as a byproduct, the 36 pounds of the solid waste would be discharged to the sewer or placed in the garbage can by the housewife.

By means of a cooperative effort between the National Canners Association and the Bureau of Solid Waste Management of the Public Health Service, U.S. Department of Health, Education and Welfare, a study is now underway on solid waste management in the food processing industry. Preliminary results of the study are the basis for estimating that 12.7 million tons of food wastes are produced, annually, by the food processing industry. Of this tonnage, approximately 8.7 million tons are utilized as animal feed or in other ways. The estimated annual cost to the industry for solid waste diposal is $25 million.

Table 1 has been prepared to show the relative amounts of waste

produced in the processing of selected, major commodities. Examination of the data will show that animal feeding of waste from the processing of apples, beets, and carrots, citrus, corn, and potatoes is a major factor in byproducts utilization. Production of fertilizer and fish meal, from fish scraps, uses a major portion of the solid materials which otherwise would require disposal as a waste. The isolated conditions under which the crab, salmon, and shrimp canneries operate in Alaska, generally prevent utilization of the waste as a byproduct.

(Table 1 follows:)

TABLE 1.—PRODUCTION OF SOLID WASTE IN THE PROCESSING OF EACH 100 POUNDS OF SELECTED FOODS

	Total waste produced	Utilized as byproduct	Handled as solid waste
Product (pounds):			
Apples	30	20	10
Beans, green	20	9	11
Beets, carrots	53	30	23
Citrus	50	43	7
Corn	65	62	3
Crab, shrimp	72	8	64
Fish	36	22	14
Olives	14	12	2
Peaches	27	5	22
Pears	36	9	27
Peas	13	9	4
Potatoes (white)	49	28	21
Tomatoes	12	2	10
Vegetables (miscellaneous)	32	13	19

On a more limited scale, this also describes the situation faced by the sardine canners. In this connection, I would like to point out that use of solid wastes from sea food processing should be allowed in ocean feeding of marine life. The raw material is from the ocean. The solid residue, not otherwise utilized, should go back as a food source in ocean farming.

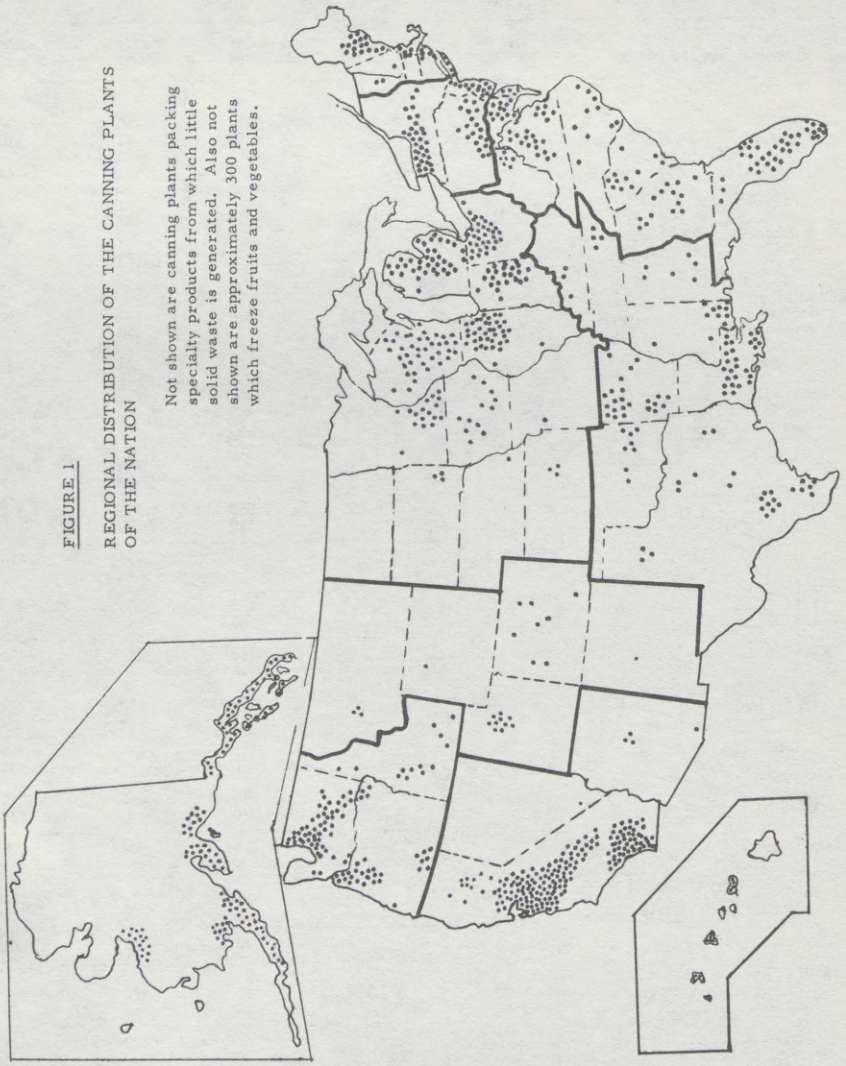
I would be the first, Senator, to insist that this be done only under prescribed and controlled procedures.

Figure 1 has been prepared to show the national and geographical distribution of food canning plants. Table 2 presents data to show the regional distribution of food processing in terms of tons of raw product processed, the tons of waste materials produced, and the relative tonnages handled as by-products and as solid wastes requiring disposal.

FIGURE 1

REGIONAL DISTRIBUTION OF THE CANNING PLANTS OF THE NATION

Not shown are canning plants packing specialty products from which little solid waste is generated. Also not shown are approximately 300 plants which freeze fruits and vegetables.



(The chart and table referred to follow:)

TABLE 2.—PRODUCTION OF FOOD PROCESSING SOLID WASTES BY REGION, PRELIMINARY

[In thousands of tons]

Regional area and product	Raw foods processed	Solid wastes not utilized	Utilized for byproducts	Total waste produced
Southwest:				
Food	9,810	880	1,150	2,030
Nonfood		90	20	110
Total		970	1,170	2,140
New England:				
Food	1,560	350	160	510
Nonfood		10	0	10
Total		360	160	520
Mid Atlantic:				
Food	2,130	330	150	480
Nonfood		20	120	40
Total		350	270	620
South Atlantic:				
Food	8,160	760	2,970	3,730
Nonfood		60	10	70
Total		820	2,980	3,800
North Central:				
Food	6,600	550	1,380	1,930
Nonfood		110	70	180
Total		660	1,450	2,110
South Central:				
Food	1,150	130	300	430
Nonfood		30	30	60
Total		160	330	490
Rocky Mountain:				
Food	580	100	140	240
Nonfood		10	0	10
Total		110	140	250
Pacific Northwest:				
Food	5,890	840	1,950	2,790
Nonfood		230	0	230
Total		1,070	1,950	3,020
Alaska:				
Food	160	67	16	83
Nonfood		3	0	3
Total		70	16	86
Hawaii:				
Food	1,200	30	420	450
Nonfood		20	0	20
Total		50	420	470

Examination of this preliminary data, obtained from the cooperative study of the association and the Bureau of Solid Waste Management, emphasizes the fact that the southwest region, north central region, and the Pacific Northwest region are the principal areas in which food processing is concentrated. In the case of the southwest region, almost all of the food processing industry is contained within California. Furthermore, in that State, the industry is concentrated, for the most part, in the counties surrounding San Francisco Bay and

in the Central Valley, beginning with Sacramento in the north and ending with Fresno in the south.

A CLOSE LOOK AT THE PROBLEM IN CALIFORNIA

I am told that California, for more than 20 consecutive years, has led the Nation in total agricultural income, with a record high gross of about $5 billion. For example, within the fertile Central Valley, the farmers produce more than 5 million tons of raw foods for commercial processing. In 1969, 3.5 million tons of tomatoes were processed by the canneries. From all of the canning crops grown, the industry packed more than 200 million cases of basic foods. Within this production is represented 60 to 85 percent, respectively, of the tomato and tree fruit products packed in the Nation.

Because of California's exploding population and rampant urbanization of agricultural areas, it is there that the first wave of a turbulent flood of troubles has disturbed the complacency of our thinking about solid waste disposal and related problems.

Because of the fulminating, land-consuming urbanization of once-agricultural lands, food processing can survive in California, only if food growing survives—and the latter only if the first survives. Because California is a testing ground for development and demonstration of solutions to solid waste problems which, soon, in other agricultural areas, will reach equal magnitude and seriousness, I wish to describe in detail the current and future problems as I see them in California.

In 1966, California's Bureau of Vector Control and Solid Waste Management began organization of the California Solid Waste Planning Study. This study was made possible by the Federal enactment of the "Solid Waste Disposal Act of 1965."

On a voluntary basis and without cost to the study, the National Canners Association supplied to the bureau, detailed information on the quantities of solid wastes being generated by the State's food processing industry and the methods of utilization or disposal of the wastes.

Tables 3, 4, and 5 have been prepared to show, respectively, the current production of food processing solid wastes in California, the current methods of disposal of these wastes, and the relationship between food solid wastes and other solid wastes.

(Tables referred to follow:)

Food processing solid wastes—California, 1967 [1]

Type of waste	*Tons of solid wastes*
Fruit and vegetable (fresh pack)	409,500
Canning of foods	750,000
Freezing of foods	170,000
Meat processing	100,000
Other processed foods	197,500
Miscellaneous food processing	500,000
Total tons of solid wastes [2]	2,127,000

[1] From "Industrial Solid Waste Production and Disposal in California." James Cornelius. California Vector Views. Vol. 16, No. 5; May 1969.

[2] Not included are solid wastes left in the field or orchard.

TABLE 4.—CURRENT METHODS OF DISPOSAL FOR CANNERY AND FROZEN FOOD WASTES—CALIFORNIA, 1967[1]

Method of disposal	Tonnage	Percent of total
Landfill operations	285,000	31
Spread of fields	110,400	12
Animal feed	276,000	30
Ocean disposal	13,250	1
Charcoal production	46,000	5
Other disposal methods	88,000	10
Nonfood wastes	101,250	11
Total	920,000	100

[1] From "Industrial Solid Waste Production and Disposal in California." James Cornelius. California Vector Views. vol. 16, No. 5; May 1969.

Production of total solid wastes—California, 1967[1]

Category of waste	*Amounts produced (millions of tons)*
Agricultural wastes:	
Animal manures	21.8
Fruit and nut crops	2.4
Field and row crops	10.7
Industrial wastes:	
Food processing	2.1
Lumber industry	8.0
Chemical and petroleum	0.5
Manufacturing	3.1
Municipal wastes:	
Residential	8.9
Commercial	9.7
Demolition	3.0
Special	1.3
Total of solid wastes	71.5

[1] From "Industrial Solid Waste Production and Disposal in California." James Cornelius. California Vector Views. Vol. 16, No. 5; May 1969.

Mr. MERCER. I agree with California's Bureau of Vector Control and Solid Waste Management in its evaluation of the current situation in California. My agreement is based on personal experience with the situation and observation of the environmental problems associated with certain methods of disposal currently in use. A report of the California solid waste planning study contains the following statement, and I quote:

> Food processing solid wastes are a major concern, not only because of the large quantities produced, but also because of the potential for environmental pollution. Due to the organic and highly putresible nature of food processing wastes, a major problem associated with its disposal is its great capacity to act as a breeding media for the production of flies. Air pollution (in the form of obnoxious odors) and water pollution are also associated with the disposal of food processing wastes.
>
> The seasonal nature of these wastes causes difficulties in providing proper disposal. For example, 68 percent of the cannery and frozen food wastes are produced during August, September, and October. At the present time, no satisfactory method of disposing of this material has been developed.

A further difficulty, Senator, in the handling of food processing wastes is the confinement of its generation to localized areas. It is estimated that 409,500 tons (see table 3) of solid wastes from fresh fruit and vegetable packing was produced in California in 1967. Five counties produced more than 150,000 tons of this total. Six additional counties produced more than 60,000 tons of the total.

In the case of cannery and frozen food wastes, plants located in four counties produced more than 50 percent of the total 920,000 tons.

One of several major canning communities is located within a county contiguous to San Francisco Bay. The following information describes the solid food wastes production in that county.

Raw tons of product delivered to canneries	765,797
Tons of solid wastes produced	154,480
Methods of disposal used:	
Landfill disposal	33,161
Spreading on land	39,275
Animal feed	59,916
Charcoal (pits)	17,114
Other	5,114
Total	154,580

Senator, I would like to point out that this community of canneries processing almost 800,000 tons of raw food crops is now limited to only one disposal site for solid wastes. It is expected that at the end of this coming season this remaining site will be closed.

An attempt has been made by the canneries to secure a disposal site within the next county which is much less urbanized and wherein there remains considerable open spaces. The permit has been denied by that county's government. The reason given being that: "Our county is not going to be a dumping ground for the waste from your county."

This was the decision of the county government in that county despite the fact that a high percentage of the agricultural crop grown in that county was sold to and processed by the canneries in the first county, or the community in which the cannery is located.

In the tabulation of the methods of disposal used for the 155,000 tons of solid waste produced in that county, I have indicated that about 86 percent of this amount is disposed of by methods thought to be doomed by urbanization.

As shown above and in table 4, much of the solid waste from food processing is handled in landfill operations. Heightened concern for stream and ground-water purity has given rise to justifiable doubts about landfill disposal of these high-moisture solids. Because, in general, the ultimate goal in landfill operation is the development of an industrial or other type of building site, the inclusion of waste materials of highly organic and putresible nature is considered undesirable. As a result, an increasing number of landfill disposal operations are prohibiting, or drastically limiting, the inclusion of food processing waste solids.

Utilization of food processing wastes as animal feed is currently a widely used method for disposal of food processing waste solids. The husks and cobs from corn and the peel from citrus fruits are good examples of products from which the solid wastes are utilized for animal feed. In some areas, the wastes from seafood canning are processed into fish meal for animal feed or into fertilizer materials.

Although a significant portion of solid food wastes is utilized for animal feed in California, this method of disposal is considered to be doomed by urbanization. As urbanization moves into once rural areas, cattle feeding operations must be removed to remaining isolated areas.

Thus, hauling distances between the point of generation of the food solids and the point of feeding the waste become too long to be economical. A further limiting factor in animal feeding of food wastes is the heterogenous nature, the low protein content of the wastes, and its seasonal production. Such conditions are not compatible with the trend toward scientifically formulated, computerized feeding programs.

Land spreading of food waste solids is still utilized as a method of disposal in locations isolated from urban areas. In areas of increasing urbanization, the nuisance conditions created by this method of disposal are the cause for increasingly severe criticism from regulatory agencies and from the public. The breeding, in the accumulated wastes, of flies and other pests of agricultural significance is reported to cause economic losses of yet undetermined seriousness. The pesticidal spray programs used in attempts to control insect populations are cause for concern regarding the increasing level of resistance of the insects to killing by pesticides.

OTHER POSSIBLE METHODS OF FOOD WASTE UTILIZATION

Senator, I can point to one major success story in California.

Each year 700,000 to 800,000 tons of tree fruits are grown in California's Central Valley. Nearly all of this tonnage goes to canneries for processing. Approximately 27 percent of this raw tonnage becomes a waste material consisting of pits, peel, green fruit, and defective pieces, not suitable for canning.

The fruit pits are now separated at the cannery from the balance of the waste. With cannery financing, two charcoal production plants have been built and are processing into briquettes, annually, 60,000 tons of fruit pits and 100,000 tons of nut shells.

Fruit refuse, with the pits removed, is 80 to 90 percent water. Dehydration or incineration would appear to be excessively costly. However, experimentation should be done using newly designed, or yet undesigned, furnaces. The combining of wet food solids with more combustible waste materials must be tried.

The production of alcohol from fruit waste has been considered and is technically possible. Sporadic attempts have been made. Similarly, utilization of the fruit waste as a substrate for yeast production or production of glutamic acid is technically feasible.

A major economic handicap in such methods of utilization is the seasonal nature of the cannery operations producing the wastes. Added to this problem is the putresible nature of the material and the magnitude of the volume produced in a relatively short period of time. Unless other suitable organic wastes are available at other times, or unless methods of storing the raw wastes could be developed, the capacity of the processing equipment required to handle the short-time, high-volume production would be out of reason on the basis of the year-round capacity needs.

Urgently needed is research which will explore all possibilities of storing the raw wastes under conditions which will prevent nuisance gated. For four processing seasons the research laboratories of the waste in economically scaled processes. Sealed underground silos offer a fascinating possibility.

A survey of other possible methods of disposal for food processing waste indicated that high rate aerobic compositing should be investigated. For four processing seasons that research laboratories of the National Canners Association conducted a series of pilot experiments to establish some of the factors involved in compositing fruit waste solids. Certain phases of the research were supported, in part, by grant funds from the U.S. Public Health Service.

The compost process is nearer to nature's method of recycling matter than any other alternative process. It follows the life cycle which builds soil and produces life. As another has said, "it is a way of returning wastes to the soil with minimum insult to nature."

Without consideration of producing compost for sale, large-scale demonstration projects should evaluate the effect of compost and methods of compost application on the whole subject of soil structure, nutrient release, water retention, crop production, and the biology and chemistry of the soil.

It is said that in nature's slow process of soil building, 500 years are required to build 1 inch of topsoil. The compost process, by comparison, can perform a miracle in the building of new soil and the restoration of fertility to poisoned and otherwise impoverished soils.

In the experiments conducted by the National Canners Association and because fruit tissue has a high moisture content, a dry, absorbent material was added to reduce the moisture content to 60 to 65 percent. Of the dry materials tested in the experiments, rice hulls, sawdust, coffee grounds, and composted municipal garbage have performed satisfactorily. Rice hulls, now creating a serious disposal problem, have been used with marked success.

Since the greatest need with regard to fruit and vegetable waste solids is a satisfactory method of disposal, the production of a compost having sales potential has not been given consideration in these studies.

With regard to fruit and vegetable refuse, the results of these experiments are the basis for reporting that the composting process is a feasible means of disposal which eliminates public health or nuisance problems.

In my opinion, experimentation has developed and demonstrated the techniques and operational procedures for composting solid fruit and vegetable refuse which accumulates from the growing, harvesting, and processing of agricultural crops. However, much study remains to be done.

Critically needed are demonstrations, in the field, of methods of composting fruit and vegetable refuse which utilize other environmental waste, such as animal manures, dry agricultural and industrial refuse, and municipal garbage.

There is the need for establishment of a basis for estimating the costs, space requirements, and other factors involved in practical operations for composting fruit and vegetable refuse with admixtures of dry waste materials and animal manures.

A further more complex need is that for evaluation of the effects of satisfactory composting of these waste materials, on a community scale, on health and welfare problems, with particular attention to preven-

tion of air and water pollution problems, abatement of odor, fly and insect problems, control of plant and animal diseases, and elimination or destruction of toxic residues of agricultural sprays and dusts.

With regard to this latter need, the National Canners Association Research Laboratories with partial support from the U.S. Public Health Service, are conducting studies to determine the fate of insecticides in composted agricultural wastes. The compost in its final form has properties which make it desirable for application as a soil conditioner. However, before applying the material to the soil, especially where edible crops are to be grown, it is essential to determine whether or not the insecticides, present on the raw materials going into the compost pile, accumulate in the intact form, if potentially toxic degradation products remain in the finished compost, or if the insecticides are completely destroyed in the compost process.

Research now being completed, indicates a rapid microbiological degradation of major-use insecticides during the compost process.

LOOKING TO THE FUTURE

It is not necessary to look into the future to find reason for worry about food industry refuse problems. They are with us today. Close scrutiny will recognize the first wave of a turbulent flood of troubles soon to disturb the complacency of our thinking about solid waste disposal and related problems.

According to the experts, before 1980, in California, 2 million acres of new agricultural land must be equipped for irrigation and farmed to produce the food needed by the newcomers to that State. At the same time, 3 million acres of highly productive land, now devoted almost completely to irrigated agriculture, will be changed into city land. Economical and environmental conditions must allow an expansion of California agriculture. Conservative estimates anticipate a 90 percent expansion by the year 2020. The resultant problems of waste disposal will undergo proportionate growth in magnitude and seriousness unless positive, problem-solving actions are taken now.

Tomorrow food production rates must be increased but the same expanse of land will not be available. Within our agricultural valleys, can be seen even now the battle lines forming between acquisition of the land for urban development and its retention for growing the foods we need. Our now highly intensified farming methods must be further intensified. Food production must be done on land surrounded by urbanized areas "beset with all the troubles which develop in the areas of conflict between expanding urban population and food production activities, increased land values, decreased land area for waste disposal, increased waste production, and greater public health and nuisance problems in closer proximity to the human environment."

It is evident, even now, that the future processing of fruits and vegetables will be in segregated, centralized areas and in plants equipped with pushbutton mechanization. Regardless of the degree of centralization and automation in food growing and processing, the amount of inedible solid refuse and change little in proportion to edible portions of the raw food. At the field, and at the processing point, it can only be expected that greater accumulations of waste materials will be produced. Proper disposal or utilization will de-

mand the best efforts of engineers, bioscientists, and all who are concerned with environmental health problems.

We strongly urge that the compost process be considered only as a trouble-free waste utilization method and not as a process for producing a marketable product.

COMMENTS AND RECOMMENDATIONS

I think we can all agree that this Nation could not sustain its current and expected population without the modern day food processing industries. All of the benefits of modern food technology are expected, even demanded, by the food consuming public. An inevitable consequence of meeting this demand has been the production of larger and larger volumes of both solid and liquid wastes.

The food industries recognize the need for close examination of their processes for the purpose of eliminating preventable food wastage. Without doubt, the food industries must also attempt to correctly evaluate their responsibilities in the prevention of problems arising from disposal of food wastes. There is ample evidence of a growing awareness of these industry responsibilities.

At the same time the food industries must point to the fact that much of the complexity and magnitude of food waste disposal problems are not of the industries' own making. Explosive invasions of people and urban industry, into once wholly agricultural areas have aggravated and multiplied these problems.

Technical help, developed through research, is urgently needed. To this end, research programs designed to establish the technology and feasibility of communitywide, areawide waste management must be undertaken and continued. To implement these waste management efforts, surveys must be initiated and/or continued to ascertain the types of wastes occuring in a given area, the volumes of these wastes, and the time of the year when each is most prevalent.

Long-range forecasting must attempt to predict what changes the future will bring in the occurrence, handling, and disposing of wastes. Such information has unlimited value to industries, such as food processing, in locating and designing future plants. Many future difficulties could be prevented if adequate information were available on which to plan waste treatment facilities for these operations.

Other research efforts must develop techniques and operating procedures for treating or utilizing each type of individual waste which is now or may later be the cause of environmental health or economic problems. Although, in many cases, the treatment and disposal of solid refuse may best be done in centralized operations, disposal at the point of origin should receive considerable attention. I have in mind here the field in which the processing crop is grown.

The collection and transportation of wet solids, such as that from food processing is beset with serious problems which would be eliminated by onsite handling.

Industry, in most cases, must be given the design criteria and operational procedures for technologically feasible methods of solid refuse disposal. It cannot be expected that each producer of an industrial waste has the trained scientists needed to develop these methods.

Unless, in my opinion, there are well organized, immediate efforts

by all concerned, no satisfactory, economical method of solid waste disposal may be know when the emergency comes.

The canning industry believes that appropriate Federal, regional, and State agencies should receive whatever authorization and assistance is necessary for developing and disseminating the information so urgently needed. To this end, the following recommendations are made:

1. All necessary support should be given to the appropriate agencies for the development of technical and administrative staffs adequate in number and ability to meet the critical needs for action in solid waste problems.

2. Qualified central and regional research centers should be encouraged and assisted in implementing, basic solid waste engineering research programs with location priority given to those areas judged to have the most urgent problems.

I would like to amplify my recommendations 1 and 2. I think we must recognize the fact that the problems of air and water and land pollution and the solutions to these problems are not always distinct and are often overlapping. It is suggested that a single national agency could deal most effectively with these problems. A single agency could more effectively assign priorities to solution-seeking efforts and could eliminate duplication of effort and could make more efficient use of available funds.

It is urged that Federal guidelines similar to those established for water pollution control be established for solid waste management. Needed is uniformity in the terms used to define solid wastes and its various components. Needed is uniformity in the criteria for disposal recovery and recycling of solid wastes.

In amplification of recommendation No. 2, I wish to call to your attention the four regional research laboratories operated by the U.S. Department of Agriculture. As an explanatory point. I will cite the full name of the laboratory located in Albany, Calif. Western Utilization Research Laboratory.

From personal knowledge, I know that on the staff of this USDA laboratory are scientists and engineers well acquainted with the serious problems created by agricultural refuse and food processing waste solids. Unfortunately, authorization and funds for extensive research on these problems has been continuously denied for a number of years.

It is my understanding that in this year funds for such important work were requested by the Department of Agriculture but were eleminated by the Bureau of the Budget.

Continuing with the recommendations:

3. The scope and intensity of research on solid wastes disposal must be expanded through grants and contracts awarded to qualified institutions preferably located in areas where these problems are most acute.

4. Every effort should be made to enlist the technical assistance and good will of industries producing solid wastes and to support needed research in qualified laboratories of these industries.

5. Technical and financial assistance should be available for construction and operation of installations designed to demonstrate the technical aspects and economic feasibility of utilizing, or otherwise stabilizing, solid wastes.

6. Consideration should be given to formulating measures needed to coordinate research and planning efforts on a nationwide basis and, on a regional basis, to give overriding authorization and guidance for programs deemed to be in the overall public interest.

7. When adequate information is available, an educational program should be designed to emphasize the health and economic aspects of improper disposal of solid wastes and should be directed to the citizen, his governmental representative, and the producers of solid wastes.

As a final comment, I would like to express my sincere hope that whatever organization of effort is approved by Congress you will not overlook the ability and desire of university and industry research groups to assist in the development and demonstration of solutions to solid waste problems.

To find solutions so urgently needed for these problems, it will require the effort of many kinds of scientists and engineers. It is my hope that whenever and wherever a meritous idea is presented, support will be available for development of that idea.

Most urgently needed is support for the building and operation of demonstration scale projects that will develop and evaluate the technical and economic feasibility of utilizing and/or stabilizing organic types of solid wastes. When this is done, workable methods will be put to use without delay.

I am authorized to say, on behalf of the National Canners Association, that we are in agreement with the general intent and provisions of the Reserves Recovery Act and the National Materials Policy Act as proposed.

This concludes my presentation.

Senator SPONG. Thank you very much, Mr. Mercer.

The subcommittee is most appreciative for your appearance and your testimony. I think that the experience in California and the projections that are included in your statement, in the main, give us some idea of the gravity of the problem.

WASTE UTILIZATION

You estimated that 12.7 million tons of food waste are produced annually in food processing. Of this, 8.7 million tons are utilized.

Does this represent a source of income and how does this compare to disposal costs of the remaining 4 million tons?

Mr. MERCER. The 8.7 million tons which is utilized as a byproduct in one way or another does not represent a source of income to the producer of solid waste. For the most part, it represents simply methods of cost-free disposal of waste material.

In the case of the manufacturer of charcoal briquettes from fruit pits and nut shells in California, this relieves the producer of that solid waste of the cost of disposing of the product.

Senator SPONG. How do you dispose of the remaining 4 million tons?

Mr. MERCER. The remaining 4 million tons is disposed of by other methods which costs the producer of the waste money. As I indicated, we estimate that it costs the total canning industry $25 million a year simply to get solid wastes from the point where it is generated to a point of disposal and this, of course, is the cost of transporting the material from one point to another.

REGIONAL VARIATION

Senator SPONG. In table 2, the production of food process and solid wastes by region, I notice that in some areas of the United States, particularly in the South Atlantic region and the North Central region and in the Pacific Northwest, a much larger percentage of the solid waste of the food processor is utilized for byproducts.

Mr. MERCER. Yes.

Senator SPONG. And a much smaller percentage evidently in, say, the Middle Atlantic area or New England or the South Central area. Could you give me any reason for this?

Mr. MERCER. Yes. There is an explanation for that.

In the South Atlantic area, which includes Florida, much of the solid waste produced there is citrus residue from the citrus operations. This is almost 100 percent utilized as a cattle food or for the production of citric acid.

In other areas, the commodities grown for processing consist of such commodities as green beans, wherein the vines become a valuable cattle feed. I think this accounts for the difference.

In California, for example, the major canning operation there is tree fruits and tomatoes. This kind of solid waste does not lend itself to utilization as an animal feed.

Senator SPONG. You have given us a very good example in Florida, insofar as the South Atlantic region is concerned. But how do you account for the small percentage in the mid-Atlantic area and in the New England area?

Mr. MERCER. In the New England area, considerable portions of the solid waste produced is that from sardine processing and there is only a limited utilization of the solid refuse produced in that operation.

In the mid-Atlantic area, at the moment I am not able to account for the limited utilization of solid waste material.

Mr. RHOADS. We would be glad to check this and supply this for you.

Senator SPONG. I would appreciate that.

In making just a passing observation, I think it just sustains your thesis for more research.

(The information, subsequently received from Mr. Rhoads, follows:)

NATIONAL CANNERS ASSOCIATION,
Washington, D.C., March 12, 1970.

HON. EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution,
Senate Public Works Committee, Washington, D.C.

DEAR SENATOR MUSKIE: During our testimony on February 26, 1970, Senator Spong requested the information concerning the utilization of solid wastes for by-products.

More than three-fourths of the estimated food processing residuals used as by-products come from only three products: citrus, potatoes and corn. All three are very large packs and produce high percentages of residuals. Furthermore, the waste from all three makes a desirable stock feed. Recovery of food processing residuals tends to be high in areas where these products predominate, as citrus does in the South Atlantic, corn in the North Central, potatoes in the North West, and potatoes and citrus in the South Central. The listed products make up from one-half to almost nine-tenths of the residuals in these areas. The presence of a livestock industry nearby is also a factor.

The low reported percentage of residuals used as by-products in the New England area was extrapolated from sparse and possibly inaccurate records on New England potatoes, which account for a large fraction of the area's residuals. If checking shows that the questionnaire figures are incorrect, the percentage of

residuals used as by-products in New England may be estimated to approach or exceed that in any other area.

In the Mid-Atlantic region food processing is spread over a variety of products. The largest amounts of residuals (totaling 48% of them) are from tomatoes, corn, and apples. High proportions of the residuals from the latter two products are used in by-products, here as elsewhere. Only small amounts of tomato wastes are re-used in any region. We believe that the current inability to utilize tomato solid wastes accounts for the lower percentage of solid waste utilization in the Mid-Atlantic Region.

Additional information from the on-going survey of solid waste management in the food processing industry may change the picture presented by the preliminary data.

Sincerely,

AUSTIN T. RHOADS.

Senator DOLE. Mr. Mercer, I read very quickly your statement. You do emphasize the monumental problem we have. I think we have had some testimony earlier this week that aluminum cans are worth recycling.

What type do most of the canners you represent use? Do they use the tin plate steel cans or aluminum?

Mr. MERCER. The major percentage of the canners that we represent use, of course, containers made of tin plate. There are some lesser percentages of the canners who use aluminum cans.

Senator DOLE. Are they a large percentage of the problem, the waste, the trash problem, these type cans? Are you doing any research in the use of either aluminum cans or so-called deflatable cans or packages?

Mr. MERCER. Senator Dole, our research laboratory does not—this responsibility is not within our area. We do stand ready to do research on any type of container in respect to prevention of public health problems or to prevent deterioration of the quality of the food in any type of container that might be presented.

We do not take an active part in research on containers as our responsibilities lie in other areas. I would hope that the people who follow in this hearing might be able to explain—or to answer your questions.

Senator DOLE. You wouldn't have any idea how many of those companies or canners you represent may be experimenting with a new type of package or container?

Mr. MERCER. No; Senator, I have no information in this area.

Senator DOLE. And I assume the tin plate steel cans are less expensive and certainly the profit motive is important to our system.

Mr. MERCER. I think you are correct in that assumption and we really have not become too active into the types of containers of which you are speaking. I am sure that many of our members are researching into this, but perhaps the Can Manufacturing Institute has gone into this a little more deeply than we have.

Senator DOLE. With the new emphasis in all of government, this may be an area for renewed emphasis by your association because you do represent but you represent those who produce waste in the normal course of their business. Senator Muskie and others in the legislative branch as well as the executive branch have pointed up the need for all of us who pollute the atmosphere to take a new look at what we are doing.

We need cooperation, as you point out in your statement. We need motivation and we need industry. If you are researching and looking

for ways to diminish the problem it would be helpful to know just what is being done.

If you can supply any information for the record it would helpful. I serve on the Agriculture Committee as well as this committee and the problems you pointed out in California can probably be found in other agricultural States. You are going to eventually move many of the agricultural related industries out of those States or at least so far away from where the canning process takes place that you create an additional economic problem. I believe you mentioned specifically feeding operations in California and the fact that you need how many acres? You lose 3 million acres to urbanization within a few years.

I don't know how you have solved this problem but apparently you have concluded that urbanization will take over before you can reach any solution.

Mr. MERCER. It is my feeling that we might find an interim solution by transplanting the food growing and food procesing industries to outlying areas but this will not solve the problem. It will be transplanting the problem to a new area. We must find ways to solve the problem where we are presently located.

Senator DOLE. Could you suggest moving some of it to the Midwest. Figure 1 indicates that some of it—the three little dots in Kansas must be Topeka. I notice some States without any dots and I assume that they don't raise any produce?

Mr. MERCER. As I have said in my statement the canneries must be located near the area where the agricultural crop is produced.

Senator DOLE. Particularly the vegetable crops which are highly perishable. But there is an effort being made now in the Midwest to further diversify agriculture. I know of some areas in the Midwest that are now raising vegetables; so, there is some hope that we may solve the two problems: First, the problem of waste disposal and, second, the problem in sparsely populated areas of attracting new industry and helping to alleviate some of the problems of the cities.

If you have any suggestions in addition to those specifically outlined, we would be happy to have them.

Is there anything else you want to say?

Mr. MERCER. We would appreciate the opportunity to amend this statement, to supply some of the information which you have asked for and we were not able to give, and to supplement the statement with additional comments which we might make at a later time.

Senator DOLE. The record is open for 2 weeks.

Thank you very much.

Mr. MERCER. Thank you, sir.

Senator DOLE. Mr. Frank Wright.

Let me welcome you. There will be others coming and going. We have, sometimes, three and four committee meetings at the same time, which may be one of the problems of the country, I don't know.

STATEMENT OF FRANK P. WRIGHT, FRANK P. WRIGHT & ASSOCIATES, ACCOMPANIED BY KLAUS PETER NENTWIG

Mr. WRIGHT. Thank you, Senator.

Senator DOLE. Would you identify your associate?

Mr. WRIGHT. Yes. My name is Frank P. Wright of Frank P. Wright & Associates.

This is Klaus Peter Nentwig of Chattanooga who is one of our leading architects and is also an associate in our endeavors.

Senator DOLE. Let me say you may handle this statement in any manner you wish. You may read the entire statement or you may summarize it.

Mr. WRIGHT. Mr. Chairman, distinguished members of the subcommittee.

I am grateful for the opportunity to appear before you with my colleague and to comment on the problems of environmental contamination that now threaten our very existence on this planet. These comments are not the result of some new impassioned understanding of these problems on my part, but are the result of many years of study on behalf of myself and my colleagues in this area and the expenditure of a small personal fortune. I feel that we are uniquely qualified to have our comments considered since we have already passed through the emotional phase so prevalent among the Johnny-come-latelys in this field and have now reached a stage in our understanding that we think is based on reason, and reason and understanding must now be the criteria for any solution to be developed to preserve our environment.

We now have a new crusade springing up across our land of the protectors of the environment who would in their quest for solution destroy the very affluence that has created the tools and the methods to bring our civilization to its present advanced point. We have those who would in their zeal completely destroy the automobile and the great industry that supports so much of our own civilized society. We have those who would have us put on sackcloth and ashes and, in an orgy of penance to the rest of the world, scourge ourselves in some abstract act that would destroy the advanced technology that has brought us to world leadership. The only results that such an act would have before a cynical world would be to see our country destroy itself, remove itself from world competition and admit that we are too simple minded to occupy a position of world leadership.

We have the new crusade of pseudo-conservationists, weekend ecologists, and cocktail party environmentalists who are ready to pick up the sword and shield and smite the Saracen wherever he may be found, only to find that they are marching in a circle where the man in front is also the man behind, and the guilt of contaminating our environment lies equally upon the shoulders of all of us. So, let's say, "Enough of this weeping and wailing and gnashing of teeth." There has been enough spoken, written, and broadcast about this problem in the last 2 years so that a deaf, dumb, and blind aborigine from the wilds of Borneo should by this time know we have a pollution problem. So, let's take advice from our young people who say, "Don't tell us about the good old days for they have gone forever. Tell us about tomorrow." For that, gentlemen, is the key, tomorrow, and the name of the game should no longer be pollution. The name of the game should be solution, and that is what we are here to talk about. How can we move now to start a program that will eventually bring about an acceptable ecology that will not, in turn, destroy 10,000 years of technical and social progress? It can be done, and it can be done now.

First, I call your attention to the fact that much of the talk, much of the reasoning, and many of the solutions that have been suggested

to this date are too shallow to be of any real value toward structuring acceptable solutions. This shallowness is brought about by the fact that the indepth cause of pollution is being given precious little consideration by the people who have the power to make decisions that will affect a national effort in the control of environmental pollution.

The reason, and the only reason, for this is the fact that nobody really cared about what was happening to our environment until just a few short months ago. In the past, the ecologist was chartcterized as a timous little man with thick glasses and a butterfly net dressed in outsized Boy Scout shorts and tennis shoes. The conservationist was always accompanied by little old ladies equipped with binoculars and Audubon's guide to birds.

The Federal Govenment itself gave little thought to any preservation of the environment by restricting hearings of such agencies as AEC, TVA, and other big dam builders to those authorities who supported the Government agency's point of view. Conservation and ecology just simply were not fields that ambitous, bright high school graduates wanted to enter, so the result was, when this odorous problem burst upon the scene, we were caught with our technology down, and the only thing we could really see was the skim of filth on the waters, the layer of trash on the land, and the dark smudge in the atmosphere that is the superfluous thin outer surface of a problem whose fires burn much deeper than most of our people are willing to admit.

This pollution is the simple result of a civilized development of the old animal instinct, the will to survive. Develop this by logic, and it becomes greed. To satisfy greed, we develop exploitation, and to satisfy exploitation, we must have resources to exploit, great deposits of minerals, available land, great quantities of water, and the availability of large numbers of people.

Then, to inject into this the spark to make it go, we need the fuel to provide the heat that produces the power that drives the machines.

Essentially then, the resulting pollution is caused by a basic instinct that has been refined down through the centuries from animal instinct to the modern affluent civilization by using advancing technology to find bigger and better ways to exploit our resources, materials, land, and men, into the good things that make up our world today. The pollution, then, that you see is simply the residue of this system, and the solution lies not in the destruction of the system, but a realinement of its workings.

Therefore, if pollution is caused by commercial activity, a modification of commercial activity must be made in order to eliminate it. If the automobile is responsible for 60 percent of our air pollution, then the transportation of materials and goods is a good 40 percent of that 60 percent.

The processing of raw materials will create 70 percent of the remainder. The processing of raw materials will create from 60 to 70 percent of all water pollution and the requirements of new raw materials to make up for what we throw away creates about 80 percent of the total destruction of our earth resources by mining, et cetera.

We have, in our own Tennessee Valley, the destruction of thousands of acres of valuable farmland inundated behind dams with that silly excuse that waterways are needed to provide barge transportation so

that industry will move into the area. We accept without question engineering studies that show us we need to dig another hole, build another dam, or another powerplant because we need more power to process more iron, to build more automobiles, stamp out more tin cans, produce more bottles, manufacture more plastics, produce more paper so that we can use them for a short period of time, throw them away, and start all over again.

JUNK AUTOMOBILE

Let's take the automobile as an example. It is erroneously called solid waste when its useful life comes to an end, but if we fail to reuse this junked automobile, then we have thrown away and really wasted some two tons of valuable resources in which we have invested many other resources.

For example, every time we fail to reuse 1 ton of iron or steel in a junked automobile, it takes 2½ tons of new ore, 1 ton of new coal, 2,000 gallons of additional water just to produce another ton of iron. We don't even consider the power necessary to strip off a hundred cubic yards of dirt to get to the iron, the hundred or more cubic yards of dirt to get to the coal, nor does it take into consideration the other fuels and materials necessary to generate the power to move the dirt and transport the materials to and from the mills.

All metals have this property, and their useful life does not end when the automobile or other article is junked. The same thing is true, for example, of a beer can. The metal in a can is not changed simply because it is drained of its contents, and regardless of whether it is a fine automobile, a locomotive, a beer can, or a submarine, metallic objects can be recycled over and over again.

PAPER

Take paper. It takes about 18 good sized trees to make a ton of paper, a ton and a half of coal, thousands of gallons of water, and all of the other countless materials that have gone into the process to support manufacture and distribution.

Now, it is possible with present technology to recover and recycle some 40 million tons of paper a year. This is a saving of about 720 million trees. Reprocessing cuts the power use in half. This is a saving of about 30 million tons of coal. Since paper can be used up to six times before the fiber gets too short to make good paper, you can see that we are beginning to get into areas where air pollution is already being reduced substantially simply because a greater amount of air pollution comes from original refining than is present in second use.

So, solid waste is not solid waste, after all. The term is inaccurate and should be discontinued. It is a resource that we have invested other resources in, so it becomes more accurately an invested resource. The technology of how to recycle our invested resources has been lying latent since World War II when this country used it to great advantage to replace strategic materials. Both Germany and Japan developed this technology to a high degree and were able to resist for a longer period of time than would have otherwise been possible.

Let's consider organic garbage. In a treatise on recycling that I wrote in 1966 of which the subcommittee was given several copies, I

called attention to the fact that it was possible to recover petroleum-type oils and other power from organic garbage. This has been confirmed recently by the Bureau of Mines laboratories who have successfully extracted oil from garbage. Our own experiments proved beyond a doubt the latent energy in organic garbage.

While we have frittered away valuable time in this country listening to intellectual seers castigate us about our affluence, the French have taken a more mundane attitude and demonstrated to the world that the application of known technology can turn refuse to resource. I call your attention to power-generating incinerators operated by Traitment Industrial des Residues Urban, a subsidiary of Electricite de France which operates two power-generating incinerators in the Paris suburbs at Issy-les-Moulineaux and another at Ivry and an older plant at St. Ouen.

These advanced units are extracting up to 8,000 B.t.u. per pound of organic garbage. Considering the fact that this material is free, it compares favorably with the best coals as a fuel and may even exceed coal when you consider it is practically free of sulfur, and no air pollution results.

This example brings us to one of the basic truths about all pollution, that all known materials, at least those known to us, with the exception of some plastics, can be successfully recycled simply by designing such systems to do it, that the second time we use these materials, energy requirements have been reduced nearly 30 percent since the initial refining has already been done. Since the initial refining is the principal area of pollution in any given material, we would automatically reduce all forms of pollution about 20 percent in the overall spectrum of economics.

CONCLUSION

It is our conclusion after studying this problem for nearly 20 years that there is no social or economic solution to the problems of general environmental contamination except complete and total recycling insofar as the technology would permit at any given period, and at this given period in history, sound economic feasibility will permit total recycling of about 80 percent of our materials within the next 10 years if we start to work on the problem now.

There are two important ways that this can be accomplished from an economic standpoint. We suggest the Congress should consider a national resources utilization act. This should be administered by a national resources utilization board set up either within the Department of Commerce or the Department of the Interior.

We recommend the Department of Commerce because of its better liaison with business. This Agency would make bank rate loans for the purpose of financing the technology. This act would provide for a resources tax levied against any resource used to produce an item where recycled materials would do the job as well as new materials.

DISPOSABLE BOTTLES

For example, in the disposable glass bottle, if a manufacturer insisting on producing nonreturnable bottles from new materials would be penalized for the new materials. A producer using scrap glass

would not be taxed for the scrap glass used in his product. Thus, competition would be established. Exceptions to this, such as optical glass, and so forth, would be free of taxing.

In the case of organic garbage, an allowance similar to the oil depletion allowance would give refineries of products made from organic garbage a competitive position with the refineries of natural petroleum. This system can go straight across the board for all materials on which we build society. It would not be difficult to work out agreements among nations for import-export trade.

Now, we have arrived at a superficial solution to at least a significant amount of the pollution that threatens our existence. I used the term "superficial" because as I have indicated previously, pollution is only the surface of problems that smolder deep within our society. We see, we feel, and we smell the pollution of our gaseous environment, the befouling of our streams and the cluttering of our land and we say, "Shame, we are destroying our ecology," but what we do not see is the deeper problem that this same exploitation of our resources for profit has created.

It wasn't so very long ago that these very halls of Congress echoed with the indignation of reformers who plead the case of the jobless and underprivileged, who deplored the disaster of our decaying cities, and who demanded that equal opportunity for all men be provided.

In the case of pollution, have we found a convenient crusade to take the place of a former crusade that seemed insoluble? Or have we now recognized that the deeper fires that we speak of are fueled by the same system of exploitation that has polluted our rivers, darkened our skies and fouled our earth?

Long agonizing years of study have convinced me that the frustrated jobless individual who stands forlornly and without hope on the streets of our ghettoes is a resource temporarily used for profit and cast aside, that the vacant carcasses of our once productive buildings resting on despoiled land are resources temporarily used and cast aside. For we have found that the exploitation of materials and technology for profit is blind to the difference between the breathing, thinking human resource and the inanimate minerals that make up the goods of our society.

When we recognize that when we go before the world with the new morality of use and usefulness as opposed to the old immorality of exploitation and waste, we will have learned something about what civilization has been trying to teach us for the last 10,000 years, that man can satisfy his greed by having the privilege to exploit himself to the fullest measure of his desire or his ability without the necessity of exploiting his fellow man. Since he sees materials and money in a much clearer light than the feelings of his brother, it behooves us to start with the simpler problem of material recycling first.

This could be done by building a recovery complex serving every 1 to 5 million people. These complexes would be operated as a privately owned utility and receive all the waste materials within their district. These materials would go through basic separation and be resold to the specific industries where further separation would occur.

As far back as 1960, we calculated the economic break-even point at approximately 1,500 tons per day. Above that point, profits to the utility would increase. Of course, the utility would not process sew-

age or gaseous residues, but would reprocess all other items including organic garbage but not such things as earth materials such as demolition, stone, and rubble. Let me assure you that this can be done now. Basic research has already been completed.

We have found that American industry will cooperate in massive programs to put recycling into effect. We have researched customers for all of the materials that will be separated out at the complex. We have discussed transportation problems with railroads, truck lines, and barge lines. We have discussed the problems with trade unions and with many city, State, and Federal officials.

A prototype installation could be in operation serving from 3 to 5 million people by the end of the first quarter of this decade. We are certain that financing would be largely private, but to start the operation, we need the interest of Congress first, and the necessary legislation to open the door for recycling. Please understand that we do not speak of ourselves in a selfish way, but only for the science and technology in general.

Let me quote from the statement Senator Muskie recently made on television. He said the time to do something is now. The country has warmed to the problem, and interest is high.

This statement is accurate and important. I would like to go one step farther, in saying that the time is now, not only because of our problems of polluting the environment, but also because of the deep underlying social problems that we must solve at the same time. For this is the age of turning. The distribution of knowledge and the understanding of civilization's function is now a part of every American. The demand for change can swing the mainstream of our progress to the right or to the left because of the friction being developed by dissident factions on either side. We must, therefore, consolidate our efforts to achieve a major understandable goal which should be the goal of the continued usefulness of man, or essentially, the new morality of use and usefulness as opposed to the old immorality of exploitation and waste.

We must provide security for every man through creating a minimum of 5 million new jobs. We must find new and continued sources of revenue to support our coming civilization. We must find new areas of challenge to exercise our technology, and only one area remains, unexplored, and undeveloped, the area of how to continuously use our resources that we have already invested in, and keep in reserve those natural resources and use them only to replenish the amounts as need arises.

But greatest of all, we must divest ourselves of the masochistic interest that we display in our attitudes toward the future. If this earth is to be saved, no biologist, no ecologist, no scientist can effect a workable solution to the problem of the ecology so long as our national attitude seems to be one of resignation to our eventual suicide.

I call on the press to take the attitude that we must start blending in with all the warnings about what we are doing to our ecology; the admonition that today solution is the name of the game, and every citizen must do his part.

But here, I must be realistic concerning widespread public interest. I don't believe it is here now. I don't believe it will be available in the future, and, again, as it has always been since man began counting

time, the awesome responsibility to save this world for the unique phenomena of life will rest on the shoulders of a few dedicated men.

Thank you, sir.

Senator DOLE. Thank you. I assume your excellent statement is based primarily on your own experience and, therefore, it might be helpful for the record to know a little more about Frank P. Wright & Associates and what you are involved in.

Mr. WRIGHT. I am a mechanical engineer and through the last period of years since we formed Frank P. Wright & Associates, I have made my living mostly from designing machinery for industry. We started as a result of my experience with serving for the War Production Board in World War II when we found we were making tanks and airplanes out of kids' toys and bombs out of kitchen fats, et cetera.

It seemed to us that under the pressure of war if we could do this successfully that we could do this in peacetime. It simply needed organization.

At one time we had 35 associates. Mr. Nentwig, who is one of our associates, is a successful architect. His interest in this problem is extremely high. We also have doctors, we have a few politicians, some lawyers. We have people from all phases of our society. We have put together a very, very complete research team in this particular field.

Senator DOLE. What, specially, are you doing now? Is there any one specific area on which you have done research?

Mr. WRIGHT. I, personally, have designed some of the largest machines that are used in the recovery of junked automobiles. This is being done now of course.

I mentioned the generating stations in Paris. They are extracting 8,000 B.t.u. from 1 pound of organic garbage. This is a solution, for example, to the problem of——

Senator DOLE. This is something your company has developed?

Mr. WRIGHT. Our company has developed mostly heavy machinery. We have simply put together this technology that now needs a prototype.

Senator DOLE. You indicated in your statement that this would be financed largely from private sources.

I was unable to be here yesterday but Leonard S. Wegman of New York City stated that a national disposal fee of 1 cent per pound should be imposed at the manufacturing level. This, as I also understood from reading his statement, would raise initially about $3 million per year.

You didn't mention specifically how you would finance. You indicate that the Government, of course, would have a role in the early stages. How do you envision financing the efforts needed to control the problem?

Mr. WRIGHT. The key word in this statement is "disposal." We can neither create nor destroy matter. We must create a system of returning this material to the economy for profit. I think this should be done with a national resources utilization board functioning within the Department of Commerce and they would say to the public and to the manufacturers. "If you insist on using our resources right out of the ground, you are going to have to pay a tax on them."

Senator DOLE. Are you familiar with the proposal offered by Senator Boggs of Delaware and Senator Muskie which would create the Na-

tional Materials Policy Act of 1969 and would create a National Commission on Materials Policy composed of seven members?

Mr. WRIGHT. Yes, I am.

Senator DOLE. Would that satisfy, to some extent, the suggestions you made in your statement with reference to the National Resources Utilization Act?

Mr. WRIGHT. I don't think it goes quite far enough, Senator, for the simple fact that we had some problems of getting the economy going immediately following the depression, as you remember, and we had a lot of people criticizing—I think it was responsible for many of our great industries. The private investor is notorious in being a pioneer. It is too easy to make 7½ percent at the banks than to go out pioneering something like recovering garbage.

If you say, do you want to pay a tax on new materials or do you want to build your plant to use old materials, we would at least lend you part of the money at bank rates to help you get into a new industry and a new business. This is what we have to have. To finance the beginnings of total recovery systems.

We can't go on making more television sets and throwing them away.

Senator DOLE. Do you see anything wrong with the proposal outlined yesterday that if a television set weighed 50 pounds, the last owner would pay a disposal fee or tax of $0.50?

Mr. WRIGHT. Yes, I do. Because you are penalizing both social and technical progress here. However, if the man who built that television set, for example, paid taxes on the new materials that he used and he was encouraged to buy used materials, to manufacture his product. A market for all used materials would be developed this could be worked out. For all waste materials.

For example, if the recovery complex is built and I——

Senator DOLE. You are talking about one for each——

Mr. WRIGHT. Five million people. This would cost about $35 million to build and would pay itself off in 10 years.

Senator DOLE. This would be a complex that would dispose of or recycle all the so-called invested resources and you say we should discontinue the word "waste" and maybe use the new term "invested resource."

Mr. WRIGHT. I think this is more accurate and I think it gives the public an idea of what you are doing more than just what the word solid waste and usually does.

We have already discussed this with the railroads. For example, in the Washington area you would have collection points in which sanitary collection cars would be placed and the collection of refuse would simply be taken to these cars and the cars would be pulled out in the wee, small hours of the morning and another car put in its place.

These cars would go to the complex which makes a preliminary breakdown of the materials. In this case we are not too concerned about whether we recover all the paper because the power available in organic garbage can power that completion. It can also generate enough electricity to power the cars to haul that stuff out.

Twenty percent of the total power of the city of Paris comes from garbage. We are trying to cut down, by recycling, the power glut.

Right now, for every man, woman, and child in America, there is about 400 horsepower continuously working for him.

By recycling, you will cut down because you do not need this much power to recycle material as you to do produce new materials.

As I said about the man standing in the ghetto, the power glut, and our social problems are all dovetailed together and they are inseparable.

Senator DOLE. You mentioned young people. Maybe we ought to do as they suggest. But you also mentioned in your last paragraph that that there really isn't the public interest that we would like to have.

Do you see the young people taking this on as a project?

Mr. WRIGHT. I very definitely do. I noticed that some of our young people went out to a vacant lot and buried a car, and then went off and left the lot all littered up.

Senator DOLE. And they all went over to the lot in cars and polluted the air.

Mr. WRIGHT. This has happened. They have pollution rallies and then clutter up the room so badly it takes a day to clean it up. We need in this country a pure ecological science. I don't mean by ecological science made over or warmed over NASA or AEC scientists. We need people who are ecologists because of the inborn desire to be ecologists, not, the inborn desire to continue their profession in some other field. When their chosen profession loses its glamor.

I would hope to see the Government recognize the fact that we must now turn our attention to the ecology because this is all we have left.

Senator DOLE. There is a dramatic change in this direction, as you point out, about the environment. As Senator Muskie, Senator Boggs, and Senator Baker have said on this committee, we all have a responsibility and some of the ideas you suggested certainly have merit.

How much money have you spent, of your own?

Mr. WRIGHT. I spent everything I had. I got so deeply in debt that even my junk mail came with postage due.

Senator DOLE. Maybe this could be recycled.

Mr. WRIGHT. We certainly hope so.

Senator DOLE. I want to point out that Senator Baker is not in the city or he would have been here. I contacted his office to see if he had any questions. He did not have any.

It may be that you will have some questions submitted by the committee for further——

Mr. WRIGHT. I would like, if I may, have Mr. Nentwig say a few words. He is uniquely qualified on this since he spent some time in Germany this summer, at his home, and saw some changes there in the garden cities. We hope, of course, to create a new economic field by recycling all waste materials that we can go out and build these new model cities that we are talking about. We can't go out there and steal industry from some other city. We have to create new industry that will occupy a position in a vacuum. Then we can build a new model city with its own economic base and relieve the pressure on the large cities. But only if we have a new economy that does not steal from some other industry. It is not right to steal an industry for your own home town and let the guy in the other city worry about it. We should create some new ones in this vacuum.

Senator DOLE. Just as an aside, I believe in the new John Hancock building in Chicago they dispose of all their wastes within the building?

Mr. WRIGHT. I certainly hope so. Every time I see that thing sticking up there polluting up the sky, it reminds me of a big Texas oil derrick. I think this is another form of pollution, site pollution. It is a pollution of certain sensibilities that we have, that I think will change, too.

Senator DOLE. That is s-i-t-e, right?

Mr. WRIGHT. Right.

Senator DOLE. Did you want to say something? We have a little more time.

Mr. NENTWIG. As Mr. Wright told you, I am an architect and a planner, and I am a member of the research team and my concerns were mostly with our town, our existing towns, and since about 2 years ago with several of the new towns.

In a recent trip last year to Europe, I visited some of the expanded and some of the new towns that have been created in Europe and recognized very vividly in Europe the complete different attitude toward an environment or complex such as a city that exists in Europe than it does in our own country.

We might go, as Americans, and study the concept of basic planning in Europe. After all, most of us come from there. I happen to come from there very recently.

Senator DOLE. The committee would be happy to spend some time over there.

Mr. NENTWIG. Planning in the sense that Mr. Wright was talking about, the recycling concept, and that is planning ahead to solve the problems that are not even here at this point or moment.

We are talking, for instance, about the increased waste that we will have by new methods of technology. After the war in Central Europe, the recycling process itself had been used just out of necessity.

You probably have seen or have heard about the devastated cities that were, not only in Germany, but all the way in Austria into the Scandinavian countries where they were building new materials out of the old rubble; where there was a possibility of getting very adequate or even superior materials out of waste, such as tree branches and tree stumps that were left over.

A new form of material that is used now as a backing for our most expensive furniture has been created from this.

The problem of pollution is, in my opinion, is not contained only in the visible, audible, smellable pollution.

Senator DOLE. That is how the average citizen understands pollution. If he sees the black smoke or the tin can or the trash on the highway or street.

You, as engineers, look at it differently. This is only a very superficial part of the problem to you.

Mr. NENTWIG. That is correct, sir.

Senator DOLE. Perhaps we, as a rule, have misplaced the emphasis. We are talking about only a very small percentage of the real problem and maybe none of the solutions.

What, specifically, in Germany have they done that does merit the attention, not particularly of this committee, but of those in this country concerned about environment and ecology?

Mr. NENTWIG. If I may give you a very small and very personal experience. I took, for the first time in their lives, my children over to Europe and the day after we arrived, three generations took a walk in the small town of Partava, of 6,000 people.

My 6-year-old, raised in this country, had as one of the first three responses to that walk—the first was, "They have so many flowers here." The second was, "Papa, there is no paper on the streets." The third one was, "There are so many babies around here." He could see all the baby carriages with the babies in the fresh air.

That is the response of a small, 6-year-old child and I think it shows pretty much the interrelationship of our own environment. The flowers, whether they are individually owned and hanging in a box on a window or whether they are planted by a civic organization or by the city itself and being kept up—it is so much a part of our environment that it would create either a harmonious or disharmonious feeling and atmosphere.

This is, in my opinion from the layman's standpoint, the way we have to attack the pollution problem. The pollution problem, I have mentioned just recently in a lecture, is much more of a moral issue, a moral problem, an ethical problem, than it is really a technological problem.

The concept is that whatever we have to attack in this country or in this world we should attack in a more overall type of attempt instead of just individuals trying, either getting cooperation from the pulpwood industry or paper industry or the steel industry or this or that industry. We have to look at it from a general standpoint.

Senator DOLE. I would guess that maybe our emphasis has been on clean-up and not on prevention or planning. Hopefully, these hearings and the legislation that may follow will incorporate what you suggest.

In other words, we can avoid some of the pitfalls a decade later by proper planning.

Gentlemen, before we adjourn, we will accept for the record at this point additional pertinent materials which we may already have or which we way receive before the record is printed.

(The following materials were later received for the record:)

BAKER & MCKENZIE, ATTORNEYS AT LAW,
Chicago, Ill., January 20, 1970.

Re Solid Waste Disposal—Organic Nutrients, Inc.

Hon. EDMUND S. MUSKIE,
U.S. Senate, Washington, D.C.

DEAR SENATOR MUSKIE: Because you are Chairman of the Subcommittee on Air and Water Pollution and have sponsored much beneficial legislation in that area, I appeal for your assistance on behalf of a client of mine, Organic Nutrients, Inc. Organic Nutrients has (in conjunction with a Kalamazoo inventor) developed a process by which compost made from garbage can be enriched into a top quality lawn and garden fertilizer.

The significance of this breakthrough may not be apparent immediately to one who is not immersed in the solid waste disposal field. The fact is, however, that composting of garbage, together with the reclamation of other waste materials, such as tin, steel, rags, etc., is the only means of disposal which does not generate substantial additional pollutants (as does incineration) or require increasingly expensive disposal methods (as does land fill). Despite the fact that everyone agrees that composting is the most desirable means of solid waste disposal, only one full-fledged compost-recycling plant is in operation, in Houston, Texas. The reason for this is that no one has yet been able to lower the cost of composting below the cost of incineration or land-fill, because no satisfactory market has been found for the compost end-product in order to make composting profitable.

The Organic Nutrients process, however, appears to be a means of turning the compost into a highly valuable end-product at a modicum of cost. It is, in my view, an ideal case for a federal grant to form the bridge to assist private enterprise in realizing the social attainments which both existing anti-pollution legislation and your proposed legislation are designed to further.

Although a pilot operation run by Arthur G. McKee in Cleveland appears to corroborate the feasibility of manufacturing high-grade fertilizer by the Organics Nutrients process has not been proven on a full manufacturering scale, and Organic Nutrients does not have the funds to build a plant to demonstrate the process. For this reason, Organic Nutrients (in conjunction with the City of Houston and a not-for-profit corporation) applied to the Bureau of Solid Waste Management in Cincinnati for a demonstration grant. I attach for your staff's consideration a copy of this application. The Bureau panel rejected the application on the grounds that operations in Altoona, Pennsylvania and St. Petersburg, Florida are enriching compost by a "similar if not identical process." This statement unfortunately is not accurate and indicates in this case a lack of understanding by the panel on this approach to solid waste management. Although I will not burden you with the reasons why neither of these two operations is enriching and pelletizing a composted fertilizer, we are prepared to substantiate this statement before the panel or before your staff if we can obtain an opportunity to do so.

We at Organic Nutrients, therefore, request your assistance in (1) obtaining a reconsideration by the Bureau of Solid Waste Management of the grant application, and (2) obtaining an oral hearing before the panel. We are in the process of applying formally for this action. We would also welcome any other suggestions which you or your staff might have.

Sincerely yours,

DAVID R. MACDONALD.

P.S.—If consonant with your busy schedule, I would sincerely like to have the president of Organic Nutrients, Joseph M. Cvengros, discuss with you the possibilities of enriched compost as a solution to garbage disposal of large metropolitan areas. There are certain individuals with a single-mindedness of purpose which enables them to take even a mediocre idea and by sheer force of hard work and personal effort carry it through to successful completion. Mr. Cvengros is, in my opinion, one of these persons, although he has in his hands an idea that is far better than mediocre. When the effort to control pollution during the 1960's and 1970's is finally assessed, I believe that a handful of people will stand out as having spearheaded that effort, among whom will be yourself, and, I will wager, Joseph Cvengros.

(Enclosure accompanying Mr. Macdonald's letter has been retained in subcommittee files.)

AMERICAN CAN CO.,
New York, N.Y., February 16, 1970.

Hon. EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution,
U.S. Senate, Washington, D.C.

DEAR SENATOR MUSKIE: I have long shared your deep interest in solving the problems created for our society by solid waste. I am pleased to receive your kind invitation to appear before your air and water pollution subcommittee on February 26th to discuss your solid waste bill and the associated amendment by Senator Boggs. However, I regret that my calendar for February 26th already has me committed, and it will not be possible for me to appear before your subcommittee.

I would like to suggest that the packaging industry's views on your legislation and on the Boggs' amendment could very well be expressed by Mr. Richard L. Cheney, who is serving the industry as president of the Materials Disposal Research Council, and it may be that you would like to consider inviting him to appear as a witness. I have worked closely with Mr. Cheney on the solid waste problem for a number of years, and I can assure you that he is anxious to cooperate with your subcommittee and with government generally in developing solutions to the problems that concern us all.

I would like to report to you that the American Can Company and the packaging industry generally are now focusing maximum attention on the solid waste

problem and on the opportunities that exist for the packaging industry to contribute solutions to the problem.

For example, the Keep America Beautiful organization has within the past few days expanded its scope, its staff, and its budget to create a program that will deal with all forms of pollution rather than restricting its educational efforts to the litter problem as it has done in the past. Also, the major associations active in the packaging field have recently joined together to form the Materials Disposal Research Council. We are all hopeful that this group will be able to serve as a unifying force to assure that the materials used in packaging are made the subjects of research and development activities calculated to eliminate or reduce the contributions made by these materials to the solid waste problem.

Keep America Beautiful and the Materials Disposal Research Council are now, incidentally, in the process of merging their two organizations in an effort to assure that the fullest possible measure of effort will be directed at the development of positive and constructive contributions to solid waste problem solutions.

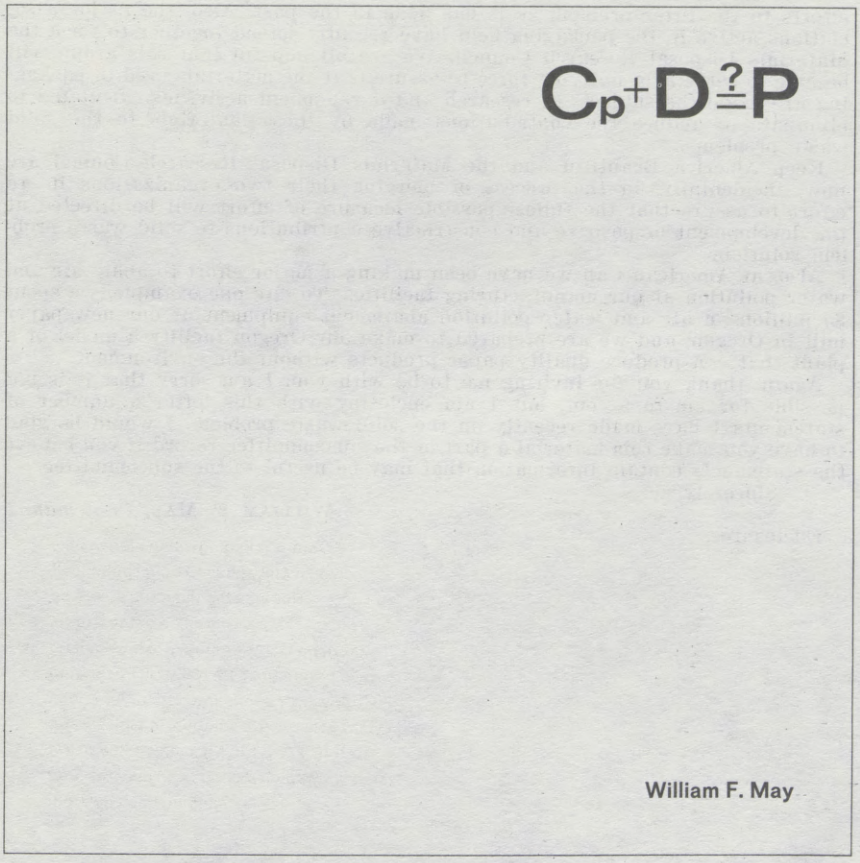
Also, at American Can we have been making a major effort to abate air and water pollution at our manufacturing facilities. To cite one example, we spent $5 million on air and water pollution abatement equipment at our new paper mill in Oregon, and we are prepared to make our Oregon facility a model of a plant that can produce quality paper products without the environment.

Again, thank you for inviting me to be with you. I am sorry that it is not possible for me to accept, but I am enclosing with this letter a number of statements I have made recently on the solid waste problem. I would be glad to have you make this material a part of the subcommittee record if you believe the statements contain information that may be useful to the subcommittee.

Sincerely,

WILLIAM F. MAY, *Chairman.*

Enclosures.


Cp+D?=P
William F. May

$C_p + D \stackrel{?}{=} P$

Does packaging convenience plus disposability have to equal pollution? This was the question posed by William F. May, Chairman of the Board, American Can Company, in his keynote address before the 36th National Packaging Conference sponsored by the American Management Association in Chicago on April 10, 1967. Mr. May suggested a first step with which industry can take the lead in changing this equation.

Gentlemen:

I greatly appreciate the opportunity you have afforded me to "keynote" this 36th National Packaging Conference. When I was given unlimited latitude in selecting my subject, I decided very quickly that I didn't want to carry packaging coals to a packaging conference.

You will have ample opportunity in the next few days to hear about all the technical, as well as the sales and marketing, aspects of packaging from an array of experts. For the moment let's theoretically unbutton our collars, slip off our shoes and talk within the family.

How familiar are you with the words "disintegration," "degradability" or "terrestrial environment"? Does that sound like a foreign language when applied to packaging? Within the next ten years those words will become as familiar to us as "convenience" and "disposability" are today.

"... Convenience ... Disposability ... Pollution"

In fact, the words "convenience" and "disposability" will necessitate the addition of the others to our packaging vocabulary. Their use will be engendered by another word with which you are familiar: "pollution."

By this time I know that you are putting two and two together and quite possibly they total a statement made recently by John W. Gardner, Secretary of Health, Education and Welfare: "The time has come for man to make his environment his ally, not his enemy."

Now if I cite some statistics from President Johnson's Science Advisory Committee to the effect that each year United States citizens must dispose of more than 48 billion cans (more than 250 per person), 25 billion bottles and jars (135 per person), 65 billion metal and plastic caps and crowns (338 per person), plus billions of miscellaneous packages . . . then the mental picture I've been drawing you begins to take form.

Let me add a little more substance with the results of a study made by one of our own trade associations which disclosed that litter taken from a composite mile of highway in Michigan, Texas, Florida, Maine and Washington consisted of about three cubic yards, loose measure, of material ranging from cigarette packs and gum wrappers to beer cans, beverage bottles and even people's pajamas. The chief offenders, however, are paper packages, cans and bottles, in that order.

By actual count there were 2,665 pieces of litter in that composite mile and it is estimated that it cost the taxpayers 32 cents a piece to have them picked up. It was estimated further that the annual cost of cleaning that one-mile stretch of road, with pick-ups three times a year, was $2,500.

I can complete the picture by saying that pollution is a national problem. Stating the obvious, however, doesn't tackle the problem . . . and the problem, gentlemen, is *our* problem. You'll remember that the highway litter study disclosed that paper packages, cans and bottles were the most prevalent items in that three cubic yards of litter.

". . . industry, municipalities and agriculture must share the major responsibility . . ."

It is perfectly correct to say that industry, municipalities and agriculture must *share* the major responsibility for our national pollution problems. Nevertheless, the American citizen is prone to place emphasis on industry's responsibility possibly because it is a profit making entity and because he considers it to have unlimited resources to deal with the problem.

You logically might raise the issue that it's the American citizen's obvious lack of concern with how he disposes of packages and wrappers of all kinds that is one of the principal contributing factors to national pollution. I would agree without reservation.

Nevertheless, so long as package users demand more convenience packaging, and more and more disposable packaging, and that demand is satisfied by the package manufacturer, the ultimate consumer will persist in his rationale that the manufacturer and the package user are responsible.

There are literally dozens of examples of such rationalization already plaguing us. The citizen who uses the circular, easy-open ring-tab from a can of beer to illegally operate a parking meter is seldom caught, or adequately punished if he is apprehended. The manufacturer of the beer can featuring the easy-open device *is* held responsible and is told to change the design of the tab so it will no longer fit the meter.

The alternative confronting the beer can manufacturer can be a ban on his product in the community. No genuine thought is given to the fact that the people who use the tab are cheating their community or that the suggested remedy is not improved morality but a mechanical change that would cost the can manufacturer hundreds of thousands of dollars.

The same applies to the inconsiderate citizen who litters a roadside or beach with beer and carbonated beverage cans. Those who complain do so to the manufacturer of the can and their complaints are even more vociferous when the easy-open tabs on the cans are thrown on the beach and result in cut feet. The individual is *not* held responsible but the company *is*.

I hope that you don't have a feeling at this point that I'm laying the groundwork for a request for funds for Keep America Beautiful. I'm not. I would assume that most of the corporations represented in this room already are supporters of KAB. It's a fine organization and performs a very useful, informative and educational role in this area. Nevertheless, it can never be the complete answer to the litter problem.

"... the packaging industry and the users of its products must anticipate the future."

What I *am* suggesting is that we in packaging and the users of our products must anticipate the future. We must anticipate the inevitability of the necessity of our doing something to minimize litter resulting from packages before the federal government directs us to, or takes it upon itself to, initiate a remedy.

We have seen what has happened with automobile safety legislation and truth in packaging legislation. We know that truth in lending legislation is a possibility in the current Congress and that President Johnson has called for legislation to minimize the likelihood of massive power failures and improve our system of meat inspection.

We in packaging should be the masters of our own destinies. "If industry would *anticipate* areas into which the government is likely to move, such as auto safety, it might by timely action preclude the intervention," the Wall Street Journal declared in a recent editorial.

I'm confident that most of us would agree with that. However, should legislation be proposed I hope, too, that industry has learned from the protracted period of time and the tremendous amount of effort and money spent in haggling over "truth in packaging" legislation that intransigent opposition is a mistake.

Anticipatory action by package-makers and packagers with respect to solving the problem of litter created by their products, after they are used by the consumer, is the only way to avoid outside intervention. One of our

industrial publications stated it quite well recently when it said: "If it can be shown that a million thumbs feel the hammer's bite each year, and the law can't improve the aim of the citizen, it CAN require soft hammers."

". . . the affliction of littering is not confined to the uneducated . . ."

The most monumental information and education program in the world will not have a major impact upon the confirmed litterers of this country. We've already recognized that the affliction of littering is not confined to the uneducated but encompasses citizens of all educational levels. Its common denominator seems to be "irresponsibility."

Nevertheless, we must live with this irresponsibility and if we don't find ways to make our products "fool-proof," so far as their disposability is concerned, we can fall prey to "soft hammer" legislation. Enlightened self-interest dictates our response in this respect but I would hope also that our social responsibilities, as corporate citizens, would motivate our search for a solution to the problem.

We must accept the fact that proliferation means problems and that we live in a world of proliferation. The world population doubled in the last century and it is predicted to double again within 50 years. That projects to more than 400 million people in the United States alone by the year 2015. The need for foresight is obvious.

Technological skills comparable to those that provided us with the automobile and the most convenient, efficient packaging in the world, certainly must be capable of solving the attendant problems of safety and pollution. It can be argued that pollution resulting from irresponsible disposition of metal, glass, plastic or paper packaging indicates an obvious lack of planning in our technological advancement.

Further technological application should solve these problems, however, before their sheer size makes them insoluble. Recognizing that what is sometimes considered too much technology is really too little, scientists now emphasize that unplanned, uncontrolled technological growth can no longer be tolerated.

I hope we won't find, as the automotive industry did, that the Congress or a government agency or commission will decide that we must have a solution to the problem of litter resulting from packaging on a specified

early date. We might have to look for a miracle at that point such as the Federal Judge who recently ruled that an automobile manufacturer was not liable for the collapse of his product in a collision on the ground that it had not been manufactured or sold for the purpose of colliding.

Pollution control consultants are quite direct about cans, glass bottles, plastic bottles, metal and plastic caps and crowns and paperboard packaging. They state unequivocally that one of the most difficult problems in waste disposal are these used containers and packages.

An article in the Harvard Business Review disclosed that collecting and transporting this refuse load, together with garbage and other rubbish, costs the municipalities of this country more than $1.5 billion annually. This projects to more than $50 billion for the remainder of this century.

"While tin plate cans will rust and disintegrate in time," the article stated, "aluminum and glass are much more permanent. And the new family of plastic containers will probably be even more durable. None of these containers can be completely consumed by the incinerator. Consequently, the present trend toward 'throw-away' soft drink and beer bottles and plastic milk bottles adds to the problem."

"... the situation probably will get worse ..."

The concluding sentence in that part of the article stated: "The situation probably will get worse if producers and distributors continue to concentrate more on pleasing the consumer and the storekeepers than on the disposal problem."

That is about as neat and comprehensive a statement of the problem confronting us as I have seen.

Convenience packaging, gentlemen, is rapidly becoming *problem* packaging and we all are caught right in the middle. How do we continue to satisfy consumer demands for easy-open, readily disposable, adequately protective packages with built-in assurance that irresponsible disposal by the user will not result in advancing the litter and pollution problem?

I'm not an expert in this respect. Someone told me once that an expert was someone who knew the way but couldn't drive the car. Nevertheless, there are directional signals from qualified experts in the field.

The Environmental Pollution Panel of the President's Science Advisory

Committee stated in a recent report: "The accumulation of present types of non-reused containers, whether made of metal, glass or plastic, is a substantial and difficult part of the solid waste problem. The development of containers with adequate storage life which will nevertheless degrade rapidly when discarded is not likely to be an easy task, but the advantages of success are great."

"... the future of the packaging industry depends upon our tackling the problem now."

The Panel has not sugar-coated its suggested remedy. It will be costly, it will be time-consuming and it will be difficult. Nevertheless, the future of packaging depends upon our tackling the problem now.

The Harvard Business Review article I mentioned earlier suggests that the fiber-foil container is a step in the right direction. It concluded that this style container "now being used increasingly for frozen juice concentrates and for motor oil can be easily crushed and disposed of, and represents the kind of degradable container that should be developed for numerous uses."

This is only one small step, however, and I believe it is obvious that there must be an all-encompassing approach to the problem, involving not only container and package manufacturers, but the suppliers in the metal, glass, plastic and paper fields as well.

I'm always reluctant to suggest the formation of another group to seek a solution to a problem, but I think in this instance it is essential that a representative group accept the challenge. I would suggest the formation of a Packaging Materials Research Council with initial representation drawn from the Glass Container Manufacturers Institute, the Can Manufacturers Institute, the American Paper Institute, the Iron and Steel Institute, the Aluminum Manufacturers Association and the Society of the Plastics Industry.

Initial representatives could be limited to two from each of the organizations named and they should represent the best top research personnel of each organization's membership. Their initial task should be to review the entire packaging materials field to determine what is now being done to provide degradable materials.

This review should be the subject of a report by the Council to be made available six months after its organization. The report should contain not only a review of the present situation on degradable materials but recom-

mendations for future courses of action by container and package makers and their materials suppliers.

Further than that, it should evaluate technological developments in the multi-million dollar business of refuse disposal in general. Even the cans, glass bottles, plastic containers and paper packages that are *properly* disposed of create refuse problems.

If they are processed through grinders, the resulting waste still must be disposed of and if they are incinerated they pollute the air. Some contaminate the ground if they are used for purposes of fill. Yet we must put them somewhere, so we are slowly filling the earth with our refuse, and one day we may fill the seas with it.

The non-combustibles in this group generally account for 24 per cent of the total amount of municipal refuse while the combustibles, including all paper refuse, account for 64 per cent. The remainder is in food wastes.

I would suggest further that the Council review its activities on a regular basis with the anti-pollution agencies of the federal government such as the Department of the Interior, the Department of Health, Education and Welfare, the Congressional Committees on Public Works and the President's Science Advisory Committee.

I don't need to tell you that we are living in a rapidly changing world. Today the control of air, water and solid waste pollution is not only an industry *problem* but a *responsibility*. Weird as it may sound, control of these pollutants is actually a battle for survival on the part of man.

One university scientist has predicted that "the world's atmosphere will grow more and more polluted until, a century from now, it will be too poisonous to allow human life to survive, and civilization will pass away."

All of us already are involved in projects to control air and water contamination. Control of litter and accumulation of solid wastes is nothing more than an extension of our existing antipollution efforts and represents an area in which we in packaging can make a direct and major contribution. As good businessmen, as citizens we must do no less.

". . . we must do no less."

Someone once said: "True achievement is measured by how much better off the world is for our having lived in it."

PANEL DISCUSSION NOTES ON "SOLID WASTE AND LITTER, ENVIRONMENTAL POLLUTION AND ECOLOGICAL BALANCE"

(By W. F. May, Chairman and President, American Can Company before the New York Board of Trade, International Section, Harvard Club, January 8, 1970)

I would like to share some thoughts with you this afternoon concerning three areas: solid waste with its associated litter, environmental pollution and ecological balance.

For some time, the packaging industries and the ancillary industries that support the packaging industries, have been quite concerned about solid waste disposal and the more apparent obnoxious demonstrations of litter. We first formed Keep America Beautiful, which addressed itself primarily to litter, trying to educate a public to be less slovenly, to be less irresponsible. The public is demanding hard-to-create convenience packaging, and yet the public abuses this convenience by contaminating and fouling the atmosphere and the environment in which it lives.

The packaging industries have also investigated the technological approaches which might bring about the development of a package that would be self-destructive. You might call it biodegradable. I don't have a great deal of hope for the immediate solution to this problem of modern living; the contamination of our parks, our beaches and our highways.

Most packages are quiet inexpensive. They cost only a few pennies. Yet, they have to offer complete protection to the things they hold.

The packaging industries, in general, not only guarantee the package one hundred percent, but also accept a full contingency liability. When a company produces a product that costs only four cents or five cents, it accepts a liability that might be as much as a dollar, on a one hundred percent performance basis.

Additionally, the required performance of the package is highly variable in time. It may be used almost immediately after it's sold or it may sit in the pantry for years. It's almost inconceivable that you can instill in a product that costs only a few pennies to create, the intelligence to perform one hundred percent and then, at a given point, to automatically disappear or destroy itself.

There are some leads. Possibly through some of the man-made materials, principally the plastics, we may find some partial solutions to the problem, but I wouldn't hold out the hope that we are going to have a bio-degradable or a self-destructive package in the foreseeable future.

Another thing we have done is to form the MDRC—the Materials Disposal Research Council. The organization has a high degree of participation and popularity among the industries, or the industry associations that have relevancy to the solid waste disposal problem. In addition to the packaging industries, representation includes the chemical industry, the fiber and glass industries, the steel industry and the plastics industry among others. More recently, executives of the automotive and the energy industries have joined us.

At our last meeting we learned the amount of money being spent on environmental control alone by the several industries represented. The figure represents several hundreds of millions of dollars that these industries, or companies in these industries, have expended in the recent past.

My own company spent eight million dollars on this program alone from 1963 through 1967, and over four million in 1968. Now this is money that was spent solely to control atmospheric and environmental contamination.

Now this leads me to our next problem which grows out of our wonderful competitive society. You can't expect corporations to spend millions on a voluntary basis. There isn't a chief executive alive who is going to spend the stockholders' money for this purpose without some reward, some return on investment, or at least some assurance of equity with his competition.

I have said that industry has spent a great deal of money in this area. But to a great extent, it's been budgeted on the cold-blooded analysis that business was going to have to spend this money one day anyway, and maybe it would be cheaper to spend it today than tomorrow. So, in this competitive environment, I believe we are going to discover that we must have some centralized authority or agency that is going to make the rules uniform for all the industries involved. If this doesn't come about, we are going to find that one industry is declining or hurting its profits in order to accomplish these desirable and very necessary objectives.

Another factor in the area of our competitive environment is the development of new technologies to meet the apparent desires and needs of the consuming public. I suggest that any new technology must be evaluated on several bases.

In addition to determining what a technology is going to do for us in terms of profitability, and what it is going to cost in terms of investment and development, there must also be a very definite determination of how the technology will relate to our society.

If the new technology could bring about negatives in the social area, then we believe that a conscientious and adaptable industry will not bring it to the marketplace. But here again, you have the tremendous pressures of competition which are going to make these decisions most difficult ones.

Much of what we've been discussing today falls in the areas of broad public affairs and public policy. We must accept the fact that the community barriers and the defined provincial responsibilities that existed in the past, cannot apply in the future. We have to take a more objective viewpoint in the control and legislation of these actions and these programs on a national, and even international, basis.

If there is a company or a plant in Bridgeport, Connecticut, that installs certain stream pollution control devices and if a competitive plant in New Hampshire or in New York State a few miles away isn't operating by the same rules, business would become mired in the mud of utter confusion and frustration. Our considerations will have to cross community, state and, in some cases, even national boundaries.

I now believe that we must think in terms of a federal approach to our environment, a centralized authority. Much as we all avoid and abhor increases in central authority or government, the pressures of population and the pressures of this problem bring us to where we must accept centralized authority and guidance in this area. The alternatives are a hodgepodge of legislation, a hodgepodge of programs and a hodgepodge of control.

It's most important too that we don't allow ourselves to be lulled into believing that creating a federal program under today's conditions is going to be the ultimate panacea. Today, there are no less than 26 federal agencies with a multitude of programs in the area of water pollution alone.

Our approach must be on the federal level, but it must bring with it a centralized and coordinated guidance so we will be able to achieve single authority and single responsibility in this area.

If we are successful in creating the proper approach to the problems of solid waste, litter and pollution, we still will not have reached the end of the road; we won't have fulfilled our obligations to future generations. There is the almost overwhelming problem of ecological balance.

We are profligate in our use of limited resources. We use once and throw away minerals and metals that are not inexhaustible in their source and supply. The answer, based on our current research and science, is that these minerals and metals must be re-cycled and re-used, if we are to conserve them for future generations.

I believe here also that we will have to turn to some public determined force to codify the knowledge and technology that will have to be brought to bear if the balance of nature and man is to be maintained.

One of the things that our space programs has certainly taught us is that there is no cheap way out—no escape. The cost of getting to the moon and then getting back is, without pun, astronomical. The cost of traveling to the further bodies of Mars or Venus will, of course, be even greater, but we have felt that it is in the national interest to spend the necessary monies more for scientific value rather than an immediate answer to our raw material or living space demands.

Don't we have to take the same economic steps to insure that we are able to preserve what's been referred to as this space capsule that we are on, earth?

We must have a multiple program, a systems approach to the problem. No one community or state, even though they might spend millions of dollars and even though they might have the necessary authorities and the public affairs concept in mind, can solve this problem alone.

The objectivity available in our educational bodies, our laboratories and our universities can't solve it alone.

I suggest that what is needed if we are to have a coordinated and workable approach to ecological balance is a quasi-political body similar to the space agency or the Manhattan Project; possibly something along the lines of the Federal Reserve System.

Only with such a body will we be able to assure that what is needed and what we are doing is consistent throughout our nation and the world, and consistent with the programs that will be necessary in the years to come.

REMARKS OF WILLIAM F. MAY, CHAIRMAN OF THE BOARD AND CHIEF EXECUTIVE OFFICER, AMERICAN CAN CO., BEFORE THE 37TH ANNUAL MEETING, NEW JERSEY TAXPAYERS ASSOCIATION, NOVEMBER 21, 1967, NEWARK, N.J.

Our Amercian society today stands as a symbol of success to virtually every other nation on earth.

We have achieved unparalleled prosperity. We have made affluence obtainable by our people to an extent unknown in recorded history.

Our ability as a people and as a nation to produce material prosperity is a goal now actively sought by all of the world's developing nations.

But America today is not the historic America of our forefathers' dream . . . of prosperous people living in freedom. The historic America was a land of hope and promise and example—not a land of civil disorder and battered cities. Our greatest responsibility today is to our historic American posture; a land of plenty and promise.

The society Americans built contained the seeds of its own destruction and today, for the first time in our nation's history, we face a tragic prospect—the cities of the richest nation on earth may soon be uninhabitable.

Today every American is rightfully concerned with the continued survival of society as we know it. For years, most Americans have looked beyond our own shores for threats to our survival.

We have concerned ourselves with world-wide aggression and colonization by Communism.

We have agonized over nuclear proliferation and the possibility of nuclear war.

We have earmarked more than half of our nation's wealth to a military defense system designed to deter any and all aggressors.

It would appear, however, as we approach the 1970's that the greatest threat to our civilization looms *not* from external aggression, but from weakness within our own society.

As taxpayers, and as members of one of the country's most effective taxpayers associations, you share, I know, the concern that has been building in recent weeks and months—concern for the future of the United States.

Most of our nation's political leaders, government specialists, educators and businessmen now appear to be in agreement. The predominately urban society we have created represents the greatest threat to our nation's continued existence. A threat perhaps far more immediate than any from outside our borders.

The urban environment we have created is polluted, noisy and ugly. It is an environment that cannot be allowed to continue.

We must eliminate air and water pollution . . . dispose of our solid wastes more effectively . . . make our streets safe from criminals and our homes safe from vandals . . . conserve our resources . . . build more, yet safer highways . . . eliminate urban blight and unplanned suburban sprawl.

We must create central cities that make it possible for our urban dwellers to live rather than merely exist.

The population of the United States is now 200 million. Approximately 125 million—or two-thirds of the total—live in urban areas. In another generation, our nation's urban population will double to approximately 250 million, and that 250 million will be 75 per cent of the projected total population of 330 million.

It seems to me that the preservation of what we call "the American way of life" may be more dependent on our finding a solution to the urban problem than on any other domestic or international battle we have to wage. I am convinced that our economic prosperity cannot be preserved if the major portion of our nation's people are clustered in a dozen areas that rapidly are becoming uninhabitable.

One of the leading functions of private enterprise in the years ahead must be to cooperate with all levels of government to reverse the trend toward an uninhabitable megalopolitan environment in the United States.

Two hundreds years ago, Dr. Samuel Johnson wrote: "A merchant's desire is not of glory, but of gain; not of public wealth, but of prive emolument; he is therefore rarely to be consulted on questions of war or peace, or any designs of wide extent and distant consequence."

Today, I believe the old cliche—"the only proper business of business is business" has been put to rest. Today's businessmen acknowledge and accept their social responsibilities, and they increasingly involve themselves in the solution of America's social problems.

Considerable recent public debate has been focused on the subject of corporate social responsibility. We have heard a number of business and government leaders call for a partnership of business and government to solve the problems created by our urban growth. I concur with this call for action.

Nevertheless, there is nothing historically new about a business-government partnership. In addition, it seems to me that a vital element of partnership present when America built transcontinental railroads . . . when our country began to develop space exploration systems . . . is not yet present as we discuss the creation of a new urban environment in the United States.

Today's missing element can be summed up in two words—priorities and responsibilities.

If we cannot achieve every noble purpose, what purposes will we achieve first—and second—and last? Who will be responsible for their achievement?

All too often throughout the sixties, our government and political spokesmen have attempted to accomplish every desirable objective—every goal suggested worthy by every group in society. They have ignored the realities of resource allocation and they have made every promise . . . held out every hope . . . kindled every flame. In short, they have ignored priorities and responsibilities.

Now, I realize that setting priorities is a frightening exercise for men and women in public life. Political popularity comes with lofty promises and with stirred ambitions . . . for everybody . . . for every voter. Priorities demand choices . . . and choices may be unpopular for the unchosen . . . and the unchosen become disgruntled voters . . . and public figures fear disgruntled voters . . . and so it goes. And so it has gone throughout this decade.

"Politics as usual" is one way of describing the process . . . usually with a critical overtone . . . but criticism of this kind will solve none of our problems . . . and it may be unfair. In fairness to our public figures, we probably should recognize some of their problems, and recognize that as a practical matter they simply are not able to set priorities for urban America's future.

But the fate of our cities demands that we set them; and if the short-range political problems of our government leaders make it impossible for them to take a long-range, objective view of our urban environment, then our priorities will have to be set by another segment of society.

American business is ready to move into the battle against urban America's social ills, but I do not believe business should, like a marine at boot camp, move out with great exuberance. I am convinced that the way business responds to the urban crisis is equally as important as its willingness to respond.

However, I believe it is critically urgent for business and government to first reach an agreement on the functions each will perform and the responsibilities each will meet.

We cannot solve all our social problems in the years immediately ahead by a welfarist approach to spending. Consequently, I believe the profit motive represents the only rational way to allocate our nation's resources.

Even our resources as the wealthiest nation on earth are not limitless and while I certainly cannot criticize those among us who would reach for the stars, I wish they wou'dn't reach for the whole firmament. I wish they would recall, too, that noble ideas like noble metals have to be alloyed to be truly valuable. Pure gold and pure silver are structurally worthless. It takes the addition of a practical element or an alloy to give them their strength and their value. Too often today, it seems to me, some of our nation's leaders are talking about the pure gold of eliminating poverty and the pure silver of rebuilding our cities without considering the alloy—a practical element—and I believe that element is the profit motive.

We cannot fund the solution of every social problem. Consequently, I believe we should invest our funds in problem areas that represent the best possible return on investment.

I do not view this as a heartless approach to our nation's human needs. Far from it. I see it as the only funding method that will truly assure a lasting solution for our social ills. We have, after all, already attempted the "spend as much as you can on every thing" approach—and it has not worked. How can we offer it as a workable solution when the projected costs of solutions to our expected urban problems would equal or exceed our nation's gross national product?

Welfarist funding standards will surely fail in megalopolitan America. On

the other hand, social projects based on potential return on investment, or the profit motive, surely will succeed . . . unless of course we abandon our free choice economic system and embrace socialism.

This, I believe, is precisely why faith in government's competence to deal with urban problems is fading . . . and why hope today is being placed on private industry. There seems to be confidence that business know-how can take the emphasis away from welfarist social spending, which has not worked, and channel emphasis toward economic incentives which can work.

Business today can invest capital in programs to improve our urban way of life in the same way that it has invested in long-range research and development programs in the past. Our corporations obviously must function within the framework of our society. And a corporation's contribution to the quality of our urban environment could be motivated by profit if we take a long-range view of return on investment.

The business that prospers in the urban America of the future will, I am convinced, be the business that invests in the solution of society's social problems.

Parenthetically, business is not alone in acknowledging its responsibilities to heal urban ills. A number of our nation's cultural and educational institutions have been doing some very exciting exploration in city planning, environmental planning and architectural design.

New York's Museum of Modern Art, for example, working with Columbia, Cornell, MIT and Princeton sponsored a fascinating exhibition recently on the New York City of the future.

The exhibition was called "New City Architecture and Urban Renewal", and it was encouraging for me, and I know for everyone who saw it, to note what can be accomplished when comprehensive planning is applied to New York City's problems. Of course, the museum's exhibition dealt only with New York City's architecture, not with the whole spectrum of urban deterioration.

Given the private sector's willingness to bring profit-motivated, free enterprise methods to bear on social problems, I would like to propose what I consider to be the first step in the development of an attack on our nation's pattern of deteriorating urban areas.

I would like to suggest the immediate establishment of a quasi-public corporation—a corporation patterned after the Communications Satellite Corporation. It would be charged with the responsibility of analyzing urban America and suggesting an optimum relationship between business, government and our cultural and educational institutions.

A great deal of progress has been made already, and I am certain that additional progress would follow if we do no more than maintain the same course we have already charted. We will never in my judgment, however, come to grips with the real problems of urban America with a comprehensive, nation-wide program unless we merge all of our resources to the task.

Today, some great projects are underway in Pittsburgh and in Atlanta and some great plans are on the boards at a number of our nation's leading "think tanks" but our attack is scattered and our resources are too thinly applied and they are disconnected.

The only way the resources of the private sector can be made to matter in solving a trillion dollar problem is through concentration. In a concentration of effort, of talent, of technological skill and of will.

A quasi-public corporation composed primarily of businessmen skilled in business planning techniques and systems analysis could bring to bear on our social malignancy the same management skills and management tools that enabled the United States to achieve unparalleled prosperity.

By systems analysis, I mean the careful identification of all elements of a problem; the careful identification of all alternative solutions to the problem, involving a combination of skillful human planning; and the utilization of our most modern data processing and computer model techniques.

A COMSTAT type corporation could represent a way for our nation's businesses to channel the optimum level of their resources into urban problem solving. A quasi-public corporation could show the way for industry to profitably invest in solving urban America's problems.

It could involve government, our cultural and educational institutions and virtually every segment of society while emphasizing technology and sensible return on investment.

It could set up each of our megalopolitan regions as systems—breaking each of the environmental problems into sub-systems—just as our defense-oriented industries have been doing so successfully for several years.

Systems analysis is not unique, but applying the concept to the deterioration of urban America is new. I know of no better way open to us to establish priorities . . . parcel out responsibilities . . . and attack megalopolitan decay.

Rebuilding an environment will require new ways of thinking . . . new answers to new questions. Most of us know that we do not have the *answers* for urban America's problems, but it is by no means clear that we even know the right *questions*. A business oriented publicly chartered corporation could bring together the new tools and the new manpower capable of asking the right questions and getting the right answers.

This kind of corporation could enable businessmen to respond to their urgent social responsibilities without obligating them to ignore the profit motive or to risk capital . . . because a quasi-public corporation could appraise the new industries, the new markets, the new products that would be generated by an all-out business attack on urban deterioration. It could recommend business urban investments that would both serve our nation's best interests and generate profit.

In addition, a COMSAT type corporation could give us a vehicle for bringing together all of the diverse urban research programs that are now diffused throughout the private and public sectors.

It is possible that the creation of a habitable environment in our nation's urbanized areas could represent the most profitable investment opportunity ever opened up for American business.

Business' innovative technology and management tools also could perform an immediate and valuable service by analyzing our past federal investment in urban aid . . . and our return on that investment. I understand that the total federal financial contribution to urban activities has gone from $17 billion in 1961 to $30 billion today. This is an increase twice as great as the increase in gross national product and 2½ times as great as the increase in total federal spending.

I know of no way government has attempted to measure the return it has received for its urban billions. I doubt if government has the tools or the techniques to measure its urban investment. Business does, however, and a COMSAT styled corporation could, I am convinced, show the way to more effective urban investment in the future. Government can tell us *how much* is being spent, but business could tell us whether our spending is *effective*.

I realize there is nothing starkly dramatic about the creation of a new corporation. But I don't believe we need instant drama. Too many of our problems seem to be approached with a sense of the dramatic uppermost in mind. Too often, it appears, we are seeking—not solutions—but the appearance of solutions.

Rhetoric is not responsibility, and today's dramatic headline is not often tomorrow's solution to the problem.

Our urban society, and the mass society projected for the near future, has never been subjected to an effective critical analysis or, if you will, to systems analysis. It may well be that private enterprise's first, and potentially most significant, contribution to the problems of urban America could be the application of the techniques of systems analysis to our burgeoning difficulties.

Virtually all of our large, private enterprise concerns today are constantly subjected to systems analysis. Our nation's massive defensive structure is similarly subjected to comprehensive scrutiny, and while systems analysis is not, and never can be, a substitute for responsible decision-making, systems analysis clearly can illuminate the factors that make up a responsible decision.

It is not difficult for a decision-maker to *make* the right decision; what is awesomely difficult is for the decision-maker to *know* the right decision. A systems analysis approach to urban America will not help our decision-makers make decisions. It will, however, help them come to a clearer understanding of the decisions that have to be made. It will help them understand the relative functions and the relative responsibilities of the various elements of our urban society.

Let me give you an example of why I believe analysis must come before solution. Suppose that what we are all seeking is a liveable environment for our population of the seventies and beyond. How do we proceed to create a liveable environment for 10 million city dwellers? How can we project an acceptable environment for 30 million?

There are two immediate alternatives: we can pour vast sums of money into our old cities in the hope that money will make them liveble; or we can plan and create new cities. We all know that there are men of intelligence, and vision, and foresight who are willing to stand for each of these alternatives with equal ferver and conviction.

If our future as a people and as a nation depends on the alternative we select, how do we select the most effective alternative? How do we decide who will perform the relative functions?

I believe the private sector's problem solving and management tools—systems analysis—represents the most promising method we have for mapping out a plan that will achieve our goal.

A systematic approach to the urban society of the near future certainly will produce innovation, because it appears that we will have to shape a new environmental structure to meet the needs of megalopolis.

In some ways, we already have witnessed rather drastic changes in a very short period of time. Large-scale building prefabrication, for example, already is here, and could make mass production economies possible for housing.

Acceleration of this development could mean more than lower cost housing for urban poor. It could mean employment for thousands of our less-skilled workers, and it is possible that the new prefabricating plants could be located in areas with concentrations of less-skilled workers.

A number of businesses already are upgrading substandard housing and substandard areas. Smith, Kline and French, Armstrong Cork, Conrad Engineering all are involved in rehabilitation projects in areas where rehabilitation might lead to the elimination of slums.

It also appears that the private sector could redevelop or rehabilitate slum areas with the help of low-rate mortgages and cooperative local housing authorities. If the provision of low-income housing continues to be one of urban America's goals, however, the public sector will have to provide financial incentives for business.

At the same time, we are going to have to face the facts of urban life under our existing federal system. It seems clear that one of the contributing factors to urban deterioration has been a breakdown in our federal system of government. Our forefathers envisioned our system of government as a government close to the people with strong local and state governments functioning to solve the people's problems.

Our nation's founders feared a strong central government and proposed a system of governmental layers with power resisting in the layers closest to, and most responsive to the people. The central government was established only to perform those tasks which could not be performed at the state and local level.

It has long been fashionable for public speakers to decry the fact that our historical boundaries between the private and the public sectors have become at best blurred and at worst non-existent. But only recently, more and more spokesmen for the various sectors of society have begun to question the blurring that is taking place between central government and local government.

Under our existing system, it is no longer possible to determine priorities or assign goals or responsibilities because our blurred system obscures responsibility. We have overlapping, we have waste, we have inefficiency because we have local government, state government and federal government all addressing themselves to the same problems. Revenues are collected from our people by all levels of government for the same purposes. And the costs of government today have unquestionably been magnified by spreading responsibility.

I'm willing to wait for the results of the systems analysis appraisal I suggested, but, in my own mind, I am convinced that any analysis of government's contribution to the urban environment problems is going to suggest three immediate reforms: (1) tax reform (2) jurisdictional reform, and (3) a strengthening and modernization of state and local government.

I believe there should be a close relationship between the people who raise revenue and the people who spend it. I also believe the development of a potentially dehumanizing mass environment makes the existence of this relationship even more imperative.

A closeness between revenue raisers and revenue spenders breeds discipline in spending. I doubt if there is anyone here who wouldn't agree that we need more disciplined spending—now, in the sixties, as well as in the future.

Vast sums of revenues will have to be raised if we ever hope to solve the urban problems that are already more real than apparent—not to mention the apparent problems ahead. There are two possibilities, it seems to me, for raising our future revenue needs.

We can plan for a vast centralized bureaucracy collecting taxes from 350-or-so-million people and then returning funds to the megalopolitan units of

government—less the cost of administration and collection, which would be staggering.

Or, we can plan for a system that lets each megalopolitan regional government collect the taxes from its own residents for social spending necessary in the region. The relationship wouldn't be as close as the county courthouse is in some communities today, but it would be as close as the burden of population allowed it to be.

I am hopeful that elected and appointed government officials at the state and local levels will recognize that their survival in urban America will depend on their ability to modernize and strengthen state and local government. This will not happen without the removal of jurisdictional conflicts and without tax reform.

Incidentally, Bill Steinmetz has often mentioned to me the work that your association has been doing in the area of jurisdictional reform, and I am particularly interested in your strong county government proposals. I hope you will continue to push for these reforms, and I would like to suggest that you make your ideas known to the systems analysis groups that will, hopefully, be looking at this problem on a national basis in the near future.

State and local governments must either modernize themselves quickly or be prepared to watch all government functions and responsibilities performed by a centralized federal government.

A monolithic centralization of power in the federal government may come; I know a number of men who are predicting it. But I hope that all of our state and local leaders will re-read George Orwell's 1984 before they let the central government assume an even larger role in domestic affairs. After all, 1984 is only 17 years away. And, as far as I am concerned, our emphasis in the future should be on regional, state and local government.

We can assist in the solution of the social and economic problems of urban America by developing and enlarging the social and economic capabilities of state and local governments. Every sign I see on the horizon points away from the accelerated involvement of the federal government and toward accelerating the effectiveness and responsiveness of state and local governments.

And, while it may sometimes be difficult to be optimistic about government's adequacy to respond to change, I am personally optimistic about our country's adequacy to meet the challenges of our urban future. Because government will not—and should not—be responding to the demands of change alone.

American Business must pool its analytical resources with the national policy resources of government to assure a liveable environment for future generations of urban Americans.

I'm confident it can be done.

Senator DOLE. I must depart at this time and I do appreciate your coming here.

We will meet again tomorrow morning at 10 o'clock.

(Whereupon, at 12:30 p.m., the subcommittee recessed to reconvene at 10 a.m., Friday, February 27, 1970.)

RESOURCE RECOVERY ACT OF 1969

FRIDAY, FEBRUARY 27, 1970

U.S. SENATE,
SUBCOMMITTEE ON AIR AND WATER POLLUTION
OF THE COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room 4200, New Senate Office Building, Senator J. Caleb Boggs, presiding.

Present: Senators Randolph, Boggs, Cooper, and Dole.

Staff members present: Richard B. Royce, chief clerk and staff director; M. Barry Meyer, counsel; Bailey Guard, assistant chief clerk (minority); and Leon G. Billings and Richard D. Grundy, professional staff members.

Senator BOGGS. The committee will come to order.

The distinguished chairman of the full committee, Senator Randolph, had hoped to be here and preside at the committee session this morning. He is, however, unavoidably detained. He is at the White House for a meeting, so he asked me to preside until he can return.

We certainly appreciate the time and the attention each of the distinguished witnesses are giving to this important matter, and we value your testimony very greatly.

This morning our first witness is Mr. Leo Weaver, director of the American Public Works Association, Washington office, accompanied by Mr. Jean Arpin, president of the Institute for Solid Waste, and Mr. Ray W. Burgess, chairman of the trustees of the APWA Education Foundation.

We are grateful to you gentlemen for being here this morning. Mr. Weaver, if you would proceed.

STATEMENT OF LEO WEAVER, DIRECTOR, AMERICAN PUBLIC WORKS ASSOCIATION, WASHINGTON OFFICE, ACCOMPANIED BY JEAN ARPIN, PRESIDENT, INSTITUTE FOR SOLID WASTE, AND RAY W. BURGESS, CHAIRMAN OF THE TRUSTEES OF THE APWA EDUCATION FOUNDATION

Mr. WEAVER. Thank you, Mr. Chairman, Senator Boggs. We in turn appreciate the opportunity to appear before this committee to discuss the problems of municipal refuse collection and disposal in relation to current and anticipated needs.

We certainly reocgnize the important pioneering and continuing efforts of this committee in pollution control and welcome the privilege of presenting the experience of the public works engineer and administrator in his continuing effort to cope with the problem of refuse collection and disposal.

The APWA is a nonprofit public service organization made up of top-ranking officials engaged in various phases of the broad field of public works. The APWA was organized in 1937 through the merger of the American Society of Municipal Engineers—founded in 1894—and the International Academy of Public Works Officials—organized in 1919. Our membership is over 12,000 and includes public works officials from all levels of government. We have 58 chapters in the United States and Canada.

The burgeoning problem of community solid waste management is a critical concern of the APWA. APWA membership includes thousands of public works and sanitation officials in the United States and Canada charged with the responsibility for collection and disposal of refuse, whether by publicly or privately operated systems. As an education and research organization, one of our important functions is to serve as a common meeting ground wherein public works officials can work together to advance improved practices within their professions and to serve the best interest of the public.

The collection and disposal of community refuse historically has been considered a local problem and responsibility. This is recognized in the 1965 Solid Waste Disposal Act wherein the necessity and direction of the present Federal program are defined. It is the policy of this association, in the conduct of its programs of education and research, to encourage the highest performance of this responsibility by public works and sanitation officials, whether it is fulfilled through publicly or privately operated systems.

Significant successes have been registered in keeping with this effort, but the problem has developed at such a rapid rate in recent years that progress tends to be obscured by the utter enormity of the task.

A goal that is to be achieved must first be defined. Then knowledge and resources can be applied with a will to achieve that goal. The goal of the Federal program as defined in the 1965 Solid Waste Disposal Act is

> (1) to initiate and accelerate a national research and development program for new and improved methods of proper and economic solid-waste disposal, including studies directed toward the conservation of natural resources by reducing the amount of waste and unsalvageable materials and by recovery and utilization of potential resources in solid wastes,

and

> (2) to provide technical and financial assistance to State and local governments and interstate agencies in the planning, development, and conduct of solid-waste disposal programs.

The goal or purpose of the Institute for Solid Waste of the American Public Works Association is the promotion, development, and adoption of safe, sanitary, and efficient methods of storing, collecting, utilizing, or otherwise disposing of community solid wastes by establishing and encouraging adherence to sound technical requirements and regulatory measures, and high professional standards for employees of public agencies responsible for solid wastes management.

You will note that these goals are not only compatible, but even more important, quite interdependent. For in the final analysis, the success of the research, development, planning, training, demonstration, and financial assistance provided will be measured largely in

terms of operating healthful, economic, efficient, and conserving local systems of solid waste management.

These goals provide a fitting background for a purview of 20th-century technology as it is applicable to solid waste management in the United States. For convenient reference it may be helpful to examine the major components of the system on-site storage, collection, and disposal.

STORAGE

Considerable work has been done to demonstrate the importance of proper refuse storage. It is well recognized that improperly stored refuse contributes to fly and rat attraction and production. Improperly stored rubbish is a significant fire hazard in and around buildings. Improperly stored refuse increases the cost of collection. The findings of the Fresno Solid Wastes Management Systems Study (A Systems Study of Solid Waste Management in the Fresno Area, Final Report on a Solid Waste Management Demonstration, U.S. Department of Health, Education, and Welfare, Public Health Service Publication No. 1959, Washington, D.C., 1969) indicate that storage practices have more important effects as an environmental insult than either the collection or disposal process.

The use of garbage grinders has reduced storage problems because the most noisome portion of household and restaurant refuse may be disposed of immediately through the sewer system. While there are literally millions of household and commercial grinders, some cities must still prohibit their use because of inadequate sewer systems or treatment capacity. New York City is a notable example.

Metal storage containers with tight fitting lids traditionally have been recommended by public health authorities. In actual practice, lids soon become loose or damaged and so serve little purpose. Recently, paper and plastic containers have come into wide use. In 1963 the APWA Research Foundation sponsored a study of four field trials (Paper Bags for Household Refuse Handling, APWA Research Foundation Research Project No. 115, Chicago, August 1963) employing disposable paper containers for household refuse. The overall evaluation was quite favorable.

The disposable bag system was more sanitary, spillage was virtually eliminated, and there was less windblown debris in the transfer and in the collection process. It was judged to be more convenient for the collectors and the householders, and it reduced noise.

The economics of the process largely reflect local practice. A number of cities, including New York City, now permit and encourage the use of disposable containers. Almost every community has statutory regulations governing the storage of refuse on the premises. Degree of enforcement varies widely.

In the early part of the century, separation of refuse at the household or business was common. Such separations varied, based on salvage or disposal practice. Barbage was commonly separated from other refuse and used for feeding pigs. This practice was sharply curtailed after an epizootic of vesicular exanthema in the early 1950's.

Separation of combustibles and noncombustibles was often required by communities using incineration. Separation became less important as the combustible portion of refuse increased and the noncombus-

tible portion decreased. The latter reflected decrease in use of coal as a fuel for space heating, and increased combustibility of packaging materials used for household and commercial products.

The present trend is to collect combined refuse. This is due to three factors: disposal processes are geared to handle combined material, collection costs are reduced, and it is more convenient to the householder. There is no indication of change in the trend toward "combined" handling of household-commercial refuse in municipal systems. The difficulty of separating mixed household refuse is an important aspect of resource reclamation considerations.

COLLECTION

The collection community refuse is accomplished by using internal combustion engine-powered conveyances of many sizes and shapes. The evolution of these vehicles and associated commercial portable storage container systems reflects changes in our culture and technology.

The characteristics of municipal collection systems may be described as sharp contrasts with very gradual change. During the 1930's trucks with enclosed bodies, equipped with compaction devices, and large portable container commercial systems were first introduced. These systems increased payloads, improved aesthetics, reduced nuisances from refuse blowing from open vehicles, and increased efficiency and reduced sanitation worker injury by permitting lower loading hoppers.

There are now an estimated 100,000 compaction type vehicles in use (but one large Eastern city did not retire its last mule-drawn garbage collection wagon until the early 1950's). These vehicles are designed for combined collection of household refuse.

Collection is a labor intensive operation which has daily and continuing interface with the citizen, both at his home and at his business. If it is not performed satisfactorily, there are immediate repercussions for the municipal authorities—usually in the form of telephone complaints. This has played an important role in assuring continuing provision of some type of service in urban areas.

What happens when this service is not provided has been dramatically demonstrated in Memphis, New York City, and Cincinnati. Yet reality inspired the Committee on Solid Waste of this association to lead off the discussion of the refuse collection problem as follows: (Refuse Collection Practice, Third Edition, prepared by the Committee on Solid Wastes, American Public Works Association, Chicago, 1966, Public Administration Service, 525 pp.)

> The collection and removal of municipal refuse—one of the major problems of American cities—has been given less attention than this public function deserves. Only within recent years have most municipal officials been willing to admit that refuse is a technical management problem worthy of their attention and study. Much progress has been made, but still only a minority of communities are using the administrative techniques which generally have proved most satisfactory. Not that methods, equipment, and practices should be uniform over the country. Conditions vary and it is vital that procedures vary to meet them. However, the problem should be approached the same way in all communities, should be analyzed in terms of sound administrative management, and should receive the same consideration usually given other public health aspects of government.

Providing courteous, sanitary, and efficient removal service sets the tone of community services and is a cornerstone of environmental protection.

The APWA has endeavored to guide and stimulate positive action to improve community collection systems. A national conference on solid waste research was sponsored in December 1963, with the assistance of the Public Health Service. This conference brought together for the first time researchers, educators, Government officials, equipment manufacturers, and operating personnel to discuss solid waste management.

The conference chairman, Dr. Ross McKinney, issued a challenge to recognize the need for changes in attitude to the importance of engineering and science in this field, and the all-important need for young teachers and young researchers to rise above conventional concepts and meet the challenges of today and tomorrow in environmental health.

In 1966 with the assistance of the Ford Foundation, this association sponsored a symposium (*Solid Wastes in Perspective*, Proceedings of a Symposium on Research Needs, APWA Research Foundation, Chicago, Jan. 28–29, 1966, 18 pp.) called "Solid Wastes in Perspective." A wide range of individuals from Government, industry, universities, communications media, private research organizations, and materials associations participated. Two areas of paramount need were repeatedly stressed:

1. The application of systems analysis, systems engineering and operations research methods to the solid waste disposal field, and
2. The development of adequate and reliable data relating to the quantity and composition of solid wastes produced, as well as data relating to current collection and disposal operations.

These recommendations are reflected in the present demonstration projects of the Federal Bureau of Solid Waste Management, and the conduct of the survey programs of the various State solid waste agencies. Several projects of the APWA Research Foundation nearing completion also reflect these needs.

One, the development of a public works equipment data bank, is to enable public works officials, as well as equipment manufacturers, to benefit from available experience records. Other projects are the "Development of Comparative Public Works Statistics" and "Computers in Municipal Process Control". These promise improved application of technology and management techniques.

CRITICAL AREAS

What are the critical areas of need for municipal collection systems? First, there must be developed recommended criteria for collection systems. Such criteria can be developed to facilitate adoption of standards by State and local governments. These criteria can best be developed by the Federal Bureau of solid Waste Management with the assistance and cooperation of the State agencies and concerned associations, such as the American Public Works Association. Manpower development, training, and education also are critical needs. The latter includes management, equipment operation and collection personnel—and the general public.

Solid wastes must be managed. This means development of systems which incorporate processing and storage at the point of generation, transport to the point or points of disposal, and the disposal process itself. Each of these operations represents a marriage of technique, equipment and people. This fact in itself is not unique. But what is unique are the size and complexity of the system and the difficulty of maintaining the various input blocks.

Consider the storage, collection and disposal of household refuse. Garbage must be drained and wrapped if it is not disposed of through a grinder; trash and other objects must be placed in a container of suitable material with a tight fitting lit; the container should be maintained in a clean condition; and the contained lid must be closed properly after each use.

Then collection should proceed at scheduled intervals. The material is placed in a vehicle by a collector who hopefully does not leave any spillage on the roadway, and who doesn't have to mutilate the container to remove the refuse. The refuse is transported to a disposal facility where it must be unloaded and processed at least once by equipment which is controlled by an operator.

Several items become evident: vast numbers of people are directly or indirectly involved in the day-to-day operating success of the system; even though the equipment in use is becoming more sophisticated and efficient, the basic techniques remain essentially the same and it does not appear likely that this will change in the forseeable future.

Thus, if more economical and acceptable systems are to be developed and improved equipment and techniques are to be properly used in these systems, manpower emerges as a key area of challenge to the achievement of success.

Local political boundaries become a key factor because there is a relatively large number of constituents participating in the precollection processing and the collection segment of the system, but relatively few in the area of concern with the disposal. Thus any program designed to improve the quality of the environment by improving solid waste management systems serving the public must consider the sanitation workers, those who participate in the operation but are not employed directly, and those who are responsible for decisionmaking.

In other words, if solid waste management systems are to be improved, an educational program must be directed not only toward the training of employees of the system itself, but also must be designed to develop public support.

TRAINING

The APWA has developed under a contract with the Federal Bureau of Solid Waste Management an assessment of the need for training of personnel in the field. A primary recommendation of this work was that "a nationwide, 3-year crash program of training, education, and demonstration be initiated." This recommendation has been partially implemented, both by the Federal Bureau and the APWA Education Foundation.

But where hundreds have had training exposure, thousands more need intensive training experiences in management and technology if present systems are to be improved. The "crash" aspect is stressed because the application of new technology is an evolutionary process.

RESEARCH NEEDS

True, there is research in progress to reduce manpower needs through equipment and system design; there is good reason to believe there will be innovative improvements in the use of truck or containerized collection systems; for example, a mechanized pickup to alleviate the need for manhandling containers. But the basic unit will, by all indications, continue to be some configuration of a wheeled vehicle completing a series of pickups.

The use of pneumatic pipe systems, an important recent development, may well find application in new high-rise or shopping center-institutional complexes. Such an innovation for whole communities—even if demonstrated to be technologically feasible today—would involve levels of expenditure comparable to the installation of completely new sewer systems in large cities. One can only speculate on the rate of application of such a development.

DISPOSAL

The general concern about disposal methods has obscured concern with premises storage and collection needs; the latter commonly costs a community two to 10 times the disposal costs. Disposal is the point at which "everybody's" problem becomes "somebody's" problem. Yet disposal as it is usually termed is a misnomer. Processing for sequestration in the environment is more accurate.

Dumping and open burning has been the principal means of refuse disposal since man first banded together. Because public health and safety hazards and nuisance values dictated the removal of "middens" from the center of the community to the edge, transport requirements have become a factor. Even before the age of individual packaging, many cities in Western Europe and the United States determined that it was more economical to reduce the volume of refuse produced within the city by incinerating it and transporting the residue to land disposal sites.

In the late 1930's an enterprising Director of Public Works, Jean Vincenz, developed a process whereby refuse transported to a land disposal site was mechanically compacted and covered with earth. Thus, the sanitary landfill method was first used in the United States.

It was further developed and applied by the army during World War II, and by 1956 more than 1,000 communities used some form of compaction-burial technique. Only about one-third of that number, however, appeared to be operating true sanitary landfills.

At that time almost 300 cities used incineration as a processing method. Few, if any, political jurisdictions, however, had standards for disposal sites and facilities, and limited attention was given consideration of air and water pollution constraints. Particulate control by visual inspection was the measure of efficiency of the operation of incinerators, and the absence of nuisance complaints the most important measure of success.

Similar standards applied to landfills. The results of recent data gathering by the State solid waste agencies indicate some 360 of 6,000 land disposal sites surveyed are operated as true sanitary landfills. This would indicate that the overall number has only slightly increased in the intervening decade. Thus, there are thousands of

"dumps" which have been surveyed, but if unsurveyed municipal, private and "no-owner" promiscous dumps are counted, there are tens of thousands more.

The technology is available to eliminate open burning dumps. The National Research Council ascribes much of this problem to "the continued reluctance of those concerned to come to grips with it and apply existing technology, systems, and organizational know-how to its solution—above all to pay for these services." (Policies for Solid Waste Management, prepared by the National Research Council, Washington, D.C. 1969, 56 pages).

Sanitary landfilling has long been recognized as the most economical sanitary method of disposing of community refuse if suitable sites, within economical haul, are available. Economical haul depends upon many factors, not the least of which is the utility of the local road system.

Transfer of compacted refuse from collection vehicles to large tractor trailer vehicles has permitted hauls of up to 50 miles to be more economical than centrally-located incineration. On the other hand, highly congested areas can ill afford such conveyances on city streets and most large eastern cities have resorted to incinerating refuse and transporting the residue.

Sharply increased pollution control requirements and increased component costs have resulted in more than doubling capital costs of municipal incinerators in the 1960's. Further equipment sufficintly sophisticated to meet air pollution particulate requirements has not been tested under United States conditions.

The possibility of using rail or barge haul of solid wastes as an integral part of the community solid wastes management system is being investigated by the APWA Research Foundation through a project cooperatively financed by 26 public agencies, the Penn-Central Railroad, and a demonstration grant from the Department of Health, Education, and Welfare.

The study indicates the feasibility of rail transport of compacted refuse to remote areas where the wastes could be used for the public benefit as fill material to reclaim submarginal lands. The final report of this project is now being prepared. (Rail Transport of Solid Wastes, A Feasibility Study, APWA Research Foundation, Chicago, October 1968, 159 pp.)

The absence of sanitary landfill-incinerator standards has had a serious adverse effect on U.S. practice. The previously mentioned National Research Council report alluded indirectly to this absence by referring to historical solid waste management as characterized by "minimum attention, minimum funding, and minimum application of technology."

RECOMMENDED CRITERIA

Recommended criteria soon to be published by the Federal Bureau of Solid Waste Management will be very useful in upgrading landfills and incinerators. There is ample opportunity to design and develop better systems of shredding, compaction, transport, and combustion to meet more stringent, environmental quality requirements; but indications are that fundamental methodology will remain substantially unchanged.

Site acquisiton usually is described as the sanitation officials' most troublesome problem. There are too many examples of open burning dumps and air polluting incinerators and not nearly enough examples of good practice. The citizen is more impressed by what he sees than what he is told will be; so when a sanitary landfill is promised where there is a history of open dump operation, the citizen is wary and hostile. Even where commendable practice is in evidence, funds for advance acquisition of sites have been found to be a problem.

There are many examples of land use plans which make no provision for waste disposal sites and facilities. The need for planning and advance acquisition of open space in urban areas has been recognized. But we have not yet applied the potential of combining these programs to better meet community needs.

SALVAGE AND RECLAMATION

Review of municipal refuse collection and disposal practice reveals many instances of successful salvage and reclamation programs. It also reveals that many successful programs became obsolete because of technical-economic developments.

A method of garbage disposal known as reduction was at one time popular and productive of revenue. In the reduction process garbage was cooked with steam in digesters. The grease was extracted. The residue, called tankage, was used as feed for livestock, as fertilizer, and as boiler fuel. The grease itself was sold primarily to soap manufacturers. Odors from the process, high operating costs, and a reduced demand for grease by the soap industry due to the advent of detergents resulted in the abandonment of the method. Philadelphia in 1959 was the last city to operate such a plant.

A rubbish salvage plant was operated in Washington, D.C. until 1928. Rags, paper, cardboard, and tin cans were baled, and cullet, bottles, nonferrous metals, and rubber were picked and graded. A more modern municipal salvage plant was built in Detroit in 1945, but it was abandoned in 1947. Presently, there is in Houston, Tex., a privately-operated salvage-composing plant.

This plant was described to the subcommittee at the hearings held in Jacksonville, Fla., June 23, 1969. Components of refuse, such as metal, glass, paper, textiles, et cetera are separated for reuse by industries. The residue is converted to compost. This plant is receiving a portion of Houston's refuse under a contract with the city involving a unit cost per ton payment to the company for the refuse delivered to the plant.

Attempts to use the organic fraction of community refuse have centered largely on composting. While at least one composting plant has been operating in the United States for a number of years, almost two dozen plants constructed after World War II have failed, presumably for economic reasons, after relatively short periods of operation.

PARTIAL SALVAGE OR RECLAMATION

Despite the lack of success of salvage and reclamation as a principal means of disposal of municipal refuse, large quantities of material from the solid waste stream are routinely salvaged and resold. Many businesses, hotels, and apartment houses engage in or permit salvage

of paper and cardboard. When pricing is favorable, volunteer organizations, such as the Boy Scouts, collect newspapers and magazines and sell them to raise activity money.

Some public officials responsible for refuse collection and disposal activities think that voluntary collections are the most practical method of conducting a salvage program. Without volunteer workers, house-to-house collections would not ordinarily be economically justified.

In fact, campaigns to salvage metals from household refuse during World War II would not have been self-supporting without volunteer workers. Some authorities involved in the wartime campaigns believe that if conservation of materials, such as metals, is the goal, not low-cost disposal, it would be better to separate the materials at the source and collect them in compartmentalized trucks. This would necessitate reversal of the previously described trend toward combined collections of household refuse.

Another example of partial salvage or reclamation may be associated with the incineration process. Heat energy released during the burning process may be used for steam generation. The Atlanta Mayson plant completed in 1941 and still in operation is an example. But this is the exception rather than the rule.

There are a number of reasons for this. Most often the primary factor is the lack of a large user close to the plant who is able and willing to take the steam on an "as available" basis. Large municipal plants usually operate on a 24-hour per day basis, but shut down for maintenance and repairs Saturday afternoon and Sunday. However, it already has been suggested that for air pollution control purposes waste heat should be reclaimed to avoid the necessity of burning other fuels in some metropolitan areas regardless of economics.

RESOURCES RECOVERY FROM INCINERATOR RESIDUE

In 1969 the American Public Works Association, with the assistance of a grant from the U.S. Bureau of Mines, conducted a study to report and analyze the factors affecting metal and mineral salvage programs from municipal incinerator residue. (Resource recovery from Incinerator Residue, analysis of factors that affect economic recycling of ferrous metals and other inorganic material contained in municipal incinerator residue, American Public Works Association Research Foundation, Chicago, November, 1969, 35 pp.).

U.S. Bureau of Mines researchers noted the limited salvage activity by municipalities operating incinerators. Discussions were held with the American Public Works Association to try to find out why this was so, and to explore the widely reported conclusions that salvaging is uneconomical.

Lack of available documentation led to an investigation on a community case-study basis of the factors affecting salvage programs.

The investigation was limited to the metal and mineral contents of municipal incinerator residues and did not consider the organic fraction of refuse. However, its potential positive impact on the concept of recycling-reclamation is significant. It was concluded that incinerator residue processing offers an avenue for resource recycling.

However, it was determined that there is a fundamental need for

research and development geared to the generation of new products and uses for low-grade ferrous metals and particulated glass. More efficient utilization of the nonferrous portion of incinerator residues depends in large part on economic application of metallurgical refining methods; and, most important, the ultimate success of resource recycling from incinerator residue is keyed to the expansion of present markets and to the creation of new outlets for recoverable items.

LANDFILL RECLAMATION

Much has been said in these hearings about landfills as reclamation projects. The Los Angeles story has received national attention. The concept is so important that it bears repeating here for two reasons. First, if the municipal official is to be successful in acquiring land disposal sites, he must think more in terms of constructive end uses to the community. This must not be done at the expense of meeting healthful-economic community disposal needs, but as a companion goal to this need. Second, constructive evaluation of a particular site must take into account the ecological implications of the program and the overall long-term community benefits.

FINANCING

Money is a key factor to all concerned with environmental pollution problems, and the matter of financing is basic. There are a number of possible courses of action to provide for financing solid waste management systems. These include application of the utility concept, earmarking of special tax funds, Federal guarantees of risk capital to the private sector and direct subsidy through a matching grant program.

Whatever method or combination of methods may be used, it is important that such financing be geared to the goal of upgrading total community solid waste management systems, not just parts of the systems.

Further, the involvement of the private sector must be encouraged in a number of vital areas. One is in the innovative development and application of equipment, methods and techniques.

Another is further extension of the concern and resources of the product manufacturing industries from manufacturing and distribution to include recovery and final disposal. The latter would not only reduce the overall costs of solid waste management systems, but most importantly reduce the level of the disposal problem itself.

CONCLUSION

In conclusion it is emphasized that what may appear to the uninitiated to be a simple problem is an exceedingly complex one.

A wide spectrum of cause and effect relationships prevail, including inadequate or no collection and disposal systems, lack of trained manpower, inadequate or inadequately-enforced regulations, budgetary limitations, public apathy, and the like.

The net result is that, while we look to the future to develop a social, political, and technological program of resource recovery, we are not doing well enough what we already know how to do. We can no

longer afford indiscriminate use of the land by haphazard disposal of our national wealth. We must face up to the need for conserving our land and material resources as a national policy, but we must do this as part of a program of assuring healthful and economic community refuse management.

Federal leadership in the form of technical and financial assistance should continue to play an important role in the development of State and local programs; standards, increased levels of research and application of research results, demonstrations of pilot level systems, manpower development, information exchange, and citizen awareness programs are vital to the successful accomplishment of needed and desirable solid waste management systems in our communities.

Mr. WEAVER. I would propose, Mr. Chairman, to review the highlights of the statement, and then if there are points requiring further discussion or other areas of interest Mr. Arpin and Mr. Burgess or myself, will certainly do our best to respond from our experience and responsibilities.

Senator BOGGS. That will be fine. I certainly don't want to rush you. But as you know, the Senate went into session today at 9:30. Any time after 10 o'clock, we could have a live quorum, or possibly a vote later on. So we will keep that in the back of our heads.

Mr. WEAVER. I do think, though, it would be worth taking a moment to give a further word of explanation about Mr. Arpin and Mr. Burgess.

Mr. Arpin has the responsibility for the collection and disposal operations for the city of Montreal in Quebec. He is also, as the chairman mentioned, president of the Institute for Solid Wastes of the American Public Works Association. Said organization was created within the framework of the APWA to promote safe and sanitary and efficient solid waste management practices, at the same time, promoting professional development to public officials concerned, and to represent these officials in international solid waste and public cleansing associations.

A few weeks ago, the new 1,200-ton Montreal municipal incinerator started operation. It is a water wall, steam producing plant, equipped with electrostatic precipitators for air pollution control, and it is the only plant, as far as we know, that is in operation that is so equipped on the North American continent.

Mr. Burgess is director of public works for the city of Baton Rouge, and the parish of East Baton Rouge, La. He has certainly served with distinction in the public works field. Just last year, he was recognized as one of the top 10 public works men of the year in the United States and Canada. He has dealt with numerous problems concerned with environmental quality at the community level, including the problem of solid waste management, and, of course, is intmately involved with this association's efforts in manpower and training through the education foundation.

The burgeoning problem of community solid waste management is a critical concern of the American Public Works Association. Our membership includes thousands of public works and sanitation officials in the United States and Canada who are charged with this responsibilitv.

As an education research organization, we feel that one of our most

important functions is to serve as a common meeting ground, where these public officials can come together and work to improve the practices and the profession to serve the best interests of the public.

Now, the collection and disposal of refuse has historically been regarded as a local problem and responsibility. This is recognized in the 1965 legislation, the Solid Waste Disposal Act. It is also, I think, pertinent to point out that the goals of the Institute for Solid Wastes and the goals spelled out in the 1965 act, are not only compatible, but certainly interdependent, because in the final analysis, if there is to be success for the research development planning and other activities that we do; this will be measured largely in terms of operating healthful, economic, efficient, and conserving systems ta the local level.

Briefly, I would like to review the major components of the system, onsites, storage, collection, and disposal. I want to point out that it is well recognized that improerly stored refuse contributes to public health hazards; improperly stored rubbish is a significant fire hazard, in and around buildings; and improperly stored material increases the cost of collection.

Perhaps even more significant is the fact that the findings of the Fresno solid waste management system study, which I think probably will be mentioned in later testimony, indicates that storage practices have more important effects on the environment in terms of insult than either the collection or disposal practice.

Recently, paper and plastic containers have come into wide use. The APWA has conducted a research project on the use of paper containers, and we would like to report that the overall evaluation was quite favorable in terms of sanitation, spillage being virtually eliminated, less windblown debris, and the like. It reduces noise, and, of course, is more convenient for the collectors, and the householders.

This is but one innovation of a number of developments which are significant, in terms of impact on storage technology.

Collection is accomplished by using internal combustion engine-powered conveyances of many sizes and shapes, and the evolution of these vehicles, and associated portable commercial container storage systems, certainly reflects changes in our culture and technology.

The characteristics of municipal systems, at least, can be described as having sharp contrasts, associated with very gradual change.

In elaboration, there are now in excess of a hundred thousand enclosed modern compactor-type trucks in service. At the same time, the last mule-drawn garbage wagon was retired from a municipal collection system in the early 1950's. These are the kinds of anomalies we have.

Significantly, collection is a labor intensive operation that has daily and continuing interface with the citizen both at his home and at his business, and if it is not performed satisfactorily, any local official will tell you that there are immediate repercussions in the form, usually, of telephone complaints. Perhaps this has played the most important role in assuring that continuing provision of some type of service is provided in urban areas.

But what happens when this service is not provided has been very graphically shown in cities such as Memphis, New York City, and most recently, Cincinnati, Ohio. The remarks that were prepared by our committee on solid waste a few years ago, in preparing a manual of practice, I think, bear repeating here, Mr. Chairman.

This is that the collection and removal of municipal refuse is one of the major problems of American cities, and yet it has been given less attention than this public function deserves. Only in recent years have most municipal officials—and these are municipal officials talking—been willing to admit that refuse is a technical management problem, worthy of their attention and study. And while recognizing that progress has been made, still only a minority of communities are using the administrative techniques which generally have proved most satisfactory.

Then the committee went on to point out that certainly methods, equipment, and practice should not be uniform over the country, because conditions vary, and it is vital that procedures that meet these conditions vary also.

However, the problem should be approached in the same way in all communities, and certainly should be analyzed in terms of sound administrative management and receive the same consideration that other public health aspects of government do.

Providing courteous, sanitary, and efficient removal services sets the tone of community services, and is a cornerstone of environmental protection.

A few words about the critical areas of municipal collection system needs.

First and perhaps foremost, there must be developed recommended criteria for collection systems.

INFORMATION

Senator Boggs. Let me interrupt you there. I was just looking at the paragraph just preceding that sentence you just read, about "several projects of APWA Research Foundation nearing completion also reflect these needs. One, the development of a public works equipment data bank, is to enable public works officials, as well as equipment manufacturers, to benefit from available experience records."

That sounds like a very practical thing, because I would think that many of the municipalities of the medium and lesser size really would benefit very greatly from a service like that. Do you get many requests? Do they know about the services available, the data bank?

Mr. Weaver. This is actually a project, and I appreciate very much the opportunity to elaborate on that, because we feel so strongly that this is a fine demonstration of what can be done when communities put their efforts together.

This particular project, Senator, was developed through the association's research foundation, which allows numbers of communities to come together and pool funds to conduct applied research, which is needed to help answer their needs. And, of course, one of the very fine benefits of this is that when results are forthcoming, they are received in a very receptive tone and mode for adoption.

And the exchange of data, the interchange of information which allows for more efficient and more knowledgeable operation, is a vital need.

Senator Boggs. I would think that would be a very valuable service, and very helpful. I didn't mean to interrupt, but I wanted to call attention to that item. It seems to me that we need the pooling of all

the information we can get, such as the experience and statistics of how this program or that program is working out.

Mr. WEAVER. Right.

Senator BOGGS. Please go ahead.

Mr. WEAVER. Well, along that same vein, we have a project that is actually entitled "The Development of Comparative Public Works Statistics," and another, "The Use of Computers in Municipal Process Control."

These are projects which you might call sister projects, that follow according to the devised plan of development.

Senator BOGGS. Very good.

RECOMMENDED CRITERIA

Mr. WEAVER. Now again, referring to the critical needs of municipal collection systems, the recommended criteria. We feel that such criteria can be developed to facilitate adoption of standards by State and local government. We feel also that these criteria can best be developed by the Federal Bureau of Solid Waste Management with the assistance and cooperation of the State agencies and concerned associations, such as the APWA.

I would like to point out also that manpower development, training, and education are critical needs, and the latter includes management and the general public, as a package, because vast numbers of people are involved, indirectly or directly in the day-to-day operating success of a system. Even though the equipment in use is becoming more sophisticated and efficient, insofar as we can tell, the basic techniques are going to remain the same for the foreseeable future.

Senator BOGGS. When you speak of the basic techniques for the foreseeable future, are you speaking of collection and transportation?

Mr. WEAVER. Yes, sir.

Senator BOGGS. Go ahead.

COLLECTION

Mr. WEAVER. In terms of the foreseeable future, practically speaking, the basic techniques, we feel will continue to be a conveyance which is man operated, and will be fed one way or another through man-directed techniques, whether it be through mechanical improvements, even one-man mechanical operations. There are research projects and demonstrations presently in progress; for example, equipment designed to reach over a parked car to pick up a container. Nonetheless, it will still be the householder preparing, and public works and sanitation official employee, or the private contractor, or whatever, collecting for the disposal.

There are no dramatic breakthroughs in the offing that would obviate the necessity of this basic type of system, insofar as we know at this time.

Local political boundaries become a key factor, because there is a relatively large number of constituents participating in the precollection and collection process, so that any program designed to improve the quality of the environment by improving solid waste collection systems serving the public must consider not only the sanitation workers, who participate in the operation and are employed directly, but

also those who are responsible for decisionmaking and those who are responsible for public support—the citizens.

The general concern about disposal has obscured concern with premises, storage, and collection needs. I believe there has already been some testimony given before this subcommittee describing the relative cost. These can vary, of course. The collection cost can be from two to 10 times the disposal cost.

There has been ample information to indicate that dumping and open burning has been the principal means of refuse disposal. We also have information which indicates that there has not been a really significant degree of improving the situation in the past decade.

The technology is available to eliminate open burning dumps, and again, there was testimony given to this committee that bears repeating. This was the testimony of Dr. Frey, who was here in behalf of the National Research Council.

Senator Boggs. Yes.

Mr. Weaver. For additional emphasis it bears repeating. That is that there is a continual reluctance of those concerned to come to grips with the problem and apply organizational know-how to a solution, and above all, to pay for these services. These are the factors which are so important to the elimination of open buring dumps.

In relation to disposal, we must highlight the problem of site acquisition. This is usually described as a sanitation official's most troublesome problem.

Senator Boggs. Local governments rise and fall on that issue. They really do. It is true, right in my own State.

Mr. Weaver. Well, Mr. Chairman, there are so many examples of open burning dumps and air polluting incinerators, and not nearly enough examples of good practice, and the citizen is more impressed by what he sees than what he is told will be. When a sanitary landfill, for example, is promised, and there is a history of open-dump operation, the citizen is wary and hostile, and even where commendable practice is in evidence, we have found that sometimes funds for advance acquisitions of site have been a real problem.

There are many examples of land-use plans which make no procision for waste disposal sites and facilities. The need for planning and advance acquisition of open space in urban areas has been recognized, but we have not yet applied the potential of combining these programs to better meet community needs.

Another highlight that we wanted to bring to your attention was this matter of salvage and reclamation. It is important to look at this in a historical context, in that municipal refuse collection and disposal practice reveals many instances of successful salvage and reclamation programs, but it also reveals that many successful programs have become obsolete, because of technical-economic developments, and one or two of these are described in the prepared statement.

But total salvage, as a method of disposal, and partial salvage or reclamation, are compatible, but yet are two different things. There has been considerable success with partial salvage and reclamation; large quantities of materials from the solid waste stream are routinely salvaged and resold.

For example, many businesses, hotels and apartment houses engage or permit salvage of paper and paperboard, and I feel certain that there will be more testimony forthcoming on this area.

But I would like to report that in 1969, this association, with the assistance of a grant from the Bureau of Mines, conducted a study to report and analyze factors affecting metal and mineral salvage programs from municipal incinerator residue. Particulated glass and metals, primarily tin cans, amount to as much as 60 to 70 percent by weight and volume of incinerator residue. What we found, that is, what I would like to highlight as the single most important conclusion is that if there is to be successful resource recycling from municipal incinerator residue, that this is keyed to the expansion of present markets, and to the creation of new outlets for recoverable items.

In other words, regardless of the high intents and hopes of those who are engaged in operating these plants, unless there are additional outlets and markets created to receive the material, the reclamation just would not occur, under the present system.

Financing is a key factor, to everyone concerned with environmental control; it is basic, and there are a number of possible courses of action to provide for financing solid waste management systems at the local level.

These include application of the utility concept, earmarking of special tax funds, Federal guarantees of risk capital to the private sector, direct subsidy through a matching grant program. But whatever the method, or combination of methods that may be used, it is important that this financing be geared to the goal of upgrading total community solid waste systems, and not just parts of systems.

Further, it is vital that these methods encourage the involvement of the private sector and not discourage the involvement of the private sector.

In conclusion, Mr. Chairman, we would like to emphasize that what may appear to be the uninitiated as a very simple problem is an exceedingly complex one, indeed.

We would like to point out that there is a wide spectrum of cause and effect relationship prevailing, and to emphasize the point that we feel that Federal leadership in the form of technical and financial assistance must continue to play an important role in the development of State and local programs regarding standards, increased levels of research and application of research results, demonstration of pilot level systems, manpower development, information exchange, and citizen awareness programs. All of these are vital to the successful accomplishment of needed and desirable solid waste management systems in our communities.

Thank you.

MONTREAL'S INCINERATOR

Senator Boggs. Thank you, Mr. Weaver. That was a fine presentation. Would Mr. Arpin want to give us a little more detail on the experience you are having with your new incinerator; information on how it is working out, and its size.

Mr. Arpin. Mr. Chairman?

Senator Boggs. We are honored to have you here today.

Mr. Arpin. I can assure you that for myself, it is really an honor and a pleasure to be here, with this committee, coming from Canada, and I hope that we will be able to contribute something to this serious problem of solid waste disposal.

Senator Boggs. I am sure you will.

Mr. Arpin. Deciding to build an incinerator, rather than use a landfill, was a major decision, and it was taken, considering, of course, pollution.

Building an incinerator, in the center of a city of 1,500,000 population——

Senator Boggs. Is that the largest incinerator in existence?

Mr. Arpin. To my knowledge, in Canada, but I think that in the United States, they have on a drafting board or are close to building larger ones.

Senator Boggs. I see.

Mr. Arpin. But that is the largest.

Senator Boggs. Is it in the center of the city?

Mr. Arpin. Right in the center of the city, and, of course, in considering pollution, we have to make sure that the emission from the stack would be within acceptable limits.

Five years ago, our standard for particulate emission was .85 pounds per thousand pounds of gas. It was reduced 2-years ago to 0.4 pound per thousand pounds of gas. The contractor guarantees that, the electrostatic precipitators will give an efficiency of 97 percent removal of particulates.

Solid wastes, is not a conventional fuel. There are very serious problems involved. Visiting a number of these plants in Europe, we observed they have solved to a certain extent this problem but new ones come up. The increased use of plastics; is an example, but we are confident that these problems will be solved.

We chose a type of grate that was in wide use in Europe, that is, the Von Roll, a Swiss type. This seemed to us to be the one with which there had been the most experience, and we felt that we should benefit by that experience.

Senator Boggs. What is its particular advantage?

Mr. Arpin. The advantage, is that it is a grate made out of steel, it is a grate which moves back and forth, and advances the refuse as it is being consumed or burned, and there are spaces to inject air, to give the right type of combustion. The system is designed so that we are not using too much excess air, that is, in the neighborhood of 50 or 60 percent. This is the basis of the whole concept. We could have used an incinerator without electrostatic precipitators, and without boilers, but we are using boilers to recover heat.

Senator Boggs. To recover heat?

Mr. Arpin. Yes. Because incinerator furnaces are operated so that the temperature of combustion gases are around 1800 degrees F. You can't let those gases out of the chimney at these temperatures, so you have to cool them down. The normal way of doing it in the past was with water sprays, but there again, to cool those gases also, you have to use a considerable amount of excess air and of course, that means that the stack emission was that much more.

So we decided to use water-cooled boilers, and of course, that reduces the temperature of the combustion gases to about 500° F., which is acceptable through these electrostatic precipitators.

Senator Boggs. Do you accept everything that comes in, or is there a separation?

Mr. Arpin. No, we have no separation. It is a mixed collection, and——

Senator BOGGS. Glass bottles?

Mr. ARPIN. Oh, yes.

Senator BOGGS. Tin cans?

Mr. ARPIN. Anything at all. And we have problems. This is our first experience. This new incinerator is just starting to operate. It has been operated for 2 weeks now, on a trial basis.

Senator BOGGS. I see.

Mr. ARPIN. And we were amazed, you know. I have seen some incinerators in Europe, where the residue was coming out perfect, but it is not the case for us. We will have to make some adjustments, due to plastics and bottles, which——

Senator BOGGS. You can't do anything with them?

Mr. ARPIN. Which melt and agglomerate, reducing the melting point of the slag, so we are getting slag flowing onto our grates, which is very serious.

Now, the last information we have in Europe is that they are running into that problem, too, although not to our extent, because they don't use as much plastic as we do, as yet.

Senator BOGGS. What do you do with the residue?

Mr. ARPIN. Now the residue, that is something else. We are arranging for reclaiming metals. The residue comes from the furnaces, through a water drop. It is cooled, drained, and then falls into rotating perforated drums, that let the ashes go through. The metals are collected at the end.

The next step is to shred the tin cans. We are fortunate that 600 miles away, we have copper mines that use the leeching process, and they have contacted us to ship them all the shredded metal we can supply. The incinerator will supply about 12,000 tons per year. So we would be assured of the disposal of that residue.

Senator BOGGS. Before it goes into the incinerator, do you compact it?

Mr. ARPIN. There is no compaction, no.

Senator BOGGS. There is no shredding? You just put it in?

Mr. ARPIN. It just goes in, into the hoppers. Now to insure—we have added something new to the conventional incinerator; at the beginning of the chute, we have inclined vibrators that receive the charge from the grapple, the vibrator feeds the refuse uniformly down the chute. This assures that the chute is always filled, and prevents backfire. We use a radiological monitoring device to indicate that the chutes are full.

Senator BOGGS. Yes.

Mr. ARPIN. Any other type, for example an electric eye type could get dust-laden, and wouldn't operate. We had to use a ray that would go through even the metal, and everything in there, to control the shute, so we would be sure it is always full.

Then this vibrator feeds the firing grate is a very uniform way. That is important, also, to have a uniform bed of refuse being burned.

Senator BOGGS. As it is located in the center of the city, have you had any complaints about it?

Mr. ARPIN. No, Senator. We had an incinerator there before, and, of course, we took advantage of that, and said, "Well, we will have another one there, but we are sure that it will be still better," because with the old one, built in 1930, you know, the emission was serious.

Senator Boggs. Yes.

Mr. Arpin. And of course, that was an improvement in condition. As we were told a while ago, collection is 75 to 80 percent of the cost of disposal, so if you can get a minimum hauling distance to your incinerator, you keep costs down.

Senator Boggs. That would be a big help in keeping costs down.

Mr. Arpin. It would, sir.

Senator Boggs. We are glad to have this report, and we will be very interested in your experience on it.

Mr. Arpin. We are not through with our problems, Senator.

Senator Boggs. I am sure.

Mr. Arpin. But we certainly welcome our good friends from the United States any time. We would like to show them around.

Senator Boggs. I hope I will have the opportunity to get there myself and see it.

Mr. Arpin. You would be welcome, sir.

Senator Boggs. Mr. Weaver, would you recommend that Federal criteria, including disposal and recycling methods, be developed into standards? Do you think we have reached that stage?

Mr. Weaver. The importance of criteria, is that the local official who is building a system, and the industry groups who are working with the local official, to help him accomplish this responsibility, need performance guides. This is the critical thing.

For example, a crane, that is installed in an incinerator plant should be more capable of heavy duty performance than a crane in a steel plant. It shouldn't be obtained solely on the basis of the lowest bid.

Consider collection system requirements. Should collection trucks have closed bodies; what materials should be collected? What frequency of collection should be required? The local official should have some guidance, particularly in view of the tremendous pressures he has at the local level for where he should spend tax dollars.

Senator Boggs. Right. I see your point. That would be especially true if there was going to be Federal financial assistance.

Mr. Weaver. Yes, sir. And it is also fundamental, if we are going to get the most out of private industry input.

Senator Boggs. You wouldn't require that by statute, would you? Wouldn't it be by regulations or by agreement in the contract of Federal assistance?

Mr. Weaver. You will note that one of the comments we made in the statement was pointing out the differences of conditions over the country. This is the reason we feel so strongly that the State agencies must play a key role here.

Senator Boggs. Right.

Mr. Weaver. And I wonder whether Mr. Burgess might want to make a comment.

Senator Boggs. I would be glad to hear from you, Mr. Burgess.

Mr. Burgess. Thank you, Senator. I think that Mr. Weaver has hit the key point there, because conditions, for instance, in Montreal—we will use that example—and Baton Rouge, the climatic conditions are so much different. Our frequency of collection may be greater. Our methods of disposal could conceivably be different, and I agree that it has to have more direct control from a State and local level, than to try to set up grandiose guidelines.

Senator Boggs. Very good. I am glad to have your views on that.

FINANCING

Mr. Weaver, you mentioned a number of possible ways to finance refuse collection and disposal systems. One of these was direct Federal grants. It has been pointed out during this committee's hearings that direct grants could be detrimental to private contractors. Do you share this concern? And if so, what mechanism do you recommend to get Federal assistance into this program?

Mr. WEAVER. Senator, there are really two parts of that question. I would like to take the aspect of do we share concern. I would like to speak to that first.

Senator BOGGS. Yes, go ahead.

Mr. WEAVER. Yes, we do share a concern, in the sense that we recognize that private enterprise makes a large contribution in the collection and disposal of municipal refuse in this country. As a matter of fact, some of the work we have done recently would indicate that in the cities, at least as much material is collected by the private sector in direct performance as is collected by the municipal direct services, where there is a municipal system. And in many places, it is twice as much.

Now this is a part of the total community system, and if we are to achieve advances in environmental quality in our communities, we are concerned that any financing incentive that is given not penalize one part—inadvertently or otherwise.

Now, if Federal grants are given, and it is not taken into account that the private sector does make a large contribution, and it turns out that the grants encourage municipalities to go into this service directly themselves, totally, regardless of whether they really felt that this was the way to do it, this would be wrong. Said in another way, we feel that the community, the local public works and sanitation officials, should have the choice, depending on local circumstances, as to whether he should proceed using direct force account, or using the private sector, and that obtaining the financial assistance, which every local administrator needs and says he needs very badly, to obtain this, it must not steer him so that it would penalize that community which chooses to use the private sector.

So we do have a concern; but this doesn't mean that a grant program can't be designed to avoid this.

On the other hand, we do visualize a number of financing possibilities. We did not take an association position on any one method. I would like to reemphasize, the utility concept. Refuse collection and disposal is a service that can be put on a pay-as-you-go basis. When I say "utility concept," I am not referring necessarily to the public utility commission type concept as such, but the concept whereby there is a private or publicly operated corporation that has its own responsibility for financing and capital improvement through established fees for service.

In other words, its operation is not directly dependent upon funds from the general fund.

I don't know whether that is clear.

Senator BOGGS. I understand that. That is good.

We have touched on the acquisition of disposal sites as a very critical and important matter, one of the most difficult ones for local government. I wonder, Mr. Burgess, if you have encountered difficulty on acquisition of sites in your area?

Mr. BURGESS. Yes, sir; we surely have. As a matter of fact, as you said, governments rise and fall on sanitary land-fills, and I think it is probably the case in Baton Rouge, too, but we have had that problem, and are having it now.

As a matter of fact, we just recently acquired a site of 150 acres that we paid in excess of half a million dollars for. Much of it was not even marginal land. It could not have been used for any other purpose, but nevertheless, we had to pay in excess of a half million dollars for it, and not only is that price exorbitant, but its location, I think, makes the cost even greater than that, because it necessitates an average 10-mile haul, whereas previous to that, we had an average three and one-half mile haul. So it ups the cost of collection and transportation to the disposal site by about three times.

We have had that problem. We have the mechanics for acquiring it, but we are a political subdivision, as many others, and therefore, a governing body is governed by the wishes of the people, and so we bought the site a long way out of town. But it is an age-old problem; yes, sir.

Senator BOGGS. Do you have a public hearing on it before a site decision is made?

Mr. BURGESS. Yes, sir.

Senator BOGGS. You say this is marginal land. Is it marshland?

Mr. BURGESS. Yes, sir.

Senator BOGGS. Ecologists are against using marshland for sites, aren't they?

Mr. BURGESS. That is right. We had to get the Public Health Service, all of those people in. We had to levee part of it, and dewater part of it. We not only had to do that, but the cover material is not available right at the spot of disposal. We have to transport the cover material in, and there again, upping the cost somewhat.

Senator BOGGS. Do you shred it before you process it?

Mr. BURGESS. No, sir.

Senator BOGGS. It goes in rough?

Mr. BURGESS. Yes, sir.

Senator BOGGS. That is interesting.

I am sure there are many other questions, but we have other witnesses. Under the circumstances, I believe I had better move on, Mr. Weaver. Thanks to each of you for being here this morning. Your testimony was very valuable. We appreciate it greatly.

Mr. WEAVER. Thank you, Senator.

Mr. ARPIN. Thank you, Senator.

Mr. BURGESS. Thank you, Senator.

(Subsequent to Mr. Weaver's appearance he was sent the following letter from Senator Muskie. The letter, and Mr. Weaver's response follow:)

APRIL 21, 1970.

Mr. LEO WEAVER,
Director, American Public Works Association,
Washington, D.C.

DEAR MR. WEAVER: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formulation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide answers to the following questions:

1. Has the American Public Works Association compiled data on the occupational health effects associated with the collection and disposal of solid wastes?

2. Do you have any figures to indicate current manpower and training needs and capabilities in solid waste management?

3. Section 209 of S. 2005 authorizes the Secretary of Health, Education, and Welfare to recommend standards for solid waste disposal and collection systems. What form do you feel these standards should take? What do you consider the value of requiring the Federal issuance of recommended collection and disposal methods, similar to those in the Air Quality Act of 1967, as guidance to State and local governments?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution.

AMERICAN PUBLIC WORKS ASSOCIATION,
Washington, D.C., May 6, 1970.

Hon. EDMUND S. MUSKIE,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MUSKIE: The questions you pose in your letter of April 21, 1970, center on several of the fundamental areas of community solid waste management and I am pleased to provide information thereto.

1. Occupational health effects: the American Public Works Association, in cooperation with the National Safety Council, conducted a survey on municipal safety programs and published the results in the December 1967 issue of the APWA REPORTER (copy enclosed). Survey results indicated a frequency rate in 16 major U.S. cities, averaging almost 9 times more than the 1966 average of all industry. The average severity rate was almost 3 times the 1966 average of all industry. Perhaps most important, because of inadequate records the accident statistics upon which these results are based are those reported from only 16 U.S. cities (3,200 questionnaires were sent to U.S. municipalities; 548 replied and only 16 of these provided data which permitted tabular listing by function of public works department activities).

Also enclosed is a copy of a paper presented by the writer at the 1969 National Safety Congress. You will note on the last page of the paper that the importance of accurate injury data is stressed; such data is, of course, vital to the direction and evaluation of safety programs.

2. The APWA, under contract to the Federal Office of Solid Waste, submitted a report on training needs to that Office in September 1968. Its primary conclusion is that "*A nationwide, three year crash program of training, education, and demonstration is urgently needed.*" Estimates at that time indicated that, nationally, there are more than 100,000 collection employees in the public sector and 80,000 in the private contractor sector and at least 15,000 employed in solid waste disposal facilities. It is my opinion that these are conservative figures, particularly when one contemplates the number of policy-management and industry people and others concerned who must become knowledgeable in this field if meaningful improvement is to be achieved.

The Bureau of Solid Waste Management has outstandingly capable people engaged in training; and they have reached a remarkable number of trainees (I understand some 600 in 1969) considering the small human and budget resource involved. Similarly, the APWA, through its 58 chapters and its Education Foundation, has encouraged and assisted in making available courses in this field. But

the number of courses possible with presently available budget is limited indeed. A Federal program designed to "train trainers" and to stimulate and encourage training programs at the state and community level is essential if middle management-operator level training is to be meaningfully achieved. Such training needs are recognized in the Water Quality Act of 1970. *A primary thrust is the need to do what we already know how to do.*

3. Federal standards: as I understand it, a standard applies to a definite rule, principle, or measure established by authority; criterion, on the other hand, may apply to anything used as a test of quality, whether formulated as a rule or principle or not. Presumably, it would be appropriate to establish standards for Federal agency solid waste management activities conducted directly or indirectly; Federal criterion could be recommended as guidelines for state and local government standards. Disposal standards have already been promulgated as regulations by a number of states. The subcommittee hearings in Detroit included a

The absence of sanitary landfill-incinerator standards has had serious adverse effect on U.S. practice. Recommended criteria for collection and disposal will be very helpful in establishing standards which will provide a base for proper practice. As a matter of fact, we have found the lack of such standards is a considerable handicap where long distance haul of solid wastes for purposes of land reclamation has been given serious consideration.

If we may be of further assistance, please do not hestitate to call on us.

Sincerely,

LEO WEAVER, P.E.,
Director, Washington Office.

Enclosures.

(Portions of the APWA Reporter, December 1967 (submitted by Mr. Weaver), which are pertinent to these hearings follow:)

TABLE VI.—NSC RECORDS (FOR COMPARISON)

Type of record	Year	Number of cities responding	Rate
Municipal employees:			
Frequency	1966	48	22.20
Severity	1966	48	799
Vehicular rate (cities) [1]	1966	513	30.57
Federal employees:			
Frequency	1966		7.30
Severity	1966		531
All industry:			
Frequency	1966		6.91
Severity	1966		689

[1] From NSC, "Fleet Accident Rates," 1966.

From NSC, "Work Injury Rates," 1967.

TABLE VII.—1965 INDUSTRIAL INJURIES BREAKDOWN FOR DIVISIONS OF PUBLIC WORKS (SAMPLE CITY)

Division	Average number of employees	Man-hours of exposure	Medical treatment cases	Disabling injuries	Days charged	Frequency rate	Severity rate	Cost	
								Compensation	Medical
Administration	14	29,120	0	0	0	.00	0	0	0
Building and grounds	75	163,800	18	12	146	73.26	891	$467.14	$881.54
Engineering	20	41,600	0	1	17	24.04	408	80.36	65.02
Garage	28	61,152	4	3	6	49.06	98	0	130.85
Inspections	27	56,160	1	0	0	.00	0	0	20.00
Sanitation	164	358,176	25	23	235	64.21	656	1,175.37	809.95
Streets	105	229,320	16	11	214	47.97	933	1,061.46	1,152.74
Water and sewer	154	336,336	17	14	216	41.63	642	1,456.64	1,809.57
Total	587	1,275,664	81	64	834	50.17	654	4,240.97	4,869.67

* * * * * * *

REFUSE SAFETY PROBLEM

An analysis of the questionnaires indicates one specific operation wherein a serious safety problem exists: namely, the refuse collection operation. Table

VII shows the frequency and severity rates for a typical department of public works. (Note that the sanitation division reflects a frequency rate of 64.21 and a severity rate of 656.)

A summary of the accident statistics reported by 16 U.S. cities for their refuse collection operations is shown in Table VII. If one is to judge by a national frequency of 60.77 and a severity of 2,012, there is, to say the least, a serious problem in refuse collection operations.

APWA AND NSC HELP

Certainly, the APWA and NSC should assist all cities, large and small, in developing better safety programs for all their departments.

Because the collection of refuse in most American cities is one of the most dangerous occupations within the public employee field, both APWA and NSC can make this area one of maximum concern. Here are a few suggestions for things that can be done:

(1) An engineering study of refuse collection can be made.

(2) A data sheet on refuse collection can be developed.

(3) Short, five minute or so, talks can be prepared for refuse collection employees, and a film on the subject can be prepared, in addition to the preparation of posters and signs, etc.

(4) Training programs can be instituted.

(5) Meaningful statistics can be collected.

Besides those five points, NSC's Public Employee Section executive committee, should develop literature for public employees. (And it might be added that NSC already has considerable training aids listed in the NSC Safety Poster Catalog.)

Taken as a whole, then, public employee safety has improved, and there are encouraging signs that it is improving even more; but, if the APWA–NSC survey is correct, there is much more to be done.

$$\text{Severity rate} = \frac{\text{Total man days charged} \times 1{,}000{,}000}{\text{Employee hours of exposure}}$$

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1{,}000{,}000}{\text{Employee hours of exposure}}$$

TABLE VIII.—FREQUENCY-SEVERITY FOR REFUSE COLLECTION IN MAJOR U.S. CITIES

[Cities over 100,000 population are identified only by a letter]

City	Name of department	Employee hour-exposure	Number of work injuries (total for year)	Days charged	Frequency	Severity
A	Streets	4,418,470	120	5,519	27.16	1,249
B	Sanitation	379,000	24	427	63.32	1,127
C	do	415,060	7	289	16.87	696
D	do	1,787,338	22	777	12.31	435
E	Garbage	106,880	9	35	84.21	327
F	Waste division	1,411,791	219	3,059	155.12	2,167
G	Garbage	1,506,398	100	1,434	66.38	952
H	Sanitation	358,176	23	235	64.21	656
I	do	2,778,008	212	12,424	76.31	4,472
J	do	159,231	17	194	106.76	1,218
K	Waste removal	160,288	8	71	49.91	443
L	Street cleaning	694,332	36	690	51.85	994
M	Refuse collection	452,326	81	704	179.07	1,556
M	Sanitation	653,800	20	6,558	30.50	10,031
N(1961)	Refuse collection and disposal	78,437	15	87	191.24	1,109
N(1962)	do	77,962	14	112	179.57	1,437
N(1963)	do	82,455	18	89	218.30	1,079
N(1964)	do	82,725	12	85	145.06	1,028
N(1965)	do	83,286	19	81	228.13	973
O	Street cleaning	736,952	12	167	16.28	227
	Total	16,422,915	998	33,037	60.77	2,012

Note: Only cities having a population over 100,000 submitted data of work-injuries, broken down by departments.

Personnel Safety in Solid Wastes Management Systems

(By Leo Weaver, General Manager, Institute for Solid Wastes, American Public Works Association, Washington, D.C.)

Community public works encompass public facilities and services of all types. Road maintenance and construction, public building maintenance and construction, sewers, water and waste water treatment, and airport operation, to name some. Yet historically the collection and disposal of solid wastes has been a continuously difficult and challenging task to public works and sanitation directors. Consequently, the American Public Works Association has directed to this field a substantial portion of its resources. The manual, *Refuse Collection Practice*, prepared by an APWA committee, is an example.

One of the chapters of this book is on personnel, and a portion of this chapter is on the development of safety practices. Data gathered for the second edition of this manual, published in 1956, included information on organized training programs for 551 cities. Eighty of the 551, or 14.5 per cent, reported that training programs were conducted. The percentiles varied from 13 to 21 in various population categories from 5,000 to 1,000,000. Three of the five cities with more than one million population reported conducting training programs. A third edition was published in 1966 and this data was updated. At that time, 102, or 16.4 per cent of 621 municipalities, reported conducting training programs. Thus, in 10 years there was about a two per cent increase in the number of cities reporting organized training programs. It must be remembered that organized training does not in itself assure safety program training. While it was recognized that refuse collection had numerous perils and dangers for untrained workers, it was not described as a hazardous occupation.

It was with this background that the APWA and the National Safety Council cooperated in what is now a widely recognized and quoted survey, revealing clearly for the first time work injury frequency rates (60.77) amongst sanitation workers that are nine times greater than that of the average industrial employee (6.91), with a severity rate (2012) 300 per cent greater than the average industrial employee (689). This, in turn, motivated the development of the issuance of NSC Data Sheet 618, "Refuse Collection in Municipalities" (*National Safety News*, April 1969).

To provide a common meeting ground for members of APWA concerned with refuse collection and disposal, the Institute for Solid Wastes was established within the Association framework. Its first meeting was held here in Chicago in 1966. The Institute is dedicated to promoting the development and adoption of safe, sanitary, and efficient methods of community solid wastes management, the establishing and encouraging of sound technical and regulatory requirements, and high professional standards for employees of public agencies responsible for solid waste management systems. It also represents public officials of Canada and the United States in the International Solid Wastes and Public Cleansing Association.

A number of inquiries were made to a selected number of municipal sanitation directors and refuse collection and disposal equipment manufacturers. The purpose was not to seek out malpractice; we already have ample evidence of this. The purpose was to obtain a sampling of positive efforts which might serve as a foundation for the several needed program thrusts; for example, the widespread awareness of training efforts which are needed in literally thousands of Canadian and U.S. cities. Responses from indusrty varied in scope but may be conveniently divided into collection vehicle and land disposal vehicle categories. No effort was made for this sampling to contact manufacturers of incinerator, grinding, composting, or salvage plant equipment or processes.

COMPACTION AND EARTH HAULING EQUIPMENT

A manufacturer of a sanitary fill compactor pointed out that a machine designed for other purposes and converted to sanitary landfill application is frequently hazardous. He cited as an example equipment that could not incorporate a fender design as a conversion feature, and therefore exposed the operator to the dangers of trash being brought up on wheel segments during the refuse compaction process and rotating around the wheel with inherent danger if a board or piece of sheetmetal is entangled. Another point of safety cited is that fires will occur in a machine due to an accumulation of paper and other refuse inside the engine and

lying on belly pans put on to protect the engine pan and transmission. Paper accumulates on the belly pan and becomes soaked with diesel fuel and hydraulic oil and then, if a piece of paper flies up from the landfill and comes into contact with the manifold and thence drops into the belly pan area, a serious fire may result.

This manufacturer cites corrective procedures of removal of pans (unbolting) for cleaning but recognizes that, in practice, this is too often neglected. Thus, this manufacturer incorporates as standard equipment a small hydraulic cylinder device which will open the pan to facilitate operator cleaning. Further, dual controls are provided so that an operator may turn the seat and always face the direction of travel. A pattern of back and forth compaction action is used on many refuse landfills and this feature is designed to make backing safer.

COLLECTION EQUIPMENT

Trucks fitted with enclosed compactor-type bodies are commonplace in Canada and the U.S. In fact, one might find it difficult to accept that the last municipal horse or mule drawn garbage wagon did not disappear from the urban scene until the early 1950's.

Replies were received from four of the six refuse collection equipment manufacturers queried. The depth of safety design indicated varied, but certainly many important innovations and developments have been effected.

One manufacturer stressed the importance of packing mechanisms that could not be engaged accidentally. A direct control lever to valve operation on the hydraulic system is designed so that the operator has to engage the handle and hold for a couple of seconds to fully engage the mechanism. Optional safety bars and hopper closure doors were also cited.

On the other hand, another compactor truck body manufacturer cites as an advantage the fact that no holding is necessary of the lever which starts the automatic packing cycle and "inexperienced personnel can be trained in a matter of minutes." This same manufacturer stresses a low loading height to provide "best possible working conditions for collection crews to reduce muscle strains, hernias, etc." The unit is also equipped with a dual purpose safety door which seals off the loading hopper during the compaction cycle and thereby releases the crew to do meaningful work rather than standing safety guard during the packing operation.

A third company reported devoting much time and effort to safety as a vital facet of the refuse collection industry and singled it out as a prime selling feature. The letter transmitting the information stressed that "Our distributors, when delivering a unit, instruct the personnel in the safe operation of the unit. Proper training should not be limited to delivery of a piece of equipment of this type, but should be maintained on a day by day basis with a thorough and comprehensive program carried out at all times."

A fourth compactor type refuse collection body manufacturer stressed special safety design for rear loaders as follows: ". . . recently introduced a rear loader with a cycle control offering unique advantages to safe operation. Besides the ability to energize the cycle, the control has individual levers so that the blade action can be manually controlled. For example, should something be pinned between the blade and the hopper sill, the operator can move the blade away from the sill. This is not a simple reversing of the cycle action, but actually moving the blade at an entirely different direction. You might ask, why not incorporate safety doors? They are available, but experience has proven that most users of these machines wire the safety door out of the way because they consider it a nuisance. For this reason we have incorporated the above described feature in our control system."

This same manufacturer points out two safety features designed into equipment fitted with front fork loading devices to self-local portable containers as follows:

1. The ability to tilt the truck cab with the arms in their down position. Thus it is not necessary to rise the arms in order to tilt the cab, a difficult task indeed if the engine is dead (and a potential hazard if the truck is being pushed or pulled to raise the arms to permit tilting of the cab).

2. The physical sides of the form arms eliminate important areas of vision when in the down position while the truck travels through an intersection. For this reason, this manufacturer has designed his machine so that the arms may be transported down or up.

MUNICIPAL SAFETY PROGRAMS

Safety program data from five cities were obtained for inclusion in this presentation: New York City, New York; Atlanta, Georgia; Bismarck, North Dakota; Los Angeles, California; and Tacoma, Washington. Each is included here in on a case study basis.

New York City. Following is a listing of the programs that the Department of Sanitation is employing in an effort to educate the personnel in the reduction of accidents:

Safety council meetings between labor and management are conducted for a practical discussion of equipment. Field meetings are held between field supervisors and a representative of the Division of Safety once a month at the field locations, to inspect and discuss safety requirements.

An inspection team composed of a foreman of mechanics, a labor union representative, and a safety officer check equipment and location conditions in the field and submit reports.

An intensive program for the testing and procurement of various types of individual safety equipment, such as goggles, respirators, reflective tape, gloves, wink lights, and barricades. Also, a program of continuous safety awareness through publication of weekly bulletins, visual aids on special safety bulletin boards.

A driver's testing clinic. This clinic is equipped with audiometers, telebinocular machines, and glare and coordination testing equipment. In addition, written and actual driving tests are conducted when required.

Safety field inspectors issue warnings to driver violators in the field. New driver employees, as well as supervisory personnel are trained and evaluated. Specifications and new equipment are inspected and approved by the Director of Safety.

The complete staff of safety officers are periodically sent to take safety refresher courses at recognized universities and schools.

Statistics are coordinated with a data processing system to gain immediate needed information of causes and effects of various types of vehicular and industrial accidents.

Atlanta, Georgia. A great number of the supervisory personnel attend the National Safety Council's Driver Improvement program Defensive Driving course. These supervisors are utilized in safety classes now being held for all employees of the Public Works Department.

Sanitation truck drivers are cautioned and reminded through a safety bulletin each month to be alert at all times for the safety of the laborers assigned to their vehicles. Laborers are cautioned by their immediate supervisors to use care at all times in the performance of their collection duties and while in the process of compacting garbage collected.

Specifications on all vehicles purchased by the Sanitary Division require that the most current safety features be included on these vehicles. If a vehicle has been proved to be unsafe for the laborers or the driver, it is ordered to the shop for whatever repairs or adjustments are required to make it safe for the personnel.

Accidents that Sanitary Division driver personnel are involved in are reviewed by a Department Accident Review Board. It is determined by this Board whether or not the Sanitary driver's negligence caused the accident; if laborer personnel are involved in any way, they are called before the Board also.

During the course of the Accident Review Board hearings, the safety of the laborers is brought to the attention of the driver. He is reminded that the operation of his vehicle must be safe at all times for his own protection, as well as that of the laborers assigned to his vehicle.

All supervisory personnel, as well as driver personnel, have orders to caution any employee observed in the act of safety negligence. When new equipment is placed into service, the supervisor, the driver, and the crew are instructed in the over-all operation of the new equipment. They are cautioned to be alert while operating this equipment.

Due to the acute personnel shortage that seems to be general, we have not been able to go as far into personnel safety as we intend to. It is our intention to have safety inspectors ride with each and every vehicle we have in service and to point out to the driver and laborers all the unsafe actions as they commit them. If it is determined during this inspection that a driver should be given a refresher course, he is scheduled as soon as possible.

At each of the four Sanitary Substations a board carries monthly safety reminders and the findings of the Accident Review Board. There is also an accident record board at each station.

In the near future, monthly posters will be placed at each of the substations to remind personnel to be cautious and alert at all times for safety's sake.

Bismarck, North Dakota. We do not have a regular safety program. However, we do have certain practices and procedures which are intended for the safety of the employee. The main source of injury in this department seems to be that of back injuries. In order to combat this problem we limit the size of the waste container to 25 gallons and do not permit the placing of concrete, sod, or other heavy material in the container. We do pick up other material, placed in boxes, providing it can be easily handled by one man. When we consider that a three man crew averages one thousand containers per day, it is necessary that we have some ground rules.

Our experience has not only been back injuries, but we find that after a man follows a truck for some 20-odd years, his feet and legs commence to give out on him. In many cases the employee is not eligible for retirement and yet, through his faithful service to the department, he has come to the point where he can no longer perform his regular duties. This does present a very definite problem in that we recognize the devotion to duty of this employee and he must be cared for until retirement age. In some cases, we have been able to work this man into other areas of public works, but can foresee where this will be a growing problem as the so-called "light work" assignments are limited.

Los Angeles, California. Training procedures in injury prevention include group instruction for all new employees; group instruction for all employees on specific situations as indicated by experience; specific as indicated by experience; specific instruction and counseling to individual employees to meet indicated problems. These procedures involve first level supervisors and/or instructional service employees of this Bureau as well as safety and training specialists of the Bureau of Personnel of the Department of Public Works.

Scheduled and formally structured safety committee meetings are held within each of the several operating districts and include supervisory and operating personnel. A similar committee composed of representatives of all districts also meets periodically. Findings of these committees have resulted in equipment modifications as well as training procedure innovations and changes. Weekly tailgate sessions by supervisors include discussion of specific accidents and methods of preventing injuries.

Competition among the districts to achieve the best records is encouraged by the maintenance of scoreboards at each facility showing the standing of each district, by the award of the monthly Injury Prevention Flag, and by the presentation of a permanent plaque to the district achieving the best record for a calendar year. Publicity is given to the programs and includes reports in *Collectors' Items*, the monthly newsletter of the Refuse Collection and Disposal Division.

Tacoma, Washington. The program presently being carried out in our department includes safety presentations in such areas as lifting, avoiding back injuries, defensive driving, avoiding hand traps, etc. One problem we have in the area of personnel safety is that of securing sufficient budgeted funds to hire an adequate number of first-line supervisors to work closely in safety programs with our sanitation crews. This, I presume, is a universal problem. Public works departments, however, must realize that adequate first-line supervision, to help implement safety programs, will be the major contributing factor to reducing accidents in the field of public sanitation.

The City of Tacoma contributed to the joint survey of 1967, which revealed a high relative frequency and severity rate of injuries suffered by municipal employees working in the sanitation field. As a matter of fact, the figures shown in the April 1969 issue of the *National Safety News* are those of one year's experience of the City of Tacoma. It is interesting to note that the same issue states that in the survey of 3,200 cities, only 39 of those responding had records that were adequate and complete enough to allow meaningful evaluation.

It would seem that one of the major steps necessary in computing high injury rates in public sanitation agencies is the development of accurate injury data compiled in strict compliance with the provisions of ANSI Standard Z16.1–1967, "Method of Recording and Measuring Work Injury Experience."

The only comparative data in this area of which I am aware is the report on "City Employees Safety Programs," by Clement Luepke, in the 1962 *Munic-*

ipal Year Book of the International City Managers' Association. The data contained therein, however, reflects only the experience of 18 cities and, therefore, appears inadequate for a thoroughgoing evaluation of accident experience by any one city. In our own case, in making a comparison we found that our frequency rate was higher and our severity rate so much lower than the figures shown in the published data as to cast doubt upon their usefulness to us. It is suggested that what is needed is not only more extensive data, but data compiled in accordance with the referenced ANSI Standard. Data should be grouped for varying population densities such as 50,000, 150,000, 250,000, and so forth. I am convinced that anything you can do to push this effort will be a major contribution to safety.

The National Academy of Engineering has just released a publication, *Policies for Solid Waste Management*, wherein one of the four principal objectives of solid waste management is "To reduce the accident rate and improve the skills of operating personnel through manpower-development programs."

The APWA and its Institutes for Solid Wastes will continue close working relationships with the National Safety Council. One action that needs to be considered is the development of a joint effort that will enable reduction of sanitation department rates with a designated timetable of goals for the 70's. The challenge is here. We can do no less than meet it.

Senator Boggs. Our next witness is Harold Gershowitz, executive secretary of the National Solid Wastes Management Association.

We are very happy to have you, Mr. Gershowitz.

Mr. Gershowitz. Thank you.

Senator Boggs. We follow your activities and some of your statements, and we appreciate your being with us.

STATEMENT OF HAROLD GERSHOWITZ, EXECUTIVE DIRECTOR, NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION, WASHINGTON, D.C.; ACCOMPANIED BY JOHN VANDERVELD, PRESIDENT OF NATIONAL DISPOSAL SERVICES

Mr. Gershowitz. Thank you, Mr. Chairman. I have with me this morning, Mr. John Vanderveld, who is the president of National Disposal Services, which is one of the largest solid wastes collection and disposal firms in the United States.

His organization operates in excess of 300 vehicles, trucks, and around a dozen model sanitary landfills throughout the United States, and he is also chairman of our research and development committee.

Senator Boggs. Very good, where are you from?

Mr. Vanderveld. Barrington, Ill.

Mr. Gershowitz. Mr. Vanderveld has also been one of the pioneers in the area of recycling and resource recovery, and we thought his perspective would be a valuable addition to the proceedings this morning.

Senator Boggs. Very good.

Mr. Gershowitz. I, of course, would like to thank you for extending this opportunity for the National Solid Wastes Management Association to participate inthese important deliberations.

We have been extremely impressed with the diligent manner in which the members of this subcommittee, as well as the staff of the subcommittee have pursued a meaningful and accurate perspective of the entire field of solid wastes management.

Before discussing the bill before us, I would like to take just a few moments to discuss some of our association's activities relevant to this important subject.

Senator Boggs. That's fine.

Mr. Gershowitz. It is the National Solid Wastes Management Association's job to assist the private sector to make the greatest possible contribution to the solid wastes problem-solving process. Our efforts toward this goal are many faceted.

We developed in 1967 a Government-Industry Solid Wastes Liaison Council whereby outstanding talent from both the public and private sectors could bring their thinking to bear on solutions to specific problems.

Senator Boggs. And I might say, it is a very valuable service. Very important, I think.

Mr. Gershowitz. Thank you.

MODEL CODES

This unofficial, joint effort has begun to produce significant contributions and the participants from both the private sector and the Federal Government are extremely enthused about the future prospects for such cooperative activities. As Leo Weaver, from whom you just heard, who was chief of the solid waste program when the Industry-Government Solid Wastes Liaison Council was formed, stated, "The Council well could become a model to guide other industries in cooperating with Government on the solid wastes problem." The Bureau of Solid Waste Management, under the direction of Mr. Weaver's successor, Mr. Richard D. Vaughan, has continued the perpetuation of this industry-Government cooperative effort. The first task that we cooperatively tackled was the development of a model standard and operation agreement for sanitary landfill design and construction. This was a joint effort, and the publication is a joint publication of both the Federal Government and the National Solid Wastes Management Association.

Senator Boggs. We are glad to have that, and we will make it a part of the appendix of the record. Thank you. (See p. 1997.)

Mr. Gershowitz. You may recall that Mr. C. C. Johnson, the Administrator of the Consumer Protection and Environmental Health Administration, highlighted the need for assistance in this area when he appeared with Secretary Finch before your subcommittee on Tuesday, September 30, 1969.

As Mr. Johnson stated—

> . . . There is no reason why, if you can operate a dump, you cannot operate a sanitary landfill, and do it almost with the same dollars that are now being expended for this purpose . . .

In this one isolated area, one of the stumbling blocks to progress has been the absence of a model that would allow a township, or a county or a city to change their procedures so that what had been a dump could be converted to a properly planned, engineered, and operated sanitary landfill. This document, which is now in the process of being distributed to local jurisdictions throughout the United States by both the National Solid Wastes Management Association and the Bureau of Solid Waste Management, is but one example of what can be accomplished through Government-industry cooperation.

Those local communities that are willing to adopt this model will have availed themselves of one tool which can help create immediate relief from poor waste management practices.

Last week, the Government-Industry Solid Wastes Liaison Council met here in Washington to draft a similar model to cover collection standards. In the next few months, we hope to place in the hands of local government authorities throughout the country a document which will allow them to draft model agreements, regulations, and standards in order to upgrade collection practices.

We have pinpointed many other areas of joint cooperation, such as safety, maintenance, operating standards, and other important areas where Government and industry together can effect meaningful and significant improvements.

We have also developed close rapport with the American Public Works Association's Institute of Solid Wastes in an effort to improve cooperation between the public and private sector and to facilitate cooperative action where both groups can jointly contribute to the solution of solid wastes management problems.

Both organizations recently passed resolutions which recognize that the problem-solving process in the field of solid wastes management must be viewed as a partnership effort which must draw upon the talent and expertise of public officials and private contractors alike.

In an effort to fully marshall the talent and expertise, the manpower, the enormous inventory of equipment, and the research which exists in the private sector, it is important to fully assess what the private sector's current and potential contributions really are.

We, therefore, have undertaken, with substantial assistance from the Department of Health, Education, and Welfare, a massive research effort to thoroughly and quantitatively explore the role of private enterprise in the problem-solving process.

Senator Boggs. That is great. I think it is essential and timely.

Mr. Gershowitz. In addition to this cooperative program with Government, we have also been conducting highly exciting technical programs for all private collection and disposal contractors, whether they are our members or not. In addition to these technical sessions, our annual meeting also includes an exposition devoted to solid wastes equipment and technology, which is now the largest event of its type held anywhere in the world.

Last year, well over 2,000 private contractors from nearly all of the 50 States and over a dozen foreign countries attended this meeting in order to avail themselves to these seminars and technical displays.

This year, our annual meeting in San Francisco will focus particular attention on the areas of resource recovery, maintenance, and capitalization. In the area of resource recovery we have developed a "faculty" of contractors who have "turned the corner" on many of the recycling problems and who are going to share their experiences with the thousands of other contractors who are so enthused about the prospects of resource recovery.

Many contractors have begun to make substantial investments in paper recycling. One such company is headquartered in Louisville, Ky., one I believe you toured, in Louisville, Ky.

Senator Boggs. I remember well the opportunity I had to view that operation with Harry Kletter. I was very happy to have the experience, and was encouraged by it. They are doing a great job.

Mr. Gershowitz. They installed a production line facility for the separation and baling of corrugated paper and other returnable paper products.

Senator BOGGS. We saw that in operation.

Mr. GERSHOWITZ. Right. We are now beginning to see some significant successes in achieving various methods of separation of corrugated paper, which not only helps recover this valuable resource, but also offers the contractor a reasonable return on his investment when the system is properly managed.

RECYCLING TECHNOLOGY

We are also beginning to see some significant progress in the development of plant facilities that can produce "a product line" of recycled materials. That such technology is at our fingertips and that it works is really no longer subject to question.

For example, I have with me actual exhibits from one such facility in Houston, Tex. This organization is a sister company of Mr. Vanderveld's National Disposal Service.

Senator BOGGS. Is that glass?

Mr. VANDERVELD. That is the glass, mechanically separated from the waste materials.

Senator BOGGS. Nonreturnable glass?

Mr. VANDERVELD. It is a mixture of all kinds, and we are working with the glass industry, and they are recycling it back into their systems, but this is mechanically separated.

Senator BOGGS. This would go back to the glass industry to be recycled?

Mr. VANDERVELD. Yes.

Senator BOGGS. That makes an excellent exhibit.

Mr. GERSHOWITZ. The glass you see there is currently being marketed to one of the Nation's leading glass manufacturers for pilot testing. They are finding that the crushed glass can be used as an aggregate in the manufacture of asphalt and have begun recent testing programs to reprocess the cullett back into glass containers. All of the paper is removed and prepared for market. Mixed paper, such as I have before me, can be, and is, used in the manufacture of dry wall, fiberboard and roofing felts, to name but a few applications.

Senator BOGGS. Let me interrupt right there. Do you separate this glass from the other solid waste by machine?

Mr. VANDERVELD. It is mechanical.

Senator BOGGS. Entirely by machine?

Mr. GERSHOWITZ. This development of classification and automated separation is all within the past 6 or 8 months.

Mr. VANDERVELD. In this plant the process has been under development with our company for some 6 years now.

Senator BOGGS. Very good.

Mr. GERSHOWITZ. Much of the paper is removed. Mixed paper, such as we have here with this exhibit——

Senator BOGGS. That is done by machine, also?

Mr. VANDERVELD. It is totally by machines. Through an air separation system that has been developed in our plant.

Senator BOGGS. That is composed of newsprint and pasteboard?

Mr. VANDERVELD. Everything.

Senator BOGGS. Wrapping paper and everything of that nature?

Mr. VANDERVELD. Now this is being recycled back into the paper industries, and the boxboard companies, and roofing companies.

Senator BOGGS. We are glad to have it as an exhibit, Mr. Vanderveld. Thank you.

COMPOSTING

Mr. GERSHOWITZ. Now much of what is left over is reduced to compost in this particular facility, still another product in the product line. Now as most of us know, the economic and marketing outlook for compost as a soil enricher has not been encouraging.

Senator BOGGS. Let me get this straight. The compost is made from what is left over after you extract the paper and the glass and the metals?

Mr. VANDERVELD. Going into the plant, mixed household refuse is going in, shredded, mechanically. Metals, glass, and paper, are extracted, with no hand labor.

Senator BOGGS. Great.

Mr. VANDERVELD. The organic then, is going to a digester, coming out with this material.

Senator BOGGS. That is a compost?

Mr. VANDERVELD. This is a compost.

Senator BOGGS. Fine.

Mr. GERSHOWITZ. Now we think the point must be made that today, and so far, the economic outlook for compost has not been encouraging in the United States. It has been a hard-to-market product, because there are synthetic soil enricheners that are often less expensive. But this one company that we have been talking about here this morning at an investment of some $5 or $6 million over the past 6 years, all private capital, has not given up on making compost a viable product.

To the contrary, I believe they are beginning to convince a number of people that if the marketing problems can be solved, they might just be the people who are going to solve them.

For example, they have begun a very fascinating test whereby they are mixing this compost you just saw with standard 20–10–5 chemical fertilizer, in an effort to not only enrich the soil, but build the soil simultaneously.

Senator BOGGS. What you have here is a mixture?

Mr. VANDERVELD. This is a mixture, then, compost that comes from solid waste and fertilizers and chemical fertilizers, blended together, pelletized, so that it can be spread in the normal fertilizer spreaders.

Senator BOGGS. Would this be marketed at a price below the price of normal fertilizers you would buy for a lawn?

Mr. VANDERVELD. It should market at less cost than the normal fertilizers.

Senator BOGGS. That is a big industry today, I can tell you that. I spend a little on it myself. I am the greatest crabgrass grower you ever saw.

Mr. VANDERVELD. But this material, we feel, will complement the fertilizer industry.

Senator BOGGS. I would think so.

Mr. VANDERVELD. And at the same time, solve a solid waste problem.

Mr. GERSHOWITZ. I think the important point here, Senator, isn't that we have solved the problem relative to composting. The important point here is that efforts at great cost and capital investment are being made in an attempt to solve these problems.

Senator BOGGS. That is most encouraging.

MARKETING PROBLEMS

Mr. GERSHOWITZ. We would therefore strongly recommend that the thrust of much of the future research and development efforts in the area of resource recovery be devoted to solving marketing and economic problems as much as to the technological problems. We are going to recycle more and more of our waste material—not when we learn how to—but when it makes sense to.

Senator BOGGS. You are right.

Mr. GERSHOWITZ. It is absolutely essential that we discipline ourselves to differentiate between resource recovery and salvage. Resource recovery should be defined as the return of raw materials found in our waste mix into production as a raw material.

Senator BOGGS. For example?

Mr. GERSHOWITZ. The paper. Many items have salvage value today and they are salvaged. However, the demand for these items may decrease at times and during those times the salvage of these items will also decrease.

The return of fiberous materials such as paper into productive use is accomplished at the conservation of substantial acres of timberland. This represents the conservation of depletable resource and the entire subject of allowances and incentives to stimulate the conservation of raw materials must be thoroughly studied.

We strongly urge that the Government carefully explore what it could do, through its own purchasing policies, to stimulate a greater demand for secondary materials. The Government, as the No. 1 purchaser in the Nation, should carefully study what the possible positive effects would be of purchasing specifications which dictate the purchase of goods from secondary sources wherever possible.

Just imagine—if I may deviate for just a moment—just imagine what would happen to the marketing outlook for compost if in the Federal highway program, road shoulders and median strips, if there were some inducement for the use of such secondary materials in the development of these attributes of the Federal highway program.

RECYCLED PAPER

The Government is a great purchaser of paper. If to the extent that it were feasible to purchase paper from secondary mills, if this were done, it would surely greatly improve the continued outlook for secondary paper. And as we improve the outlook, the demand becomes greater and more constant, and stable, and when that happens, I think the free enterprise system will develop all of the technology we need to receive that demand.

Our research people are currently developing a study plan which would establish a large metropolitan city or control city in which we could study the feasibility of returning greater and greater portions of the waste mix back to productive use.

We stated earlier that we have been impressed with this committee's investigations into the problems of waste disposal in the United States. We have also been extremely impressed with the recent research that has been done by other study groups on this subject.

I believe that everyone would agree that every knowledgeable and objective study of the problem has been uniform in its recommenda-

tion that national policy stimulate the greatest possible involvement of free enterprise into the problem-solving process.

There are approximately 15,000 refuse contractors in the United States operating hundreds of thousands of trucks and employing an even larger number of people.

The stereotype of yesterday's garbage man bears little resemblance to the more sophisticated businessmen who have become commonplace in the field today. While there is, and probably always will be, room for improvement, I believe that there is no group in the United States in hotter pursuit of such improvement than the contractors characterized by our membership.

NAS–NAE STUDY

Others who have carefully and objectively studied this field have come to the same conclusion. In the report, "Policies for Solid Waste Management," prepared by the National Academy of Engineering–National Academy of Sciences, this point becomes abundantly clear. Among the final recommendations made in this report, which I, and I believe many others in the field, consider to be probably the most important document ever published on the subject of solid wastes management, are included: (1) The need to foster greater participation of the private sector in the planning and design of new and innovative systems and components for present and future needs, and (2) greater utilization and dissemination of know-how from private waste collection and disposal companies through the medium of conferences and other appropriate information-exchange media.

This report, with which this committee is familiar, makes many salient points concerning the future course of Federal policy in the area of waste management. I would like to touch upon just a few of them at this time.

The Academy's Ad Hoc Committee on Solid Waste Management confirmed the belief that a strong Federal program is needed to carry on the variety of activities beneficial to local, regional, State, and private solid waste management groups. They recommended that there be substantial effort to improve system business management, planning, and manpower training, including coordination with other Federal, State, regional, and local government groups, and with private operators.

The report recommends the expansion of Federal financial aid "risk capital" for development of solid waste management facilities. Such "risk capital" support in the solid waste management field, both public and private, could, the report suggests, underwrite the field-scale testing and demonstration of experimental and bench-scale proven system components.

UTILITY CONCEPTS

The report urges thorough study of the public utility concept in the waste management field, with which we concur wholeheartedly. This concept could, in effect, establish an equation in many areas whereby Government would be called upon to require and enforce stringent operating standards, and to determine direction for waste management systems. The private sector, on the other hand, working in partner-

ship with Government, would be responsible for maintaining optimum service and optimum efficiency in the operation of the system.

There are a growing number of examples today where such an equation of Government and indsutry partnership is producing new levels of operational efficiency.

Furthermore, the utility concept may stimulate greater acceptance of the principle that the generators of waste, be they residential, commercial, or industrial sources, must pay for the service they receive in something that resembles a more sophisticated cost-benefit relationship than that which has existed in the past. This is particularly true in the area of residential waste.

I personally feel that it makes little sense for a family that disposes of four 30-gallon cans of refuse a week to pay the same amount of money that a family that disposes of 15 gallons a week would pay.

Just as we are attuned to paying so much for the gas utilities that we bring into our home, and the electric utilities, I would predict that, in the solid wastes field, the day will come when we will be attuned to paying in proportion to what we generate.

The report entitled, "Solid Waste Management," prepared by Prof. Rolf Eliassen for the Office of Science and Technology, also constitutes a contribution to present planning.

I will not go through the entire report, inasmuch as you have all received a copy of the report and it has been made a part of the record. However, there are a few points which I do think it appropriate to focus attention on at this time.

The report makes the observation that a large portion of research and development should be placed with organizations engaged in the business under study, particularly in the areas of collection and transport, processing technology, and reclamation of wastes for beneficial uses.

The report stresses that constraints preventing support of research of private corporations with capabilities in the solid wastes field should be eliminated. The report stresses that Federal support must be expanded to encourage private industry to develop and demonstrate innovative processes and procedures for solid wastes handling and disposal.

The report states that many of the advancements that have been made in the solid wastes field have resulted from the experiences and development efforts of private industry. Private industry should, by all means, be encouraged to develop new and improved handling and development processes.

And finally, among the final recommendations of the report are the recommendations that private industry be encouraged to develop and demonstrate new technologies to improve solid waste management, to stimulate salvage and recovery of materials and resources, and reduce the quantity of solid wastes generated.

I have had the opportunity of meeting with interested groups all over the United States on the subject of solid wastes management. In fact, you and I met with such a group not too long ago, in Louisville, Ky.

Senator Boggs. I was happy to be there with you.

Mr. Gershowitz. Now, whether these travels have taken me to university seminars, to regional association meetings, or to study groups

with public officials and private agencies alike, we have repeatedly articulated our support for most of the provisions of the bill before us.

In many instances, we have encouraged the strengthening of this legislation. We have written to both the President and to the Secretary of Health, Education, and Welfare urging that they rethink their former opposition to certain portions of the bill, including the Boggs amendment.

However, we have observed concern, and we have expressed concern, over the construction grants articulated in S. 2005. The concern expressed over these provisions is as prevalent in the public sector as in the private sector, as you heard a few moments ago.

CONSTRUCTION GRANTS

Basically, this concern has centered on the following points. First, that the construction grant concept does not appear to be responsive or cognizant of the role of private enterprise in the solid waste management field.

Because the construction grant concept would appear to many to be an appropriate tool in tackling the problems of air and water pollution, it does not necessarily stand to reason that the same would hold true in dealing with the problems of solid waste management.

Much of the capability, much of the manpower, much of the equipment, and an enormous portion of the expertise is in the hands of private enterprise. A Federal program to stimulate capital improvement must be designed to stimulate improvements in both the public and private sectors. To devote attention to one area while ignoring the other would be an inadvertent regressive step.

An example of the work being done by NSWMA members is a potentially exciting development by one of our member companies, Fiber Process, Inc., of Piqua, Ohio. This company has a patent pending on a process that may well solve one of the tackiest of waste disposal problems.

Two compounds generated by the upholstery manufacturing industry and the cable and wire manufacturing industry are polyvinyl chloride and high and low density polyethylene. Last year American industry produced 405 million pounds of polyethylene wire and cable, and it is estimated that by 1975 industry will produce 643 million pounds of polyethylene wire and cable.

In 1969, 990 million pounds of polyvinyl chloride were produced for automobile upholstery and wire and cable, and by 1975 a projected 1,937 million pounds of polyvinyl chloride will be produced for these industries.

If we counted all industry producing these two compounds, we could increase the production of polyethylene wire and cable more than a dozenfold in these projections, and you could increase the production of polyvinyl chloride three or four fold.

These industries generate polyethelene and polyvinyl chloride wastes at a rate of about 15 percent of total production. This meant that during 1969 alone, 140 to 209 million pounds of automobile upholstery and wire and cable were relegated to landfill. Burning is impossible because the high corrosive acid content yields dense black smoke which is toxic in nature.

One manufacturer of upholstery with whom the NSWMA member we are discussing has done considerable work accounts for 16 percent of the total U.S. output. This manufacturer sends 40,000 pounds of polyvinyl chloride and cotton waste to the dump every day.

By recycling the same polyvinyl chloride compound and by eliminating the cost of solid waste disposal, this manufacturer will save an estimated $1,752,000 per year.

At this point in time, these people have constructed and have in operation a plant for pilot research. They have completed engineering plans for a larger facility, with a 15 million pound annual capacity.

The corporation's objective is to construct operating plants in the geographical centers of manufacturers in order to process and return their waste materials nationally as they are currently doing in their pilot research.

If I may, I would like to illustrate what may have been a lot of confusing verbiage.

This is an example of the polyvinyl chloride with cotton backing that is used in the routine manufacture of automobile upholstery. These are the scraps * * * the waste materials. In this process, 40,000 pounds a day from one plant are sent to a dump.

The member company that I have been describing has developed a process which automatically strips the polyvinyl chloride from the upholstery and the cotton backing. This can be put back into use, this can be rechanneled back into use, with very little dissipation of the viability of the compound, and at a cost that is economically attractive.

Now, this is still in pilot. This is in pilot testing, but there is great enthusiasm for the possibility of bringing this back.

In the production of cable, enormous quantities of these scraps are relegated to landfill every day. The copper inside of this, of course, is very valuable, if you can collect it in large enough samples.

The same process strips the polyethelene, and returns it to this pellet form.

Senator Boggs. Does it separate the metal out?

Mr. Gershowitz. Well, yes. I will get to that in just a moment.

This is recycled back into the manufacture of this housing that you see on the cable, here.

The metal is automatically stripped, these are just small samples, but automatically stripped, and in great quantity they have great value for recycling back into the mill process.

When those steps are done, in tests, this is all that is left. At this point in time, this can't be used, but we are returning to the landfill, or we are sending to the landfill, this, instead of these materials here.

We mention this only as an example.

Senator Boggs. Do you send it in that form, that fine, shredded form?

Mr. Gershowitz. That is correct. This is exactly as it will be delivered.

COMPACTION

Another example of, I think, forward-thinking research that is taking place in this field today, involves new concepts of compaction.

This is routine municipal refuse, and forgive me for bringing it to the dais to you.

This concept of compaction here compacts at a ratio of around 18 to 1. This would form a column that would be 18 feet high. It is compacted to this size here. There is no difference between the two, except that this appears to have a higher paper content.

Senator Boggs. What happens after this?

Mr. Gershowitz. Well, right now this would be landfilled. This would be landfilled but we would be landfilling this much instead of something 18 times this volume.

Now, this concept, this process here, which is manufactured by Seneca Falls Machine, in New York, is the mil-pac system. They began their marketing venture 1 year ago, in January of 1969, and this is a developing process. They don't feel that they have solved all of the problems, but that they have achieved a great advancement in compaction goes without saying.

There are, to date, 20 installations using this * * * one hospital, three schools, and the rest are in large high-rise apartment buildings, where refuse that would ordinarily be dropped down a chute would be dropped down the same chute, into a unit that would produce this instead of huge containers of refuse for relegation to the landfill.

We think this process has potential in the future, and it is, as I said, a developing process.

Mr. Vanderveld, who is very research-oriented, is experimenting with other applications of this, and as I return to the table he might want to comment on that.

Senator Cooper. May I ask a question?

Senator Boggs. We are happy to have Senator Cooper here. He is a member of this subcommittee and the ranking Republican member of the full committee. Senator, you have been very attentive to these hearings, and we appreciate it.

Senator Cooper. I haven't been very good this morning.

Senator Boggs. Yes, you have. You are great.

Senator Cooper. Just asking, would this equipment be installed at the dump, or is it used in various areas of the city or community?

Mr. Gershowitz. Currently, this equipment is being used at the source of generation. It would be at a high-rise building, it would be in a hospital, so that the collector, instead of picking up perhaps 40 cubic yards of refuse, would pick up something in greater compaction.

In addition to the tremendous saving of space in landfill, the potential for this concept is that your cost of transport, the efficiency, is increased enormously.

But there are experimental concepts that would take this from the source of generation and put it into the materials handling process, and Mr. Vanderveld is doing some experimentation there.

Senator Boggs. On that point, Senator Cooper, if I may: Does there have to be a separation at the hospital of the materials sent down?

Mr. Gershowitz. No.

Mr. Vanderveld. It is mixed material.

Mr. Gershowitz. This is thoroughly mixed.

Senator Boggs. I see.

Senator Cooper. What is the weight?

Senator Boggs. It is light.

Senator Cooper. You say the equipment has not been perfected yet?

Mr. Gershowitz. To the extent that there are successful installa-

tions, the prototype models have been perfected, but the company sees the opportunity to achieve still greater improvements, and they are doing so.

Senator COOPER. Do you have any idea of what the volume is to be handled by the machines now, the machines that have been built?

Mr. GERSHOWITZ. I can obtain that information within the next 24 hours and supply it to the committee.

Senator BOGGS. Make it available for the record, please.

Mr. GERSHOWITZ. Yes.

(Information subsequently furnished follows:)

The Mil-Pac System will handle 15 cubic yards per hour. It is estimated that there are between 150 and 250 pounds of mixed refuse in each cubic yard.

Senator COOPER. Is it very expensive equipment? I suppose from the point of development it is just now.

Mr. GERSHOWITZ. That is probably relative. I have a good idea of what some installations have cost, but I would rather get that information from the manufacturer and supply it more accurately.

(Mr. Gershowitz later supplied the following:)

The Mil-Pac System costs $10,990 FOB Mountainside, New Jersey. The cost for installation ranges from $300 upward.

Senator BOGGS. What is the biological state of this? Is there a heavy odor?

Mr. GERSHOWITZ. Well, this is alive; it is bacterially alive. If we opened it, there would be some odor.

Senator BOGGS. It is sealed up as part of the process?

Mr. GERSHOWITZ. Yes, the moistures present in the wastes are the only ingredients. There is no additive. There is nothing synthetic added to create the brick. It is the pressure and the moisture present in municipal refuse that makes this possible.

Senator BOGGS. Thank you.

Mr. VANDERVELD. I might add, Senator, that one further development that we have been giving a great deal of consideration to is the idea of mobilizing a unit like this, to put out on the street.

Senator BOGGS. Yes.

Mr. VANDERVELD. And have this compaction out on the street.

Senator BOGGS. Instead of a standard collection vehicle, you have one with a unit like this on it?

Mr. VANDERVELD. Right. Which should, if it works, greatly improve the collection equipment that is now used.

Senator BOGGS. That seems to be a good idea to me.

Mr. VANDERVELD. Senator Cooper asked the question about volume, and what volume could be handled with it, and at this stage, there doesn't seem to be much limitation. It is a matter of sizing of equipment. It is quite flexible equipment.

Senator BOGGS. What kind of personnel does it take to operate this unit in a big hospital?

Mr. VANDERVELD. This is highly automated, highly automated.

Senator BOGGS. Very good.

Mr. GERSHOWITZ. During the Jacksonville field hearing, which I believe was the second of the field hearings that have been conducted on S. 2005, you heard from one witness whose company has invested, as we said before, millions of dollars in private capital in developing

an operational concept in one city, Houston, Tex., that is extremely compatible with the objectives of this bill.

This is the company that Mr. Vanderveld here has an affiliation with, the company that presented these samples.

This company represents what we consider to be an investment in the future. They have developed technology which includes a complete and automatic separation system for segregating various components of the waste mix, and they have worked hard to solve the marketing problems of resource recovery.

We are not prepared to say that this company has solved all the problems there are to be solved. Certainly there are still hurdles before them. But every observer, whether in the public or private sector, recognizes that there is a demand for efficiency and a requirement for eventual profit that has been responsible for this company's contributions to date, and that it is these attributes of our free enterprise system that will make resource recovery work in the United States, if it has any chance of succeeding at all.

PRIVATE CAPITAL

Victor Brown, president of Metropolitan Waste Conversion and a member of the National Solid Wastes Management Association, expressed great concern in Jacksonville that if the thrust of Federal policy in stimulating capital improvements in the solid wastes field evolved around the construction grants concept as currently envisioned in S. 2005, that the interest of private capital in this field would dry up quickly.

He discussed a concept whereby Federal guarantees would be applied to loans made to private contractors who had been extended valid contracts, and whose proposals had been approved by the municipalities concerned.

Senator Randolph, at the conclusion of Mr. Brown's testimony, stated:

> Another important item that you bring to the subcommittee's attention is a matter of a possible guaranteed loan for the construction of disposal facilities, and I want to say to you that this is a matter which we are thinking about. We are studying this and alternative methods by which this can be done.

I strongly urge this subcommittee to continue its study into such alternative methods of stimulating capital improvements.

Other recommendations that we consider to be worthy of serious study might involve the formation of a federally chartered corporation similar to the Federal National Mortgage Asssociation, which would provide for waste disposal construction the type of incentive used to stimulate housing construction, or an SBA-type facility which would administer funds earmarked exclusively for expansion and improvement of the solid wastes industry—funds which would be returned to the Government with interest.

Risk capital could be made directly available to private concerns who have submitted proposals deemed worthy of additional study. These funds could also be returned to the Government with interest in those instances where risk capital produced a new concept which later became operational. In effect, such demonstration money would convert to loan money.

As I stated earlier, the concern over the possible effects of construction grants has been articulated as widely in the public sector as in the private sector. Public officials and public servants have told me that they are concerned that construction grants in the solid wastes field would tie financing to a concept that would always have us playing catch-up ball, but we would never quite catch up, let alone get ahead of the problem.

John E. Vogt, chief of the division of engineering of the Department of Public Health for the State of Michigan, a well-respected public official, also expressed opposition to construction grant.

Among the reaons he gave was a concern that the grant program would not recognize private operators, and that construction grants could wind up being an inadvertent anchor to progress. He made the point that private enterprise has made significant advances in Michigan, and has played a significant role in the problem-solving process.

"A program of construction grants," he said, "only to units of government would surely stiffle initiative on the part of private enterprise from continuing to develop workable programs and adequate facilities."

He also expressed concern that as soon as a faint light appears on the horizon that Federal grant assistance may possibly be forthcoming, local initiative too often comes to a halt, irresponsive of whether such grants are needed or not. We have already seen examples in this Congress of how sensitive the grant apparatus can be to the political or economic pressures that may be prevalent at any point in time or in any given administration.

Senator Eagleton, who did such a fine job of chairing the Detroit field hearing, queried other local government representatives on Mr. Vogt's concern with construction grants being unresponsive to the role of private enterprise in the solid wastes management field.

Senator Eagleton asked the Wayne County supervisor, following Mr. Vogt in Detroit, whether or not he felt Federal grant programs would have a deleterious effect on private enterprise. Mr. Tripp responded:

> I think there should be some provision made for utilizing all of the know-how within the segment of the American economy so that some provisions should be made, if a business or concern could enter the field, whether it be from a private concern contracting with a municipality, or a municipal entity, so that we could move forward.

Senator Eagleton asked still another witness who represented the Southeast Michigan Council of Governments whether or not he felt the construction grant program would have an adverse effect on private enterprise.

Mr. Turner replied that while the point was obscure to him, that, "certainly the private sector in general needs to be brought into the partnership approach," he continued, "I would not want to see anything adverse occur that would inhibit the private setcor's unit in these urban type problems or in solid wastes disposal."

Public officials have expressed concern to me that the construction grants concept could well inadvertently penalize those municipalities that wish to work with private contractors in the development and construction of viable waste disposal facilities.

Indeed, we just heard one of the most respected representatives of public administration voice that same concern just a few moments ago.

The National Association of Counties, in their recently published guidelines on solid wastes management, state in their guideline on "Organization" that—

> Local government may choose not to perform all or part of the physical operation of collection and disposal service (stating) that more than half of the solid wastes collection and disposal in the United States is provided by private enterprise.

The guideline continues:

> In some urban areas the large private collection companies may provide better service, maintain better working conditions and safety standards, and can offer higher salaries than do government agencies. Government operations may be less able to adjust to increases in cost or to designing special equipment to service new accounts. If private enterprise is available to do the job and can do so better and more cheaply, local government should limit its activities to regulation.

In an effort to develop as broad a perspective as possible on the subject at hand, I wrote to well-recognized and nationally respected concerns in the field of waste management. Specifically, I wrote to Ralph Stone & Co., Inc., of Los Angeles, Calif., one of the Nation's best-known consulting engineers in the field of waste management, and to Roy F. Weston, well-respected environmental scientists and engineers headquartered in Philadelphia, Pa. We also wrote to Bauer, Sheaffer & McCall, Inc., one of the few management consulting firms specializing in environmental control systems and in the field of solid wastes management.

I told each concern that we would appreciate any comments they had on the proposed legislation in general, and on the construction grants provisions in particular. The replies were as follows:

Ralph Stone & Co., Inc.:

> Thank you for the opportunity to review the subject legislation. We have many years of experience in the solid waste management field and have been impressed with the effectiveness of the private sector's traditional activities in solid wastes collection, disposal and resource reclamation. We believe it is most important that future legislation should provide that private industry be given the full opportunity to participate in research and demonstraion grans.

Roy F. Weston:

> The interaction between public agencies and private enterprise in the management of solid wastes is well established. I know of no area that does not utilize both to some extent. While many public agencies would benefit by the construction grant provision of S. 2005, it is just as apparent that those using private enterprise facilities will not be provided similar benefits. Since solid waste operations do reflect this dual management, it would appear that some mechanism of supporting new facilities for all communities should be considered. Some of the alternate solutions might be revolving, low interest loan funds, loan guarantees for responsible private and public entities, or grants to public agencies and corresponding tax benefits for private enterprise.

Bauer, Sheaffer & McCall, Inc.:

> Thank you for your invitation to comment upon the appropriateness of S. 2005 as an effective legislative tool to provide solutions to our solid wastes problems. I am concerned that the bill will not provide true and responsive assistance to the organizations and enterprises that have shown the greatest efficacy in approach and innovation for upgrading the practices in this field.
>
> The only long-term solution to our environmental problems is to recognize that all abatement efforts will result in some type of solid wastes, and that these wastes are resources out of place. The techniques used to recover and reclaim these

wastes must be planned in the context of their relationships to other sectors of the environment. We must avoid transference of these problem wastes to those sectors, and recycle them to productive sectors of the economy, or channel them to fixed locations, and incorporate them into other resource management efforts.

The efforts of private industry and enterprise have produced most of the viable solid waste management techniques becoming effective in many communities. Plastic sacks, compaction, transfer stations and sanitary landfill economic benefits are typical of the imagination that has been utilized by private enterprise.

That a grant program, which qualifies municipal and public waste management enterprises alone to advance the state of the art would be inconsistent with the attempt to provide an incentive for those organizations which have shown the talent, capacity and willingness to solve these problems in a businesslike and efficient way.

There are methods of techniques for providing these incentives that both protect the public interest and attract private capital.

In summary, we believe that we have an opportunity, through S. 2005, to create Federal policy that could establish 1970 as the year in which we began to turn the corner on the problems of solid wastes management.

If this subcommittee come to grips with the problems of stimulating capital improvements, it should give serious study to incentives which would attract the greatest possible infusion of private investment capital into the field, and avoid funding concepts which will drive private capital out of the field.

R. & D. NEEDS

We believe the Bureau of Solid Waste Management needs additional fiscal resources to increase its research and development efforts in the area of recycling and resource recovery.

We believe strong emphasis should be placed on economic studies as well as—if not instead of—technological studies.

Special attention should be paid to what the Federal Government could do through its purchasing policies to improve the demand for secondary materials.

The Bureau should have the authority and the funds to greatly accelerate its training effort at the operational and the managerial levels. These programs should be geared to both the public and private sectors, and "faculty" should be recruited from both the public and private sectors.

New regulations to allow States to implement certain findings of their planning grant studies will probably be necessary. Specifically, where planning grants call for the creation of regional solid wastes authorities, or the machinery to establish and enforce regulations, additional money may be needed for implementation.

I would like to deviate just for a moment once again from my prepared text, to make an observation.

Everyone who studies the problem of waste management agrees that we must stimulate the greatest possible infusion of all of the capability, be it public or private, into the problem-solving process.

I think we have an opportunity here to create impetus to do more than pay lipservice to this very important and vital concept. Specifically, in S. 2005, under the planning grants provision on page 6, section C, paragraph (c), the current paragraph—paragraph (c)—reads as follows, and I am going to recommend consideration of a change. It reads:

The Secretary shall make a grant under this section only if he finds that there is satisfactory assurance that the planning of solid waste disposal will be coordinated, so far as practicable, with and not duplicative of other related State, interstate, regional, and local planning activities, including those financed in part with funds pursuant to Section 701 of the Housing Act of 1954.

I would like to recommend consideration of this change:

The Secretary shall make a grant under this section only if he finds that there is satisfactory assurance that the planning of solid waste disposal will be coordinated, so far as practicable, with and not duplicative of other related State, interstate, regional and local planning activities, including those financed in part with funds pursuant to Section 701 of the Housing Act of 1954, and that the planning will provide, where possible, for the utilization of the capabilities of private enterprise, where available, and where such capability is consistent with the objectives of the community.

Continuing in our recomendations of what we think are required improvements in the Bureau of Solid Waste Management's activities, we believe a thoroughly automated information center, the data of which would be available to both public and private agencies, should be considered essential. The amount required to convert the existing Solid Wastes Information Retrieval System to a thoroughly automated information center should be determined and made available.

Working in close cooperation with the private sector, the Government is in a position to establish guidelines for proper operation of solid waste management facilities. Quite possibly it would be advantageous to formalize, through S. 2005, the Industry-Government Solid Wastes Liaison Council, which heretofore has functioned informally, but most effectively.

FEDERAL FACILITIES

Finally, the Congress should assure that proper solid waste management practices become mandatory in Federal facilities.

It is estimated that we look to private enterprise for the management of between 50 and 66⅔ percent of all the waste handled in the United States today. The industry, through the National Solid Wastes Management Association, has committed itself to the principal of public-private partnership in the field of solid wastes management.

The Federal Government, through the Bureau of Solid Waste Management, has enthusiastically participated in the activities of the Government-Industry Solid Wastes Liaison Council.

The action of the American Public Works Association and the National Solid Wastes Management Association in the passage of a joint resolution establishing the machinery for, and recognizing the necessity of, working jointly and cooperatively whenever such efforts can appropriately contribute to the solutions to solid waste management problems also reflects the vital necessity of the partnership effort to problem solving in this field.

CALIFORNIA PLAN

California, which I believe would be considered by most observers to be among the most progressive States in the Nation in their understanding of the waste management problem and from the steps they have taken to plan for the future, has just released an extremely fine document entitled, "A Program Plan For Solid Waste Management In California." The 37-page report makes many recommendations and

draws numerous conclusions for dealing with the solid wastes problems in California. I would like to touch on just a few of them.

One of the key conclusions of the report is: "It is imperative that the State assume leadership in coping with these problems by initiating an effective program of solid waste management with the involvement of local governments and participation by private industry."

In delineating the responsibilities of private industry, the report states that to be effective, a statewide program of solid wastes management must be cognizant of the capabilities and resources of the private sector.

The final "responsibility" states that industry must keep pace with technical developments and related knowledge in the field of solid wastes management and utilize the best available information toward providing the most efficient, effective, and economical service to the public.

At the same time, the report states:

> Government agencies should recognize the capabilities of the private sector in achieving solutions to solid wastes management problems, and should utilize these capabilities to the fullest practicable extent.

Surely the Federal role should do no less.

We urge that this subcommittee and the Congress assure through S. 2005 the greatest possible encouragement of the developing partnership between private enterprise and public administration in the field of solid wastes management.

Senator BOGGS. Mr. Gershowitz, that was a fine and valuable presentation. We were glad to have Mr. Vanderveld for the contributions he has made.

As I said before, we are glad Senator Cooper could be with us for a while. Senator Dole is another valuable member of the committee; I am glad he is here.

Senator Cooper, would you care to start the questioning?

Senator COOPER. I was going to say I came in when Mr. Gershowitz was testifying, but I have read your statement, I have been catching up—in fact, I got ahead of you once or twice—but it is a very interesting statement, and confidentially, I feel like a pupil here listening to you, and I have learned a great deal from it.

It seems to me your association has done a great deal of work, and you should be commended for the work you have done.

May I ask, do you get any grant from the Federal Government now, or does this association have any grant for its work?

Mr. GERSHOWITZ. Yes, we do, sir. We have a 3-year, $250,000 grant from the Federal Government to conduct a thorough and totally comprehensive study of the total contributions and potential of the private sector, and this will be the most comprehensive study of private enterprise ever undertaken in the field of solid waste management.

Senator COOPER. Is the work your organization does chiefly one of collation, or bringing together the studies that private enterprise groups have made, and municipal groups have made, and does your staff have any independent research people, engineers, scientific people, who work on these problems?

Mr. GERSHOWITZ. The association currently has working relation-

ships with research consultants, who work on a retainer basis with the association.

We hope to establish in June, at our forthcoming annual meeting, a Division of Technical Assistance, whereby full-time technical and engineering talent will be made available to all of our members, and to the public instrumentalities which they serve, as an adjunct of our association's activity.

Also, as a key function for our membership, a key member service, we attempt to bring to the membership a continuing program of technical programing.

Senator COOPER. I note that you say that such management and work as is now being done in this field, about 66⅔ percent is now being done in the field of private enterprise.

In that field, are the large industries or small industries working on equipment to dispose of their own wastes, or is it those who are developing equipment to dispose of wastes any place?

How would you evaluate the work that is being done? Do you know if some of the large industries are working on equipment, or seeking equipment, to manage their own wastes?

Mr. GERSHOWITZ. Yes, sir. There are industries and industrial concerns that are totally self-contained. They collect their own wastes, and they dispose of their own wastes.

Recently, during the Detroit field hearing, we had an opportunity to show members of the staff of this subcommittee how at least one of the largest automobile manufacturers had brought in one of the more progressive private contractors, and jointly worked together to solve the problem.

This one industry felt that the trend in industry would be working relationships with imaginative specialists in the waste management field. Their feeling was that industry should not attempt to develop a new area of expertise unrelated to their primary function, and they felt that—and this you will see in the proceedings of the Detroit field hearings as a panel from the automobile industry—they felt that the greatest benefit to industry would be to develop close working relationships with imaginative and progressive waste management firms, who could devote the time and attention to designing specific solutions to their specific and unique problems, and in effect contracting these solutions out.

Senator COOPER. Thank you.

I note, it seems to me the chief theme of your recommendation is directed to this committee and the Congress not to rely so much on the public sector, municipalities, grants for construction to them, but we should direct more attention to private enterprise. You have made a very fine argument for that.

Would you say, looking to the bills before us, which call for construction grants to municipalities——

Mr. GERSHOWITZ. I am sorry, sir. I did not hear the question.

CONSTRUCTION GRANTS

Senator COOPER. I say, the bills that you have spoken of, that are before us, provide for construction grants to municipalities: Is the state of the art such that you think the commencement of grants to

municipalities for construction of waste disposal facilities is practical now?

Mr. GERSHOWITZ. That was almost a two-part question, and I will try to give it a two-part answer.

Senator COOPER. Or a three-part.

Mr. GERSHOWITZ. First, I would not want to imply in my testimony that our position is that more of the responsibility should be turned over to private enterprise at the cost of the public operations that are doing extremely fine jobs, and there are certainly many that are.

The point that—the key point that I wanted to make is that surely we should do nothing to inadvertently penalize those public instrumentalities that are working with the private sector from utilizing the private sector in the future, merely because the funding apparatus would penalize them.

I think there is something to be said for the concern that was expressed back in October at these hearings, that in relying totally on a grant concept, we would cast in concrete disposal systems that 3 years from now all of us would consider to be obsolete, that more flexible financing, and again, I think, private capital is far more flexible, that it would be flexible enough to change as technology changed, would make a lot more sense.

I personally believe—and I am not really speaking for the association, here, but as an individual observer—I personally believe that the real answer to funding in the solid waste field is going to come when we attach the same sophistication to funding on solid wastes that we do in fundng in every other utility area.

USER FEES

When a community extracts from a business or commercial establishment or a home a cost for removing refuse in some proportion to the refuse removed, we are going to have the funds to do the necessary improving that has to be done.

Right now, in most public jurisdictions, refuse is paid for out of the property tax. There is nothing more unpopular in the world than raising the property tax, so you don't raise it, if you can avoid it, and you have bid situations that are predicated on fitting that property tax.

You have homes that pay $3.50 a month for refuse collection, whether they throw out refuse to fill one 30-gallon can or 10 30-gallon cans. That is nonsensical. Some day there will be, and the sooner the better, a cost-benefit relationship to how we charge, and how we pay for solid wastes, and until we do that, until we do that, much of other discussion is going to be purely academic.

FEDERAL FACILITIES

Senator COOPER. I noted your presentation on 18, which I think is very good, "The Congress should assume that the proper solid waste management practice would become mandatory in Federal facilities."

Mr. GERSHOWITZ. Yes, sir.

Senator COOPER. The President has applied that principle to a municipal sewage plant. I think that is good.

I have a practical question I direct to you. I have received letters from a small community in my State, which is Kentucky, that under the Air Quality Act, of course, you are concerned with pollution from open dumps, burnings, and have to go to landfills, but most of these communities say they do not have sufficient money to do that, and I don't know whether this construction grant would——

I suppose it would reach them, too. Is that the situation?

Senator Boggs. It could reach them, but I don't know that it would.

SMALL COMMUNITIES

Senator Cooper. Have you given thought, has your association given thought to these smaller communities, or large communities, that have been doing the open dump burning?

Mr. Gershowitz. I think that when we attune ourselves to spreading the cost, to spreading the cost of collection and disposal, more equitably over the entire tax base, in something that represents a utility concept, just as you have the money to build new electric powerplants, and new natural gas facilities, as the community needs them, through an appropriate rate structure, I think you are going to have vast improvements in this field.

I am not totally sympathetic to the concept of the tax on the cost of manufacture to pay for the costs of disposal. I have great fear that we will create a pay-as-you-pollute concept whereby the cost of disposal will be added to the cost of the product, which is added to the cost the consumer pays, so we are paying for the disposal, but we are not doing anything to impede the proliferation of these materials. I think it was former Vice President Humphrey who coined the phrase, "Pay as you pollute."

We may find the money to get rid of the materials, but we may do nothing at all to halt the proliferation.

Senator Cooper. Thank you.

Senator Boggs. Thank you very much, Senator Cooper.

Senator Dole?

Senator Dole. Just briefly, I am in the same position as Senator Cooper, of arriving late, and I certainly won't take the time of the chairman, but I have read the statement, and I agree with Senator Cooper and Senator Boggs, it is an excellent statement.

You made one specific recommendation, at least since I came in, and I am not certain I understand the full impact of it. Could you give me a little more explanation of the recommendation?

Mr. Gershowitz. Yes, sir.

I think it would be in everyone's best interests, if in some way the legislation reflected the intent of the Congress.

If the intent of the Congress was simply that the capability of private enterprise should be used where that capability is available, and consistent with the goals of this bill, than I feel that the provision where I recommended the insertion of that language would do little more than declare the intent of the subcommittee and the Congress.

But if we are going to plan, if we are going to have grants for planning, regional planning grants, one of the things in the charge given when those grants are let is that an assessment be made of what the private sector's contribution could be in that area, and if there is a

contribution to be made, surely it is in the best interests of the whole program of waste management to utilize that capability.

Senator DOLE. I think on page 6 there is another interesting observation, in fact recommendation, that since the Government is the No. 1 purchaser in the Nation, that perhaps we should look to the Government to take the lead in purchasing goods from secondary sources.

Now, has there been any Government action on this area that you are aware of? Have there been any efforts made by any Government agency to do this?

Mr. GERSHOWITZ. None that I am aware of. I do not know of the recommendation having been made. Possibly it has been.

I know of no Government program to specify purchasing requirements which would stimulate a greater demand for secondary material.

Senator DOLE. But you are certain there are goods that could be purchased by Government, through your own research and your own studies, that would stimulate this activity?

Mr. GERSHOWITZ. Absolutely. And two areas immediately would be both in the area of paper.

The Government must purchase a lot of paper. They have the option of buying from primary or secondary mills. I am not saying that the Government must begin buying, or should begin buying from secondary mills. It must first determine what the adverse impact might be on the primary mills. But it is worthy of considerable study, because it would make an enormous difference in the demand for that material.

This is especially true, I think, in the area of compost. Were the product to become economically marketable, were it possible to pay—and I am just giving an example off the top of my head—to pay an extra 1 percent contribution to a State that used this peat-like compost in part of its shoulder development or median strip development in the Federal highway program, you would certainly create a completely new picture on the outlook for this particular product, as a single example.

Right now, the market for compost is yourself, and me, when we go to the store, and there are synthetics that generally you are going to buy. It is less expensive.

The technology has continuously reduced the cost of this compost more and more, but we are not prepared to say across the board that it is the cheapest soil enrichener on the market today.

Senator DOLE. I think you touched on a general question I am certain there has been some testimony on.

In our desire to solve the problem of disposal of waste, what impact do we have on the primary source? I mean, are we going to destroy someone in the process of solving a second problem, the disposal problem? Are you exploring that possibility, or that area?

NATIONAL MATERIALS POLICY COMMISSION

Mr. GERSHOWITZ. No, I can't say at this point in time. We have commissioned our research consultants to prepare a proposal that would make determinations in that area, but I do believe that would be one of the great attributes of the Boggs amendment to this piece of legislation.

I personally feel that it should not be an 18-month commission, but a permanent adjunct of government to constantly assess the inventory of raw materials, and where there is room for a greater infusion of secondary materials back into the mix.

I don't think you need a 1-year study to come up with answers, because the findings may be completely different 6 years from now, or 10 years from now. That is what I think the great value of what Senator Boggs has proposed is. The continuing commission, to constantly look at this program.

Senator DOLE. Thank you, Mr. Chairman.

Senator BOGGS. Thank you for your questions, Senator Dole. Mr. Gershowitz, I want to thank you for your testimony. I appreciate your reference to amendment No. 153, which several of us have cosponsored to establish a National Commission on Materials Policy. Your views on that are most appreciated.

In your statement you said, "We believe strong emphasis should be placed on economic studies." Are there any economic studies going on now that are financed by the Government?

Mr. GERSHOWITZ. I am not certain.

Senator BOGGS. I am not certain, either.

Mr. GERSHOWITZ. I am thinking primarily in terms of what the Bureau of Mines has been doing, in their recommendation and research, and I think there may be some, but I think that up until now the thrust has been to develop new technology. I believe, very firmly, develop the economics, show that there is a profit at the end of the road, and I think our system will develop all the technology we need.

Senator BOGGS. There are many other questions we could ask. I have several. But in view of the time—we have other witnesses—I am going to thank you very much for appearing. We, of course, welcome any additional materials you are able to provide that we consider pertinent to these hearings. Mr. Gershowitz has provided us with the Sanitary Landfill Agreement and Recommended Standards which was jointly prepared by his Association and the Bureau of Solid Waste Management of HEW. We will include it in the record at this point.

(Report referred to follows:)

1997

SANITARY LANDFILL OPERATION AGREEMENT

AND

RECOMMENDED STANDARDS

FOR

SANITARY LANDFILL

DESIGN AND CONSTRUCTION

This publication (SW-20ts) was jointly prepared by

The National Solid Wastes Management Association
The Bureau of Solid Waste Management

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Consumer Protection and Environmental Health Service
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1969

FOREWORD

THE SANITARY LANDFILL is an acceptable and recommended method for the ultimate disposal of solid wastes. This method is often maligned by being mistaken for the open burning dumps that disfigure the countryside of the United States, despite the fact that the sanitary landfill is an engineering project requiring sound planning and careful construction with detailed plans, specifications, and adequate agreements to assure proper construction.

Both public and private organizations are deeply involved in the management of solid wastes, by necessity, since the efforts of both groups are needed to cope with the increasingly complex problems of solid waste management. Where government chooses to utilize private enterprise as an integral part of a total management system, mutually agreeable arrangements must be developed to protect both.

The model sanitary landfill agreement and recommended standards were developed jointly by the National Solid Wastes Management Association and the Bureau of Solid Waste Management for the use of government and industry in their negotiations. To this material has been appended *An Accounting System for Sanitary Landfill Operations*, a Public Health Service Publication (No. 2007). Because of the nature of any model, individuals utilizing this model may have to modify the content to fit their particular project. The purposes of the model agreement and recommended standards are to provide the necessary framework to assure satisfactory arrangements between government and industry; and proper design and construction of the sanitary landfill.

--RICHARD D. VAUGHAN, *Director*
Bureau of Solid Waste Management

1999

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EXHIBIT A: INSTRUCTIONS TO BIDDERS

Suggested Provisions to be Included in the Instructions to Bidders Distributed by The City or Other Governmental Agency to Prospective Bidders

1. Intent and Purpose. It is the intent and purpose of this contract on which bids are sought, to assure the healthful and aesthetic operation of a sanitary landfill, at one or more sites, for the disposal of solid waste originating within the City or for which the City has accepted responsibility.

2. Qualifications of Bidders. All bidders hereunder must furnish satisfactory evidence to the City that they have operated or are presently operating a sanitary landfill of the type and capacity involved here and that they have successfully operated a sanitary landfill of the type required by the specifications for a period of time that will insure experience in operation under all weather conditions prevailing in this area, or they must show sufficient experience in a comparable field, such as excavation and grading, to demonstrate their ability to comply with the requirements of this contract.

Bidders with the experience outlined above may list all completed or existing sanitary landfill sites which they have operated, or are now operating, all of which may be subject to inspection by personnel of the City in order to determine the eligibility of the bidder selected.

In the event that bidders are not available with satisfactory sanitary landfill experience the contract may be awarded to a bidder with sufficient experience in a related field, as indicated above, in which case he shall employ the services of consultants who are qualified to assist in the engineering, planning, and supervision of the operations contemplated in the specifications. The names and experience of all such consultants shall be listed by all bidders without sanitary landfill experience.

All bidders shall supply detailed inventories of their equipment, showing each type of same by model, year of manufacture, time used as of the date of the inventory and all accessories for each piece of equipment so listed. All leased equipment shall be separately listed, showing the time remaining on each leased machine and options of renewal where applicable.

All bidders shall be required to demonstrate to the satisfaction of the City that they have adequate financial resources, experienced personnel, and expertise to perform the services required by the specifications and shall furnish such information and/or proof of these qualifications. No agreement (contract) will be awarded to any bidder, who, as determined by the City, is not qualified to perform satisfactory service due to an unsatisfactory record or inadequate experience, or who lacks the necessary capital, organization and equipment to conduct and complete the services in strict accordance with the specifications.

All bidders shall be held to comply with the attached legislation, including the Solid Waste Disposal Act of the State of _____, the rules and regulations promulgated thereunder, the applicable ordinances, rules and regulations of the City, the ordinances, rules and regulations of the County(ies) of _____, and the Recommended Standards for Sanitary Landfill Operations, hereinafter referred to as the Standards. The contractor shall meet all requirements of the above legislation, regulations and Standards including any subsequent changes, copies of which are to be supplied to the contractor by the City.

3. Compensation. Payment will be by ton, cubic yard or load received for disposal as set forth in a schedule attached to the agreement. While exact quantities of solid waste per contract year cannot be specified, a minimum contract year compensation will be paid in the sum of $_____ based on an estimated weight per volume of _____ ton per yard.

4. Inspection of Site. All bidders shall visit the site of the proposed work and familiarize themselves with the work, including all requirements of the plan. Submission of bid shall be deemed conclusive by the City that site visit has been made and shall constitute a waiver of all claims of error in bid, withdrawal of bid or payment of extras, or any combination thereof, under the executed contract, or any revision thereof.

5. Bonds. A performance bond will be required of the successful bidder, to be executed by a surety company licensed to do business in this State and in an amount equal to 50 percent of the estimated payment of the first year of the contract and 50 percent of the compensation paid in the past year for each succeeding year. Said bond shall be obtained within 10 days of the execution of the contract.

A payment bond will be required of the successful bidder, to be executed by a surety company licensed to do business in this State, in an amount to be determined by the City, conditioned to guarantee the payment of all wages, materials and supplies, including all insurance premiums used by the contractor in fulfilling the terms of the contract. Insurance premiums include, but are not limited to, workmen's compensation, liability insurance and bond premiums. It is estimated that such bond will not exceed the sums expended for wages, materials and supplies and insurance premiums expended in one quarter of operation.

Bid Bond. All bidders shall furnish a bid bond executed by a surety company licensed to do business in this State, binding itself to indemnify the City against any loss, not to exceed the sum of the bond, due to the failure of a bidder to execute the agreement. Said bond shall be in the sum of $_____.

A certified check, payable to the City, or other personal property acceptable to the City, may be deposited in lieu of a bid bond. In such event, the three low bidders' security will be held until the execution of the agreement, at which time said security shall be returned to the respective owners.

6. Indemnity Clause. An indemnity clause, or alternatively, liability insurance, will be required of the successful bidder, in which the successful bidder will be required to hold harmless and indemnify the City from all claims, legal or equitable, including court costs and reasonable attorney's fees, arising out of the operation of the sanitary landfill site.

7. Insurance. Motor vehicle limits for property damage and personal injury may be set by the City. Proof of all required insurance and policy limits must be shown by certificates of insurance, issued to the City by the respective companies and each policy shall have a minimum cancellation period of not less than ten days, to become effective after delivery, in writing, to the City at the address shown in the agreement.

While no minimum policy period will be required by the City, it is expected that long term policies will be utilized in order to obtain lower premiums. Insurance shall include all documents issued by all insurance companies licensed to do business in this State.

8. List of Officers and Stockholders. Bidders shall submit a list of all officers and of all stockholders who own over 10 percent of their respective companies.

EXHIBIT B: MODEL SANITARY LANDFILL OPERATION AGREEMENT

This agreement made and entered into this _____ day of 19____, by and between _____ (a City or a Village, County, etc.) organized under the laws of the State of _____, hereinafter referred to as the City (Village, etc.) and _____ (a Corporation or a Partnership, Proprietorship, etc.) organized under the laws of the State of _____ and having its principal place of business at _____ hereinafter referred to as the Contractor.

WITNESSETH:

Whereas, the Contractor is qualified to operate a sanitary landfill for the disposal of solid waste in accordance with the Instructions to Bidders; and

Whereas, the City desires the Contractor to operate the area designated to be used for a sanitary landfill operation;

Now therefore, in consideration of the mutual covenants and agreements contained herein, and of the consideration paid by the City to the Contractor, as hereinafter set forth, the City and the Contractor hereby agree as follows:

1. Disposal Site. All solid waste shall be disposed of at the location(s) specified herein, same being the property under the control of the City (or Contractor), and more specifically described as follows:

[Insert Legal Description]

(It should be recognized that the site may be provided either by the local government authority or the contractor).

2. Materials to be Disposed of. The Contractor shall accept all solid waste created within the jurisdiction of the City or that for which the City has accepted responsibility upon payment of fees as scheduled. Toxic, volatile, and other hazardous materials must be clearly identified to allow for special precautions to be taken during the disposal operation.

3. Inspection. The City may make inspections of the sanitary landfill site through designated personnel during business hours.

4. Operation of Site. The Contractor shall have the exclusive right and responsibility for the operation of the disposal site in accordance with the provisions of this Agreement for the term of this Agreement and any extension thereof.

5. Compliance with Laws. The Contractor shall operate the disposal site in compliance with all applicable laws, ordinances and regulations; including the Solid Waste Disposal Act of the State of _____, the rules and regulations of the State Board of Health and the City and/or County Board of Health, and the Ordinances of the City and/or County, copies of each being attached hereto and are hereby made a part of this Agreement. Copies of all such laws, ordinances and regulations shall be furnished to the Contractor by the City and shall include new legislation and amendments to existing legislation.

In the event that there are no statutes and/or ordinances regulating the disposal of wastes, then the Contractor shall design and operate said disposal site in full compliance with the Recommended Standards for Sanitary Landfill Operation, or revisions thereof (Exhibit C attached). Said Standards for Sanitary Landfill Operation shall be revised by the City only, but the Contractor is not hereby precluded from submitting written recommendations thereon to the City.

6. Labor and Equipment. The Contractor shall furnish all labor, tools and equipment necessary for the operation of the site and shall be responsible for all required maintenance thereof. Supervision by an experienced and qualified person shall be provided at all times the sanitary landfill is open for use or operation.

7. Service Facilities. The Contractor shall construct and maintain, at his expense, any facilities, improvements and buildings within the site necessary for the operation of the site.

([To be included if the site is City property:] The use of such land within the site shall be made available to the Contractor free of charge for the period of this Agreement or any extension thereof. At the expiration of this Agreement all permanent structures and improvements shall become the property of the City or shall be removed by the Contractor at the option of the City. [If permanent structures and improvements become the property of the City, there should be some provision for compensation to the Contractor, such as book value or fair market value. If the Contractor is required to remove such structures and improvements then he should be paid to do so.])

8. Offsite Improvements. The City at its expense agrees to provide all required offsite improvements including any improvements required on public streets or roads, drainage facilities, etc; and shall provide to the site all required utilities including adequate power and water supplies. (If any of this work is to be performed by the Contractor, it should be included in a separate contract with detailed engineering plans.)

9. Charges For Utilities. The Contractor agrees to pay the normal and standard charges for all water, electrical power, natural gas, and phone service utilized at the site. (If any of the services are to be provided free of charge by the City, this section should be modified accordingly.)

10. Salvage. Neither scavenging nor salvage operations shall be permitted at the operating face of the sanitary landfill. (If salvage is permitted, then insert: Salvage operations shall be conducted at a location separate from the operating face of the landfill by persons licensed by the City so as not to interfere with the operation of the sanitary landfill by the Contractor.)

11. Title to Waste. Title to waste shall vest in the owner of the fee simple estate as it is deposited.

12. Completion of the Site. Upon completion of disposal operations, the site shall be contoured and finished in accordance with the Approved Final Plan, which is attached hereto and is hereby made a part of this Agreement and the Operating Standards. Any changes of the Approved Final Plan must be agreed to by both the City and the Contractor. The liability of the Contractor under this agreement shall cease upon acceptance of the site by the City.

13. Compensation. Compensation shall be paid pursuant to the attached schedule. (A model schedule could be attached here and provide for payment by weight or volume. A minimum charge should be set out. Hazardous materials would be handled on a mandatory basis on fees paid for each type and quantity handled. Experience should soon establish fees for such materials.)

(If materials are to be accepted from users other than those paid for by the City, a similar schedule of prices which the Contractor can charge these users should be established. There should be clear provisions regarding the distribution of such fees to the Contractor and/or the City.)

14. Change in Regulations. In the event that compliance with subsequent statutes, ordinances and/or rules and regulations results in change in operating costs, the parties hereto agree to renegotiate this Agreement so that the compensation herein shall reflect such change.

15. Change in Sanitary Landfill Site. In the event that the parties hereto mutually agree to transfer said sanitary landfill operations to another site, or additional sites, then this Agreement shall be renegotiated to reflect any changes required by said transfer or addition, including, but not limited to increases in compensation due to increased operating costs.

16. Change in Cost of Doing Business. The fees and/or compensation payable to the Contractor for the second and subsequent years of the term hereof shall be adjusted upward or downward to reflect changes in the cost of doing business, as measured by fluctuations in the consumer price index published by the U.S. Department of Labor, Bureau of Labor Statistics, for the _____ area. At the start of the second year and every six (6) months thereafter, the fees and/or compensation to the Contractor shall be increased or decreased in a percentage amount equal to the net percentage change in the said consumer price index computed as follows:

Beginning with the first month of the second year the net change shall be the difference between the said consumer price index during the first month of this Agreement and the last month of the first year.

Beginning with the seventh month of the second year of this Agreement and every six months thereafter, the net change in the said consumer price index shall be the change for the last preceding six month period.

17. Term. The initial term of this Agreement shall be for the _____-year period beginning _____, 19_____, and ending _____, 19 _____. The initial _____ year term of this Agreement shall be extended for successive additional _____-year terms, unless either party notifies the other party in writing as hereinafter provided, not less than ninety (90) days prior to the expiration of the initial _____ year term or of any _____ year extension thereof of its intention to terminate this Agreement.

18. Performance Bond. The Contractor shall furnish a Performance Bond for the faithful performance of this Agreement, said bond to be executed by a surety company licensed to do business in this State, and to be in a penal sum equal to one-half the minimum fee to be paid to the Contractor by the City for the first year of this Agreement, and for each year thereafter to be in the penal sum of _____ percent of the total compensation paid by the City to Contractor for the last preceding year of this Agreement, but in no case to exceed 100 percent of the compensation paid during the prior year of this Agreement. Said Performance Bond

shall be furnished annually by the Contractor on the first day of each year of this Agreement or any extension thereof, and shall indemnify the City against any loss resulting from any failure of performance by the Contractor, not exceeding, however, the penal sum of the bond.

19. Payment Bond. The Contractor shall, within ten (10) days of the execution of this agreement, deliver or cause to be delivered to the City a bond in the amount of $_____ executed by a surety company licensed to do business in this State, guaranteeing payment of wages to all employees of the Contractor at the site or sites and the cost of all supplies, materials, and insurance premiums required in fulfilling this Agreement.

20. Indemnify. The Contractor hereby binds himself to indemnify and hold harmless the City from all claims, demands and/or actions, legal and/or equitable, arising from the Contractor's operation of all disposal sites herein above described.

Proof of such insurance shall be furnished by the Contractor to the City by certificates of insurance, with a minimum cancellation time of ten (10) days, said time to commence after delivery of said notice to the City at the address shown above.

(Liability insurance policies approved by the City as to type and coverage, may be required by the City as a part of the indemnity provisions of this Agreement. If policies such as automobile liability, general liability or owner's protective liability are required, the type and amount of coverage should be clearly spelled out in this section. Proof of such insurance shall be furnished by the Contractor to the City by certificates for each policy, with each policy having a minimum notice of cancellation to the City of ten (10) days.)

21. Workmen's Compensation. The Contractor shall carry in a company authorized to transact business in the State of _____, a policy of insurance fulfilling all requirements of the Workmen's Compensation Act of said State, including all legal requirements for occupational diseases. (Would not apply in monopoly States.)

22. Standard of Performance. In the event that the Contractor shall fail to dispose of materials herein provided to be disposed of for a period in excess of five (5) consecutive days, and provided such failure is not due to war, insurrection, riot, Act of God, or any other cause or causes beyond the Contractor's control, the City may, at its option, after written notice to the Contractor as provided hereinafter, take over and operate any or all of the Contractor's equipment used in the performance of this Agreement, and provide for such operation until such matter is resolved and the Contractor is again able to carry out its operations under this Agreement. Any and all operating expense incurred by the City in so doing may be deducted by it from compensation to the Contractor hereunder.

During such period, the liability of the City to the Contractor for loss or damage to such equipment so used shall be that of a bailee for hire, ordinary wear and tear being specifically excepted from such liability. The liability of the Contractor to third persons shall cease and all claims or demands arising out of the operation and/or control of the site or sites shall be directed solely to the City.

Provided, however, if the Contractor is unable for any cause to resume performance at the end of thirty (30) calendar days, all liability of the City under this contract to the Contractor shall cease and the City shall be free to negotiate with other contractors for the operation of said site or sites. Such operation with another contractor shall not release the Contractor herein of its liability to the City for such breach of this agreement. In the event that this contract is negotiated with another contractor(s), third-party liability of the Contractor herein shall terminate insofar as same arises from tortious conduct in operation and control of sites.

23. Arbitration. Any controversy or claim arising out of or relating to this Agreement, or breach thereof, shall be settled by arbitration in accordance with the Rules of The American Arbitration Association, and judgment upon the award rendered by the arbitrators

may be entered in any court having jurisdiction thereof. Such controversy or claim shall be submitted to one arbitrator selected from the National Panel of The American Arbitration Association.

(Arbitration Statutes are in effect in the following States: Arizona, California, Connecticut, Florida, Hawaii, Illinois, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Washington, Wisconsin, and Wyoming. Common law governs in all other States.)

24. Landfill Inspection. To insure that the detailed specifications, regulations, and laws for the operation of a sanitary landfill are complied with, the landfill site and operation shall be inspected a minimum of once a month during the term of this Agreement by a representative of the City to assure compliance.

25. Assignment. No assignment of this Agreement or any right occurring under this Agreement shall be made in whole or part by the Contractor without the express written consent of the City, and in event of any assignment the assignee shall assume the liability of the Contractor.

26. Books and Records. The Contractor shall keep daily records of wastes received and the City shall have the right to inspect the same insofar as they pertain to the operation of the sanitary landfill site(s) for the purpose of analysis of the financial condition of said operation. The records should include the type, weight and volume of solid waste received, the portion of the landfill used (determined by cross section and survey) and any deviations made from the plan of operation and equipment maintenance and cost records. The contractor shall submit a proposed record and accounting system for approval. All information so obtained shall be confidential and shall not be released by the City unless expressly authorized in writing by the Contractor. A recommended set of acceptable records is included in Exhibit D.

27. Bankruptcy. This Contract shall terminate in the case of bankruptcy, voluntary or involuntary, or insolvency of the Contractor. The time of termination in the event of bankruptcy shall be the day and time of the filing of the petition in Bankruptcy.

28. Number of Copies. This Agreement may be executed in any number of counterparts, all of which shall have the full force and effect of an original for all purposes.

29. Law to Govern. This Agreement shall be governed by the laws of the State of _____, both as to interpretation and performance.

30. Modification. This agreement constitutes the entire agreement and understanding between the parties hereto, and it shall not be considered modified, altered, changed or amended in any respect unless in writing and signed by the parties hereto.

31. Right to Require Performance. The failure of the City at any time to require performance by the Contractor of any provisions hereof, shall in no way effect the right of the City thereafter to enforce same. Nor shall waiver by the City of any breach of any provisions hereof be taken or held to be a waiver of any succeeding breach of such provision or as a waiver of any provision itself.

32. Illegal Provisions. If any provision of this Agreement shall be declared illegal, void, or unenforceable, the other provisions shall not be effected, but shall remain in full force and effect.

33. Notice. A letter addressed and sent by certified United States mail to either party at its business address shown hereinafter shall be sufficient notice whenever required for any purpose in this Agreement.

34. Effective Date. This Contract shall become effective and the City shall begin delivery of the solid waste to the Contractor _____ days after the date of execution hereof.

City: _____

_____

_____

_____

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Contractor: _____

_____

_____

_____

IN WITNESS WHEREOF, the City and Contractor have executed this Agreement as of the day and year first above written.

Approved to Form _____
City Attorney

City of _____

A municipal corporation of the State of

_____

By _____

By _____

By _____

_____ (Name of Contractor)

By _____

By _____

(Sealed, witnessed, and/or notarized as required by the laws of applicable State.)

FEE SCHEDULE

(Alternate methods of charge)

1. $_____ per ton of solid waste
2. $_____ per yard of compacted solid waste
3. $_____ per yard of uncompacted solid waste
4. $_____ minimum fee per load
5. $_____ per ton of solid waste consisting solely of material such as bricks, concrete, dirt, etc.
6. The city shall pay to the contractor a minimum fee of $_____ for each year, or extension, of this agreement.

Toxic, volatile or other hazardous materials requiring special handling shall be clearly marked by the City and, upon payment of mutually agreed upon fees, shall be disposed of by the Contractor pursuant to the terms of Item 2 of the Contract.

The Contractor shall submit billings to the City at the close of business at the end of each month for all other waste placed in the sanitary landfill and the City shall pay the Contractor on or before the tenth day of the following month, payments to be mailed to the Contractor at the address shown above.

EXHIBIT C: RECOMMENDED STANDARDS
FOR SANITARY LANDFILL DESIGN AND CONSTRUCTION

I. Site Location Requirements
II. Site Design
III. Operational Design Features
IV. Personnel and Personnel Facilities
V. Equipment
VI. Construction
1. General
2. Landfilling
3. Special Waste Handling
4. Supervision and Inspection

A sanitary landfill is defined as an engineering method of disposing of solid waste on land by spreading the waste in thin layers, compacting the waste to the smallest practical volume and covering the waste with earth cover each day in a manner which prevents environmental pollution.

While a sanitary landfill is possible on nearly all topographies, some land formations present more difficulty than others. Because topographical considerations make each sanitary landfill somewhat different, it would be impossible to delineate the technique required by every potential configuration. However, these recommendations cover those features and procedures that are intrinsic to most sanitary landfill operations.

I. Site Location Requirements

The disposal location site shall:

1. be easily accessible by collection vehicles, private autos, and where applicable, transfer vehicles;

2. safeguard against water pollution originating from the disposal of solid waste;

3. have an adequate quantity of acceptable earth cover. The cover material should be easily workable and compactible, should be free of large objects that would hinder compaction, and should not contain organic matter of sufficient quantity and distribution conducive to the harborage and/or breeding of vectors.

4. conform with the surrounding environment;

5. conform with future development of the area.

II. Site Design

Where the site is being provided by the local government authority, Items II.1, II.2, and II.3(a) through (d) and II.4 shall be provided to the contractor prior to submission of bids.

1. Map or aerial photograph of the area showing land use and zoning within 1/4 mile of the solid waste disposal site. The map or aerial photograph shall be of sufficient scale to show all homes, industrial buildings, wells, watercourses, dry runs, rock outcroppings, roads and other applicable details and shall indicate the general topography.

2. Plot plan of the site showing dimensions, location of soil borings, proposed trenching plan or original fill face, winter cover stock piles, and fencing. Cross sections shall be included on the plot plan or on separate sheets showing both the original and proposed fill elevations. The scale of the plot plan should not be greater than 200 feet per inch.

3. A report shall accompany the plans indicating:

(a) population and area to be served by the proposed site

(b) anticipated type, quantity and source of solid waste to be disposed of at the site

(c) geological formations and groundwater elevations to a depth of at least 10 feet below proposed excavations and lowest elevation of the site. Such data shall be obtained by soil borings or other appropriate means.

(d) source and characteristic of cover material and method of protecting cover material for winter operation

(e) type and amount of equipment to be provided at the site for excavating, earth moving, spreading, compaction and other needs

(f) persons responsible for actual operation and maintenance of the site and intended operating procedures

4. The design of the sanitary landfill shall include one or more topographic maps at a scale of not over 200 feet to the inch with 5-foot

contour intervals. These maps shall show: the proposed fill area; any borrow area; access roads; grades for proper drainage of each lift required and a typical cross section of a lift; special drainage devices if necessary; fencing; equipment shelter; existing and proposed utilities; employee facilities; and all other pertinent information to clearly indicate the orderly development, operations and completion of the sanitary landfill.

5. The sanitary landfill shall be designed by a professional engineer registered in the State of _____.

III. Operational Design Features

The disposal site should be provided with operational features and appurtenances necessary to maintain a clean and orderly operation. These minimum features are:

1. operational plans to direct and control the use of the site;

2. fencing of the site to control access;

3. an all-weather access road to the site; in some cases it may be more economical to provide a temporary landfill area adjacent to an all-weather road for inclement weather operation;

4. signs indicating traffic flow, hours of operation, and charges for disposal (if any);

5. scales for weight determination of the solid waste received at the landfill; for small landfill operation, periodic weighing at public or other scales is acceptable;

6. dust control methods; these may require use of chemicals, oils, or water sprays;

7. litter control devices; portable fences, and other suitable devices may be used;

8. communication devices for emergency use and for operational control;

9. electrical service for operations and repairs;

10. fire protection and fire-fighting facilities adequate to insure the safety of employees and provisions to deal with accidental burning of solid waste within the sanitary landfill;

11. emergency first aid equipment to provide adequate treatment of accidents, especially those associated with hazardous wastes.

IV. Personnel and Personnel Facilities

In order to provide suitable staff to man and operate the site, the following are recommended;

1. a fully trained supervisor or foreman and fully trained equipment operators;

2. a shelter from inclement weather sufficient to accommodate disposal site employees;

3. a potable water supply for landfill personnel and collection crews;

4. sanitary toilets on or near the site;

5. training in the proper and safe operation of all equipment and first aid training for all employees.

V. Equipment

The operation of a sanitary landfill depends on mechanical equipment. To assure adequate operation the following are recommended:

1. equipment sufficient for the spreading, compacting and covering operations;

2. sufficient reserve equipment, or arrangements to provide alternate equipment within 24 hours following equipment breakdown;

3. safety devices on equipment to shield and protect the operators from potential hazards during operation;

4. equipment shelter for maintenance and storage of parts, equipment and tools.

VI. Construction

Certain operations must be included to perform the basic functions and objectives of a sanitary landfill. These follow.

1. General. (a) Controlled access to the site must be maintained to keep unauthorized persons out and to assist the dumping operation. Access to the site shall be limited to those times when an attendant is on duty

and only to those authorized to use the site for the disposal of solid waste.

(b) Operational records shall be maintained daily. The records should include the type, weight and volume of solid waste received, the portion of the landfill used (determined by cross section and survey), and any deviations made from the original plan of operation and equipment maintenance and cost records. A monthly report shall be prepared that describes the amounts of solid waste received, the area of the fill used, the amount of the fill used, and the amount of cover material used and submitted to the appropriate governmental agency.

(c) Burning of waste material at the sanitary landfill site shall not be permitted.

(d) Blowing paper shall be controlled by providing a portable fence near the working area. The entire area shall be policed daily or at more frequent intervals as may be necessary to remove unsightly accumulations.

(e) Salvaging and scavenging shall not be allowed at working face of sanitary landfill.

(f) Provisions shall be made for on-site control of potential gas movement from the landfill.

(g) Surface run-off in the drainage area of the site must be diverted around the site to control infiltration and erosion.

(h) Conditions unfavorable for the habitation and production of insects and rodents should be maintained by carrying out sanitary landfill operations promptly and in a systematic manner. The site shall be regularly inspected by an independent pest control firm and certified reports submitted to the appropriate government agency. Supplemental vector control measures shall be instituted whenever necessary. Domestic animals shall be excluded from the site and proper control measures should be used to prohibit wildlife, when necessary.

(i) A detailed description and a plat of the completed fill site shall be recorded with the proper local agency responsible for maintaining titles and records to land, to provide notice to future users

and/or owners of the site. The detailed description should include but not be limited to: type and location of all deposited solid waste; type and number of lifts; type and location of pollution controls; original and final terrain description.

(j) Continual training of personnel in the proper operation of a sanitary landfill.

2. Landfilling. (a) Supervision shall be continuously available to coordinate the unloading activities.

(b) Special provisions shall be made for vehicles being unloaded by hand so there is no impairment to the flow of mechanically unloading vehicles.

(c) A sloped working face shall be confined to as small an area as the equipment can safely and efficiently operate.

(d) The solid waste shall be spread and compacted in thin layers. In the construction of each cell the solid waste should be spread into layers not to exceed 2 feet prior to compaction. The number of layers incorporated into a cell is dependent upon the design and configuration of the site.

(e) All solid waste shall be covered daily with a minimum of six (6) inches compacted soil. Daily cover has three main functions: To provide vector control, to provide fire breaks between cells, and to offer an aesthetically pleasing site at the end of the day's operation.

(f) Intermediate cover shall be applied where daily cover will be exposed more than thirty (30) days. (Final cover, not intermediate, should be used if future fill is not planned within a period of one (1) year.) Compacted thickness of graded intermediate cover shall not be less than one (1) foot and should have characteristics comparable to those of daily cover.

(g) Final cover shall be applied to any surface that represents the final grade of the sanitary landfill. A minimum of two (2) feet of a well-graded soil compacted and graded will usually fulfill the requirements of final cover. In some cases, where other soils are used or where trees are planted, etc., additional cover may be necessary. Suitable

grasses, etc., should be planted to help minimize erosion and surface deterioration. Final cover shall be placed over any completed section of the fill within one (1) week following the placement of solid waste within that portion.

(h) The grade of the final cover shall drain the surface runoff water to predetermined points in the drainage system and prevent ponding. For this reason, it is best to slightly overdesign initial grades so that when settlement occurs the surface will be sufficient for good drainage.

3. Special Waste Handling. (a) Disposal of waste sludges and liquids shall be done with special consideration of water pollution, odors, and the health and safety of employees. Appropriate provisions shall be made for the handling of these waste materials.

(b) Hazardous wastes shall be evaluated and appropriate provisions shall be made accordingly before incorporation into the sanitary landfill.

(c) Large bulky items shall be reduced in volume and covered daily. If necessary for efficient operation, separate areas on the site may need to be designated solely for the disposal of bulky items, but even in separate areas daily cover is required.

4. Supervision and Inspection. (a) Supervision of the operation shall be the responsibility of a qualified individual who has experience in the operation of a sanitary landfill.

(b) Routine inspection and evaluation of landfill operations shall be made by a representative of the State and/or local health department. A notice of any deficiencies, together with any recommendations for their correction, shall be provided to the owner or agent responsible for the use of the land and the appropriate individual or firm or governmental agency responsible for the landfill operation.

(c) Inspection of the completed sanitary landfill shall be made by a representative of the State or local health department, before the earthmoving equipment is removed from the site. Any necessary corrective work shall be performed before the landfill project is accepted as

completed. Arrangements shall be made for the repair of all cracked, eroded, and uneven areas in the final cover as required during the years following completion of the fill.

EXHIBIT D: Reprinted from Public Health Service Publication No. 2007

AN ACCOUNTING SYSTEM for sanitary landfill operations

Eric R. Zausner

The increasing costs and complexities of solid waste handling require new, more sophisticated management techniques. Data on performance and the costs of operation and ownership are essential for the use of these management tools. Hence, an adequate information system is a prerequisite to effective management. Although cost accounting represents only one part of the total information system, its design, installation, and utilization can represent the most significant step in the development of effective solid waste management.

Present information on landfill activities and associated costs is both inadequate and nonstandardized. The proposed system provides a guide to the type and quantity of information to be collected, its classification, and the method of collection. It is intended to be of use to municipal or private personnel involved in landfill operation and ownership.

Installation of a cost accounting system can aid the landfill manager in controlling the costs and performance of the operation, and also in planning for the future.

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System Benefits

Implementation of a system such as the one described herein has several important advantages, as follows:

1. It facilitates the orderly and efficient collection and transmission of all relevant data. In fact, much of the recommended data is probably already being collected, although haphazardly and inefficiently. Hence, the added cost of implementing the system is minimal.

2. Reports are clear and concise, presenting only data required for effective control and analysis. Because they can be completed and understood by landfill personnel, operation of the system can be made almost foolproof.

3. The data is grouped in standard accounting classifications. This simplifies interpretation of results and comparison with data from previous years or other operations. In turn, this allows analysis of relative performance and operational changes.

4. The system accounts for **all** relevant costs of operations.

5. Accumulated data from the system can over a period of time lead to standards of performance and efficiency. These standards are used to control costs. They indicate what costs are high and what is causing them. The landfill supervisor may then take corrective action.

6. The system includes automatic provisions for accountability. Cost control becomes more effective when the individual responsible for cost increases can be pinpointed.

7. The collected data aids in short-range and long-range forecasting of operating and capital budgets. This facilitates estimation of future requirements for equipment, manpower, land, cash, etc., which, in turn, aids planning at all levels of management. The data is also available for later evaluation and analysis, using operations research techniques.

8. With only minor modifications, the system is flexible enough to meet the varying requirements of landfills of different size and scope.

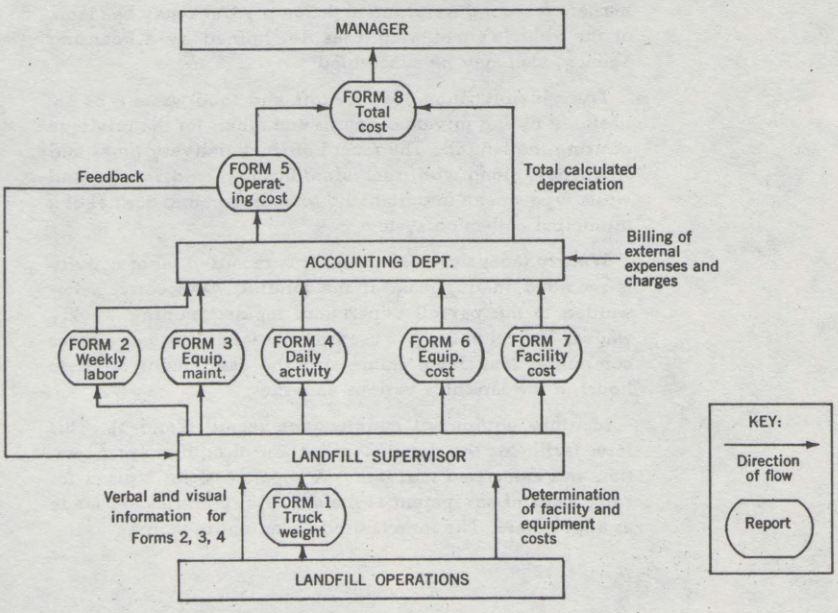
Reports and Information Flow

The cost system is designed for medium-size sanitary landfills. It assumes that the community or private firm has an accounting section or department to aid in preparation of the summary reports. The system also assumes that a scale is on-site. Actual measurement of solid waste quantities is possible only with scaled weights. Due to the system's flexibility, however, neither of these assumptions is critical. Only minor modifications are required to adopt the system to significantly larger or smaller operations. Due to the diversity of disposal operations no attempt will be made to suggest all of the possible variations.

The flow of information through the cost system is by means of reports (Diagram I). The eight reports transmit in-

DIAGRAM I

INFORMATION FLOW DIAGRAM



formation from the field where data is recorded to the point of data use — various levels of supervision and management.

The reports are most easily classified as those that are prepared daily and those that are prepared at less frequent intervals. Cost control, responsibility accounting, and the preparation of periodic summary statements cannot be accomplished without the daily recording of all pertinent activity and cost information. Data not recorded daily is not retrievable at some later date.

Daily truck weight record (Form 1). This form records the quantities, sources, and types of solid wastes delivered to the site. Cover material, if it is delivered from off-site, may be recorded on this form. If the cover material is acquired on the site, the "cover material" column may be deleted or a daily estimate of cubic yards may be recorded. The information is recorded manually on this form for the entire day. If the landfill has a scale that automatically records the weight data, that part of the form would be replaced by the weight ticket. Each delivery is recorded separately by the weighmaster. A second weighing of the empty truck may be taken, or the vehicle's tare weight (as determined by a licensing agency, etc.) may be substituted.

Truck identification, load weight, and solid waste type are useful in billing private concerns and others for the privilege of using the landfill. The record of truck delivery times and frequency, along with truck identification, load weight, and waste type, are an important aid to operation and control of a municipal collection system.

Weekly labor ticket (Form 2). This record of labor activity is recorded in duplicate at the landfill. One copy is forwarded to the payroll department for determining weekly wages. The other copy is used by the landfill supervisor for computing total labor hours and the assignment of these hours to the landfill's various activities.

Monthly equipment maintenance record (Form 3). This form facilitates the detailed collection of equipment operation and associated cost data. A separate sheet is used for each piece of equipment at the site. Daily entries are made as appropriate. The form is used for an entire month.

FORM 1

DAILY TRUCK WEIGHT RECORD

SITE: _____ DATE: / /

SIGNATURE: _____

Truck ident.	Time*	Wastes		Weight in	Weight out (tare weight)	Amount delivered	
		Source†	Type‡			Solid waste	Cover mat'l
Totals	X	X	X	X	X		

Instructions: To be completed by weighmaster for each truck, each time it makes a delivery. If scales are not available, an estimate of cubic yards is acceptable.

* Only record time at 15-minute intervals.

† Sources: R = residential, I = industrial, C = commercial, A = agricultural, etc.

‡ Types: H = household refuse, D = demolition/construction wastes, T = tires, B = bulky waste — furniture, refrigerators, etc.

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FORM 2

WEEKLY LABOR TICKET

SITE: _____ DATE: / /

SIGNATURE: _____

Employee ident.	Day 1		Day 2		DAY 3		DAY 4		DAY 5		DAY 6		DAY 7		Individual totals	Note causes of absences, extra hrs. to be paid, etc.
	Job	Hrs.	Job	Hrs.	Job	Hrs.	Job	Hrs.	Job	Hrs.	Job	Hrs.	Job	Hrs.		
Totals	X		X		X		X		X		X		X			XXXXXXXXXXXXXXXX

Instructions: Landfill supervisor to complete this form daily. List all employees separately including temporary help. "Hrs." refers to hours worked daily. "Job" refers to the job description.* At the end of each week, forward one copy to the payroll department and retain the original for further use.

*TD = tractor driver, W = weightmaster, ME = equip. maint., MB = building maint., etc. Tractor driver activity may be divided into spread and compact refuse(s) and cover operation (c).

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FORM 3

MONTHLY EQUIPMENT MAINTENANCE REPORT

SITE: _____ PERIOD: from _____ to _____

EQUIP. IDENT.: _____

Day	Hours operated	Fuel cost	Maintenance						
			Type of repair or service	Hours down	Labor hours	Labor cost	Parts cost	External cost	Total cost
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
25									
24									
26									
27									
28									
29									
30									
31									
Totals			XXXX						

Instructions: To be completed by the landfill supervisor at the end of each day. Entries under maintenance should be made only as they occur. This sheet is only for one piece of equipment.

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Daily activity summary (Form 4). This form summarizes the truck deliveries, solid waste quantity disposed of, man-hours worked, machine hours utilized, cover material used (if measured or estimated), and miscellaneous expenses incurred. Since this provides a continuous cover material inventory, it is useful in keeping the landfill supervisor advised as to his present status and when more cover material will be required. The form is used for an entire month. It is completed at the end of each day by the landfill supervisor. At the end of the month, it is forwarded to the accounting department.

Less Frequently Prepared Reports

These reports may be prepared as often as desired. The Operating Cost Report is used for control purposes. Hence, the more frequently it is prepared (perhaps even weekly), the more useful it would be. The remaining reports are summary reports (preparation quarterly would be sufficient).

Landfill operating cost report (Form 5). This report summarizes the landfill's operations. It is compiled from all the daily tickets. As a summary of the landfill's total operating costs, it may be used to hold the supervisor responsible for any adverse trends in costs. In addition, the calculated unit cost and efficiency factors are helpful to the supervisor in analyzing these adverse cost trends and controlling them. This is more fully discussed under **system utilization.**

If most of the expenses incurred in operating the facility are billed directly to the municipality, the necessary cost data required for preparation of this form would not normally be available to the supervisor. Under these circumstances, the supervisor should forward the information he has collected (the daily tickets) to the accounting department. This department will then compile the complete Operating Cost Report and send a copy back to the landfill supervisor.

A more detailed breakdown of the expenses that should be included under each category is in Form 5a. Form 5a need not be prepared; it is only shown to indicate the relevant cost groupings.

FORM 4

DAILY ACTIVITY SUMMARY

SITE: _____ DATE: ____ / ____ / _____

SIGNATURE: _____

DAY	Solid waste		Cover material				Man hrs.	Machine hrs.		Expense*		Site hrs.
	Loads	Tons	Begin	Rec'd	Used	Remain		Use	Down	$	Type	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Totals			X			X					X	

Instructions: To be completed by landfill supervisor at the end of each day. Some of data is to be summarized from Forms 1 and 2. Record cover material in either tons or cubic yards. Today's beginning cover material equals yesterday's remaining.

* Record only miscellaneous expenses that would not be recorded by the accounting department and are incurred at the site.

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FORM 5

LANDFILL OPERATING COST REPORT

SITE: _____ PERIOD OF REPORT: from _____ to _____

	Data	Actual this period	% var. from budget	% var. from last period	% var. this period last year
Totals	Total tons received				
	Total operating cost				
	Total operating cost/ton				
Unit costs*	Labor/ton				
	Cover material/ton				
	Equip. operation/ton				
	Overhead/ton				
Efficiency factors*	Cover material util.				
	Overtime hours/total labor hours				
	Labor efficiency				
	Equip. % downtime				
	Equipment utilization				
	Equipment efficiency				

Instructions: To be completed by accounting department from Forms 1, 2, and 3. One copy to landfill supervisor.

* Calculations: Unit cost = aggregate cost ÷ tons solid waste received. Note that cover material unit cost is cover material ÷ tons of solid waste received.

Cover material utilization = cover material used ÷ tons of solid waste received.

Labor efficiency = tons received ÷ labor hours.

Equipment utilization = tons received ÷ equipment hours.

Equipment efficiency = equipment cost ÷ equipment hours.

Equipment % downtime = total hours down ÷ total equipment hours.

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FORM 5a

OPERATING COST CLASSIFICATIONS

Labor costs

Include all wages at base pay, plus all overtime pay, and labor fringe benefits.*

Cover material costs

Include all costs for the delivery of cover material. This category may be excluded if cover material is not delivered from off the site. The cost of labor, equipment, and overhead required to obtain on-site cover may be substituted.

Machine operating costs

Include oil, gasoline, grease, equipment repairs, and maintenance.

Overhead costs

Include all utilities, supervisor's salary, building repairs and maintenance, liability and property insurance, and charges from other departments.

---

*Labor fringe benefits include group insurance, pension costs, social security contributions, vacation costs, etc., whether actually budgeted to the operating agency or absorbed in municipal general funds.

Equipment and facility cost reports (Forms 6 & 7). These two reports are compiled at the landfill site or wherever the data is available. They are then updated only when additional equipment or facilities are acquired. The periodic depreciation charges are then computed and posted by the accounting department.

Landfill total cost summary (Form 8). This report summarizes all the activities and costs incurred by the landfill during the period. It is compiled from data available in present and past Operating Cost Reports and the depreciation data available on the Facility and Equipment Cost Reports.

Report Flow Summary

A brief summary may help to put the system in perspective. Operating reports are generated daily at the landfill site and transmitted periodically to the accounting department. The accounting department combines these reports with additional information it accumulates to produce total operating costs.

System Utilization

Now that the actual system has been described and one possible set of forms illustrated, utilization must be discussed. Only with efficient and intensive utilization of the information generated, can the additional time, effort, and money required to implement and maintain the system be justified.

All the factors which affect the quality and effectiveness of sanitary landfill operations can be translated into costs. Extent of cover material use, the size of the face, degree of compaction, litter control and dust control, among others, determine how good a job of sanitary landfilling is performed, and they are more costly than simple operation of an unattended open dump. Cost control at a landfill does not call for economizing at the expense of quality. To the contrary, once a level of acceptable operation has been determined along with the attendant costs, the cost control system can help the supervisor maintain that level of operation.

The routine control of costs is slightly more complicated. Effective cost control has two prerequisites: recognition of

FORM 6

LANDFILL EQUIPMENT COST REPORT

SITE: _____ DATE: ____/____/____

(for use by acctg. dept. only)

Type	Model no.	Model year	Mfg. name	Date of purch.	Cost	Est. life	% Time used by other dept.	Annual depreciation	Monthly depreciation	
Totals	X	X	X	X		X	X			

Instructions: To be filled out by accounting dept. or supervisor. "Est. life" should be based on supervisor's estimate of remaining life. Use of equipment by other dept. should be based on percent of time (working day) equipment is away from the landfill. Depreciation may be on a straight-line or accelerated basis.

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FORM 7

LANDFILL FACILITY COST REPORT

SITE: _____ DATE: ___/___/___

(for use by acctg. dept. only)

	Item or category	Description	Date put in use	New cost	Est. total life	Other comments	Annual depreciation	Monthly depreciation	
	All land						XXXXXX	XXXXXX	
Improvements	Roads								
	Lights								
	Fences								
	Surveys								
	Other								
Facilities	Scales								
	Garages								
	Buildings								
	Other								
	Totals	X	X		X	X			

Instructions: To be completed by supervisor or accounting dept., if they have data available. "Est. total life" should be based on remaining life as estimated by the supervisor. Land purchased subsequent to the original land purchase should be included. Depreciation may be either straight-line or on an accelerated basis.

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FORM 8

LANDFILL TOTAL COST REPORT

SITE: _____

PERIOD OF REPORT: from _____ to _____

Data	For this period	Budget — this period	Year to date	Budget — year to date
Tons of solid waste received				
Total operating cost				
Total depreciation cost				
Total cost				
Operating cost per ton				
Depreciation cost per ton				
Total cost per ton				

Instructions: To be completed by the accounting department, when requested or periodically, from data available in operating cost report or capital cost reports. Copies sent to the city manager (or his equivalent).

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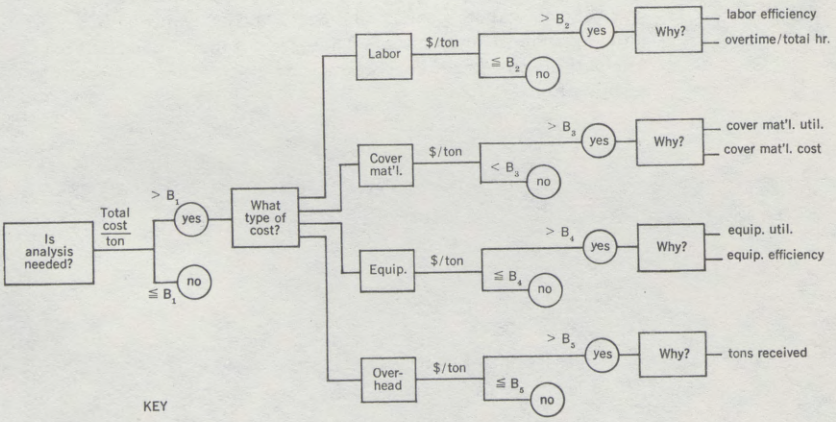
excessive costs and identification of responsibility for the increased costs. By comparing present unit costs with the currently budgeted unit costs and the actual unit costs of the previous period and the same period last year, some determination can be made of whether present costs are excessive. The determination of responsibility is facilitated by the efficiency factors. The system described allows both of these critical factors to be determined. Corrective action may then be effectively initiated.

At the highest level of management, the Total Cost Report indicates whether costs are excessive, in which case the supervisor of the particular sanitary landfill can be held responsible. The supervisor, in turn, can use the cost system to determine the cause of increased costs. He may trace the increased costs to the particular cost element, and possibly to the employee, piece of equipment, or method of operation responsible. All of the needed data is in Form 5 (the Operating Cost Report). To aid the supervisor in the analysis of Form 5, a decision tree may be used (Diagram II). It illustrates the methodology required to analyze the cause of increased costs. For clarity, a hypothetical situation will be examined.

Let us assume that the landfill supervisor receives his copy of the Operating Cost Report from the accounting department. His analysis of the data starts at the extreme left of Diagram II. Quite obviously, the first question to be answered is whether any analysis is required. If total operating cost per ton is less than or equal to the budget, the answer is No. However, if total cost per ton is greater than the budget, additional analysis is indicated. Next, it is desirable to isolate the cost element which is abnormally high. It may be one or more of the four shown (labor, cover material, equipment, or overhead). Let us assume that only labor cost per ton is higher than its budgeted amount. (We are now on the uppermost branch.) We must determine why labor cost per ton increased, so that corrective action can be taken. Several factors are listed which may be relevant. Assume "overtime hours per total labor hours" is excessive. This implies that either scheduling is poor, there is a temporary peak load, the

DIAGRAM II

DECISION TREE FOR SANITARY LANDFILL
COST VARIANCE ANALYSIS



KEY

B_1 = Total cost/ton budgeted

B_2 = Labor cost/ton budgeted

B_3 = Cover mat'l. cost/ton budgeted

B_4 = Equip. cost/ton budgeted

B_5 = Overhead cost/ton budgeted

employees are working overtime when not required, or perhaps more regular employees are required. Under any of these circumstances, corrective action could be initiated by the supervisor.

This example is an over-simplification of actual operations. Nevertheless, it does illustrate the use of the decision tree (Diagram II) and more importantly, the methodology needed

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to pinpoint and correct factors which might have caused increased costs.

In addition to routine cost control, the data collected is useful in doing special analyses of trends in composition and quantity of wastes, peak load hours, on-site waiting times, and equipment evaluations These and other quantitative evaluations can improve performance and reduce the costs of operation.

Mr. GERSHOWITZ. Thank you, Senator.

(Subsequent to his appearance as a witness, Mr. Gershowitz supplied the subcommittee with the following letter:)

NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION,
Washington, D.C., April 2, 1970.

Senator EDMUND S. MUSKIE,
U.S. Senate, Old Senate Office Building,
Washington, D.C.

MY DEAR SENATOR MUSKIE: I have just returned from California where I had been working on arrangements for our Association's annual meeting in June. While there, I had the opportunity to sit in on the San Francisco Field Hearing on S. 2005 which you conducted on March 31.

The hearing progress on S. 2005, both in the field and in Washington, has been an exemplary example of non-partisan committee work in the development of meaningful and productive legislation.

Our Association has aggressively supported this important legislation. This support has been articulated at university seminars and at waste management conferences throughout the United States. We have written to both the President and to the Secretary of Health, Education and Welfare urging them to rethink much of their opposition to S. 2005.

Two of our members, Mr. Moscone and Mr. Stefanelli, had the privilege of testifying before your Subcommittee in San Francisco. They voiced some concern over the affects of the construction grants provision of the bill. We have heard this same concern articulated throughout the country by representatives from both the public and private sectors as well as at field hearings and the Washington hearings on S. 2005. We, too, are concerned over possible inadvertent, but nonetheless, regressive ramifications of the construction grant concept in the field of solid wastes management.

Aside from the fact that many are concerned that much work at the local level would grind to a halt while communities waited for Federal grants to materialize, there are other important points that require serious study on the subject of construction grants. Many of the finest proposals for improved waste management systems have been, and are being generated by the private sector. The construction grant concept would seem to require that a local government apply for funds to construct a system which it proposed. While the local government would have the option of contracting with the private sector to operate a facility it constructed with such Federal funds, shouldn't there be some inducement for capable private contractors to propose, finance and construct improved waste management facilities for the communities they serve. We recognize, of course, that a private operator could not receive Federal grants. But, the government has many opportunities to stimulate massive infusions of private capital into the private sector without requiring the expenditure of Federal funds. For example, Federal guarantees of privately-secured financing for *approved waste management proposals* would not only stimulate considerable investment capital into this field, but would do so on a longer term basis and at more favorable rates than would ordinarily be available. Also, we believe that demonstration funds could be made available to the private as well as the public sector. When such funds are made available to the private sector these funds could be returned to the Federal government *with interest* in those instances where the projects demonstrated become operational.

Possibly, SBA-type funds could be made available to qualified contractors to construct *approved* waste management systems for the communities they serve. Also, the suggestion has been made that a "Fannie May" type facility designed to provide incentives for investment in the solid wastes field similar to those incentives provided for the home construction field could also be considered.

These observations are not merely the suggestions of the National Solid Wastes Management Association. The hearing record on S. 2005 is replete with similar observations and suggestions made by public and private representatives alike. The National Academy of Sciences, in its report prepared for the Federal government, "Policies for Solid Wastes Management," makes the observation that the greatest possible participation of the private sector must be fostered and the know-how and expertise of private waste management firms must be utilized and encouraged. It makes the observation that demonstration capital and risk capital should be expanded to include the private sector.

The Eliassen Report makes similar observations and suggestions.

Key public officials at the Detroit Field Hearing expressed nearly identical concern that the construction grant concept would stimulate improvement in the public sector while ignoring the private sector.

On February 27, I appeared before your Subcommittee to testify on this important legislation. On that same day, there also appeared Mr. Leo Weaver, Manager of the Institute for Solid Wastes of the American Public Works Association and former Chief of the Federal Solid Waste Program. He outlined many alternatives available to the Federal government in financing improvements in our waste management system. He made the statement, "that any method of financing waste management systems that would encourage local governments who are working satisfactorily with private waste management contractors to cease doing so would be wrong." He also stated that any Federal funding program that would inadvertently penalize those communities that needed money but did not choose to apply for Federal funds because they were being satisfactorily serviced by the private sector would be equally as wrong.

Frank Bowerman who is the Vice President of Zurn Industries and the former director of waste management planning for the Los Angeles area made similar observations. He testified that he would be opposed to grants and urged consideration of Federal guarantees of private financing instead. His observations which reflect the perspective of many years work as one of the nation's leading public officials in this area indicated concern that those responsible for spending waste management dollars would be far more conscientious in their expenditures were they dealing with private "loan money" rather than Federal grant money.

I could go on and quote from the record those local public officials whose communities would be the potential recipients of these Federal dollars who stated that while they were for any type of Federal assistance possible they would be reluctant to see any funding program that discouraged the involvement and partnership of the private sector.

I know, perhaps, more than most other people, just how difficult a task it is to establish meaningful national policy in the area of solid wastes management. There is no one more aware of, or more chagrined over, the artificial barriers that are constantly erected in the way of effective regional approaches to solving waste management problems. I know the task is not an easy one, but I think we are close to making some exciting strides forward. I think it is essential that we take the time . . . now, to explore with vigor and imagination those methods of stimulating capital improvements that would be most apt to provide improvements in all facets of the system either public or private.

Our Association is anxious to be of assistance to you and to your colleagues in any way possible. Should it be considered desirable to have the staff of your Subcommittee meet with a panel of leaders from the private sector for informal brainstorming, we can supply industry leaders for such a meeting, and would be pleased to do so.

June 4–7 of this year our Association will hold its annual meeting. There will be nearly 5,000 contractors from all of the 50 states and numerous foreign countries in attendance. In addition to the stimulating technical sessions that will take place, we will have on display the world's largest exposition devoted exclusively to solid wastes management. Richard Vaughan and other officials from the Bureau of Solid Waste Management will be participating in our program, along with Leo Weaver from the American Public Works Association and numerous leading contractors and other representatives of the free-enterprise system who are involved with the problem. Senator Boggs of your Subcommittee will deliver the Keynote Address at this important meeting. While I know how jammed your schedule is, we would like to invite you and any other members of the Subcommittee as well as the Staff of the Subcommittee to visit us in San Francisco and observe the technical programming as well as the exposition which I described above. The meeting is an outstanding example of the intense interest our members have in providing new solutions for the communities they serve.

We are both enthused and excited about the great national interest that has developed over the problems of solid wastes management, and we are pleased that you are at the helm of the congressional effort to establish more meaningful national policy.

Sincerely,

HAROLD GERSHOWITZ,
Executive Director.

Senator BOGGS. We have a statement from Mr. Harry Kletter, who is president of the Industrial Services of America, Inc. Mr. Kletter's

statement arrived too late for the Detroit hearings which were held last session on S. 2005, but since it is entirely pertinent to these hearings we will include it in the record at this point.

(Statement of Mr. Harry Kletter follows:)

STATEMENT OF HARRY KLETTER, PRESIDENT, INDUSTRIAL SERVICES OF AMERICA, INC.

Mr. Chairman and Members of the Committee:

I want to thank you for allowing me to submit this statement as part of the record of the Senate hearings in Detroit, Michigan, on the proposed Resource Recovery Act of 1969. This important bill is designed to provide financial assistance for the construction of solid wastes disposal facilities and improvements to existing solid wastes research programs.

First, I would like to say that my company and many others in the private sector of our industry, enthusiastically endorse and support the objectives of the bill. We know that research and development must be continued in order for us to find better answers to the solid wastes problem. We know also that area-wide planning must be stimulated. Capital improvements must be accelerated and means and methods of stimulating these improvements must be studied carefully. One way—which we believe is the best way—of getting the job done would be to stimulate a greater infusion of private capital into the field of solid wastes management. We must also provide or encourage risk capital to stimulate greater innovation by both the private and public sectors.

While I have been most impressed with the progress that this industry has made in recent years, I can best address myself to the experiences of our company in order to illustrate what can be accomplished. We have been successful in making a fair profit, building a public company and in making significant contributions to the solution to the nation's solid wastes problems. We are a total concept company. Our work involves research and development, engineering, manufacturing, marketing, placing of part of the product line in our own service divisions, designing transfer stations and processing plants which deal with recycling of wastepaper, metals and any other items that are resalvageable.

Recycling is what our business is all about. We are also operators of properly engineered sanitary landfills; we are in the land development business; we serve as consultants; we offer all aspects of solid wastes management services and we sponsor an academy program for education in the field of solid wastes management.

It is a big job. We have invested much of our profits back into our business in order to get where we are. We are operating internationally. We have our own operations in Michigan, Kentucky and Georgia. We operate under license in Canada and London, England, and many of our products are in use throughout the world. However, I am not submitting this statement to sell Industrial Services of America. I want to discuss an industry that I think is making significant contributions today and which is in a position to make even greater contributions tomorrow.

The biggest single problem which the private sector has is, of course, capital. Many times, successful operators are stymied by the lack of capital. That is because lending agencies do not quite understand the problems of solid wastes management. They do not yet appreciate the potential attractiveness of this field as a source of investment. Fortunately for us, we are a public company and money at this time is not a problem. However, I recognize that in the future even we could encounter money problems. By stimulating investment in the private sector, or perhaps with tax incentives, we could greatly accelerate the program of private enterprise in the problem-solving process.

We think the Resource Recovery Act of 1969 could be a tremendous step in the right direction. However, we believe construction grants constitute the least desirable approach to caiptal improvement in the solid wastes field. First, they are always subject to unrelated pressures . . . grant money can be, and is, turned on and off. A good case in point would be the recent dilemma surrounding the Federal water pollution control grant program. Congress authorized $1 billion to fund grants in this area this year. To date nearly 5,000 applications for water pollution control grants totaling nearly $2½ billion have been received. The Administration requested only $214 million and Congress has appropriated $600 million. One state, New York, has already submitted applications for $1.3 billion for water pollution control grants. Furthermore, there appears to be

little opportunity to utilize the capabilities of private enterprise under the current grant proposal.

In a field where the private capability represents up to two-thirds of the total capability such a grant program would appear to be regressive rather than progressive. Grants often discourage local revenue from being applied—many times immediate action is postponed while local authorities wait for a decision on grants that they have applied for. It discourages private capital from being invested.

Grants, as currently envisioned in S. 2005, do not appear to encourage the use of private capability and enterprise. Grants also will not stimulate regular innovations. Private enterprise has been the greatest source of innovation in the field of solid wastes management.

Let me just give you some examples of how private enterprise has solved some of the problems of solid wastes management. As I explained earlier, our company manufactures solid wastes handling equipment. About 7 or 8 years ago, we saw a piece of equipment which we thought would help us with some of our large volume customers. It was called a stationary compactor. Upon getting one of the very few available, we found it was not adequate but, with our experience and background in equipment, we innovated, engineered and came out with a vastly improved version. This concept today is being used by all the automotive companies, many of the food processors, many packaging companies and many apartments and commercial establishments. It is a means of material handling today that has solved one part of the great problem.

Containerization is old. In fact, it has been used for over two decades in the private sector. Containerization has played a very important part in solving the material handling problem of solid wastes. We, today, have taken these two concepts and have converted them into a sophisticated system that results in improved handling and improved pay loads.

Another objective, of course, has been to take care of the wastes after it is loaded into our trucks. This is where we decided we had to get into recycling. Recycling, as we all know, involves bringing wastes into a plant and processing it for shipment back into the raw material market. We are making money today recycling newspaper, scrap iron, scrap metals and many other items. Many items that were throwaways yesterday, we are recycling into resaleable products.

I could go on about how we, at Industrial Services of America, are solving the solid wastes recycling problem. We have an operating plant in Louisville, Kentucky, and we are getting ready to break ground on a plant here in Detroit, Michigan. Detroit is an example of a city that is coming to grips with its solid wastes problem. There are available landfills, processing plants and highly professional private contractors that are contributing greatly to solving the problem in the Detroit metropolitan area. Our company, alone, has ample area to bury, through land reclamation, millions of yards of solid wastes and we are planning to install recycling plants. Our economies as a private operator are still very much below the rates or costs that are being discussed relative to these sophisticated programs.

We can operate at costs of $5.50 to $6.50 a ton for the total disposal responsibility in an area like Detroit . . . that's from the time that the truck delivers it to a processing plant to the complete operation of the landfill and land development. Furthermore, endless acres of ground will be improved through our method of reprocessing, recycling and land development.

Industrial Services of America is not alone. There are many other companies emerging out of this industry of independent operators. Grants are not the answer to stimulate the innovations that I have been discussing or to further stimulate the utilization of the enormous capability found in the private sector. I strongly urge that thorough consideration be given to a program of Federal guarantees of privately secured financing in the field of solid wastes management. Such guarantees would help attract hundreds of millions (perhaps billions) of dollars to the field.

We have three associations that are doing commendable jobs of stimulating industry progress. They are: the National Solid Wastes Management Association; the Institute of Scrap Iron & Steel and the National Association of Secondary Materials Industries, Inc. These three associations represent over 5,000 businesses. The National Solid Wastes Management Association is conducting extensive research regarding the private sector's contribution to the problem-solving process under a three-year, $250,000, HEW grant. Their Industry-Government Solid Wastes Liaison Council has, in cooperation with Federal

officials, developed a model sanitary landfill contract with the finest operating standards ever developed.

They are currently working on a similar project in the collection area. Their recently formed Manufacturers-Contractors Industry Standards Committee has already achieved impressive success. They hold many regional and national meetings and the National Solid Wastes Management Association also sponsors the world's largest exposition devoted exclusively to solid wastes technology. Over 2,000 contractors from all over America attended their last annual meeting in Washington,, D.C. to study the equipment and attend their technical sessions.

In summary, if S. 2005 is going to stimulate progress in the field of solid wastes management its primary objective should be to stimulate maximum utilization of the expertise, the investment, the personnel and the equipment which exists in the private sector. As both the Eliassen Report and the report of the National Academy of Engineering-National Academy of Sciences indicates, now is the time to make greater utilization of the know-how of private waste collection and disposal companies. The Academy's recommendation urging greater participation of the private sector in the planning and design of new and innovative systems is well conceived.

Just as Federal guarantees have been successfully used to stimulate mortgage starts, construction of sewer and water treatment facilities under Title X of the Housing and Urban Development Act as well as the construction or reconditioning of ships in the American fleet under Title XI of the Merchant Marine Act, so can Federal guarantees be used to stimulate massive capital improvements of solid wastes management systems throughout the United States. To the extent Federal guarantees are used successfully, scarce tax dollars can be conserved for other programs where the ability of the private sector to perform is not as great.

Thank you for the opportunity of submitting this statement.

Senator Boggs. Senator Eagleton has received a letter from Mr. R. Ken Reitzloff, president of the A. N. Reitzloff Co. which outlines Mr. Reitzloff's views. We will include it in the record at this point.

(Letter referred to follows:)

A N. Reitzloff Co.,
Detroit, Mich., November 10, 1969.

Senator Thomas F. Eagleton,
New Senate Office Building,
Washington, D.C.

My Dear Senator Eagleton: I would like to commend you on the exemplary manner in which your recent Detroit field hearing on S. 2005 were conducted. I attended the entire hearing and found it to be a most informative experience.

I am a private refuse contractor who has been in the solid wastes management business for 35 years. I operate 65 trucks in the greater Detroit area and we are considered to be one of the larger companies in Michigan.

I think it is extremely important that your committee develop an accurate perspective of the contribution which the private sector makes in helping to solve the nation's solid wastes problems. In addition to the enormous tonnage of industrial, commercial and residential wastes which we handle, the private sector is beginning to make significant breakthroughs in the area of recycling and resource recovery.

This past May over 2,000 contractors from all over the United States traveled to Washington, D.C. for our National Association's annual convention and exposition. The thirst for knowledge as witnessed by the huge attendance at our technical sessions and at our equipment exhibition was extremely impressive. The National Solid Wastes Management Association is currently conducting a three-year study under a $250,000 HEW grant to more fully assess the total contribution and the potential capability of private enterprise in this field.

As the recent National Academy of Sciences Report clearly states, the time has come to foster the greatest possible utilization of the expertise that exists among the private solid wastes management firms. It is estimated that the private sector handles up to two-thirds of the entire workload. While our Association supports most of S. 2005, and while I believe that the interest in our field being shown by the Congress constitutes an enormous step in the right direction, I am nonetheless concerned by what appears to be the total absence of understanding of the role of private enterprise in the proposed legislation.

I believe that S. 2005, when finally reported out of Committee, should serve to stimulate the greatest possible improvement in both the public and private sectors.

Perhaps such alternatives as Federal guarantees of privately-secured financing for approved waste disposal proposals would be the answer. The bill must come to grips with the problem of stimulating improvements wherever improvement is needed, be it the public or the private sector.

Again, I would like to commend you for the manner in which you handled the Detroit Field hearing and I do hope the thoughts expressed in the above statement will be of some value to you in your deliberations.

Sincerely,

R. KEN REITZLOFF, *President.*

(On April 21, 1970, Senator Muskie sent the following letter to Mr. Gershowitz:)

APRIL 21, 1970.

Mr. HAROLD GERSHOWITZ,
Executive Secretary, National Solid Waste Management Association, Washington, D.C.

DEAR MR. GERSHOWITZ: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formulation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide answers to the following questions:

1. Do you have any figures to indicate the current manpower and training needs and capabilities in solid waste management?

2. Section 209 of S. 2005 authorizes the Secretary of Health, Education, and Welfare to recommend standards for solid waste disposal and collection systems. What form do you feel these standards should take? What do you consider the value of requiring the Federal issuance of recommended collection and disposal methods, similar to those in the Air Quality Act of 1967, as guidance to State and local governments?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution.

(Response from Mr. Gershowitz to April 21 letter of Senator Muskie follows:)

NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION,
Washington, D.C., April 30, 1970.

Hon. EDMUND S. MUSKIE,
U.S. Senate,
Old Senate Office Building,
Washington, D.C.

MY DEAR SENATOR MUSKIE: We are pleased to have this opportunity to further contribute to the deliberations relative to solid wastes legislation.

There are no figures available at the present time, from any source, that accurately reflect the magnitude of the manpower dilemma in the solid wastes field. However, the generalization can certainly be made that waste management is one of our most labor intensive areas of endeavor and that there are few occupational areas in which the problems of manpower are more severe.

The National Solid Wastes Management Association is currently in the midst of extensive research which will provide, during the next year, significant data on the manpower problem in our field.

We believe the establishment of training centers for supervisory personnel is worthy of considerable study. Under such a program an individual from each company or public agency could be given training "tools" to take back to his own people.

The manpower problem in the solid wastes field represents a double-edged sword. It is increasingly difficult to attract labor to the field, and it is equally as difficult, in many instances, to retain good people once they have been attracted to the field. While the problem is severe in both the public and the private sectors, it is apparent that the private sector is having considerably

more success in dealing with labor problems than is the public sector. The private sector can be more responsive to changes in the marketplace and is more flexible in its ability to adjust wages and to adjust working conditions than is the public sector. Also, the public sector appears to have had far greater difficulties in handling the problems generally found in the labor-management interface and in the area of collective bargaining than has the private sector. While nearly all of the lengthy and notorious "garbage strikes" (Memphis, New York, Oklahoma City, Cincinnati, Philadelphia, etc.) have been unique to the public sector, we recognize that the problems of manpower and labor are problems we mutually share with the public sector and that this is an area where we must work together to develop waste management policies that can help offset the "disincentives" that are driving labor out of the field.

A growing number of private contractors are successfully instituting programs that do tend to mitigate against many of the labor difficulties. For example, the introduction of plastic bags, satellite service vehicles and one-man collection vehicles has helped to alleviate many of the labor problems the industry faces. It is also important to note that the public sector has also begun experimenting with these concepts, and with significant success.

NSWMA is firmly committed to the establishment of national standards of performance which would tend to upgrade the quality of waste management services in the United States. I have enclosed a Model Sanitary Landfill Contract and Model Operating Standards which was prepared as a joint project by the National Solid Wastes Management Association and the Federal Bureau of Solid Waste Management. Working through the Industry-Government Solid Wastes Liaison Council which was created in 1967, we are currently at work with officials of the Bureau of Solid Waste Management on development of a Model Collection Contract and Model Collection Standards. These documents, of course, are merely models and do not have the weight of law.

The single greatest problem in establishing national standards or guidelines will be determining parameters that are universally acceptable in all areas of the country. However, we do believe that minimum levels of performance can and should be established. Quite possibly, the most practical way to proceed would be to allow the Bureau of Solid Waste Management to develop guidelines with which the states would have to comply in order to be eligible for Federal assistance. I think it would be important to allow the states to file certain exceptions to the guidelines when local circumstances warrant such exceptions. For example, in the development of sanitary landfill standards, certain soil might be ideal, but certainly not essential. You would not want to promulgate a guideline that would tie a community to a specific practice when equally viable alternatives are available, and perhaps more practical in a given locality.

We would urge that a panel be formed which would consist of an equal number of knowledgeable public administrators and private contractors who are familiar with the everyday operational problems encountered in waste management. Such a panel could recommend standards to the Bureau of Solid Waste Management which in turn would recommend standards to the Secretary of the Department of Health, Education and Welfare.

We in the private sector fully recognize that the national fragmentation which exists relative to levels of performance is inconsistent with the opportunities, the challenges and the responsibilities inherent in the field of solid wastes management today. Therefore, the National Solid Wastes Management Association will offer its finest talent to any effort to develop meaningful national standards or guidelines for the improvement of solid wastes management practices in the United States.

We appreciate this opportunity to further discuss these problems with you. Please do not hesitate to contact us at any time should we be in a position to offer any assistance to your efforts in this vital area.

Sincerely,

HAROLD GERSHOWITZ,
Executive Director.

Senator BOGGS. Our next witness is Frank Bowerman, who is a group vice president of Zurn Industries, Inc., Arcadia, Calif.

We are glad to have you with us, Mr. Bowerman.

STATEMENT OF FRANK R. BOWERMAN, GROUP VICE PRESIDENT, ZURN INDUSTRIES, INC., ARCADIA, CALIF.

Mr. BOWERMAN. Thank you, Mr. Senator.

Senator BOGGS. Proceed, please.

Mr. BOWERMAN. Senator Boggs, Senator Dole, may I bring the warm greetings and the enthusiastic support for the work of this committee from Mr. Frank Zurn, the president of our company, and Mr. Everett Zurn, the chairman of our board of directors.

Senator BOGGS. Thank you.

Mr. BOWERMAN. I am representing another private sector, the manufacturing sector.

What you have been shown here by way of end results in salvage and recycle are in part because it is our responsibility and privilege to make the machines that tear apart, shred, grind, compact, and sort materials that can be more easily recovered, or more readily disposed of.

Zurn Industries is one of the few corporations in the United States that has a clear charter in this field; we are an environmentally oriented company.

Senator BOGGS. I see.

Mr. BOWERMAN. Zurn Industries is currently manufacturing and marketing about $80 million a year worth of air pollution, water pollution, noise pollution, and solid waste management equipment.

I am speaking to you not only as a representative from industry, but from 18½ years of experience with government. I used to be the assistant chief engineer for the sanitation districts in Los Angeles County and had the privilege of developing the solid waste management porgram in that county.

In putting together this very brief statement, I reviewed the testimony that your committee has heard, and decided it would be worth saying something different.

Senator BOGGS. Very good.

RECYCLING AND REUSE

Mr. BOWERMAN. If what I say sounds a little simplistic, if it sounds as if I am not stressing recycle and reuse, please be assured that I am a strong advocate of recycling refuse for reuse. I think it is a very important part of our work. But I will to emphasize some other aspects of solid waste management that have been overlooked in the hearings.

Senator BOGGS. Very good.

PROBLEM DEFINITION

Mr. BOWERMAN. If it seems at times a little difficult to state precisely what the Nation's problems are in the management of solid wastes, it is probably because of a failure to recognize that there are two quite dissimilar aspects to the problem.

The aspect that we most often read or hear about is the improper disposal of solid wastes on the land so as to create unsightliness and blight, or air pollution from burning, or water pollution through improper placement of solid wastes.

This is by far the most visible and dramatic part of the problem,

and undoubtedly the one that should receive the greatest immediate attention.

What I am going to stress here, Senators, is that if we are primarily interested in an immediate improvement of the environment, then we should spend our resources—talent and money—to correct the most pressing problems first.

DISPOSAL

The solutions to most solid waste problems of environmental pollution are simple and direct, and in many cases not overly expensive.

Most communities in the United States could today, for a modest investment, convert open and burning dumps into sanitary landfills which neither pollute nor destroy the usefulness of the land.

The few very large centers of population that may find it unreasonably expensive to haul to distant sanitary landfill sites do have incineration technologies available that would provide for the pollution-free reduction of volume of solid wastes. Zurm Industries Inc. is currently marketing a municipal incinerator that can meet even the most restrictive air pollution codes to be found in the United States. Zurn's VKW (Dusseldorf) system will reduce the volume of municipal refuse to about 5 percent of the original and create an ash that is stable and suitable for reclaiming lands for construction of buildings or other such uses. This would permit economical hauling of the reduced volumes of ashes to the more distant land disposal sites.

Any community in the United States could correct its environmental problems resulting from solid waste disposal by applying either or both of these two well-proved technologies.

This is not to minimize the importance of the recovery and reuse of resources, for landfills can be considered, in all practicality, as storage reservoirs for metals, glass, and other waste materials that will be available in some form to future generations if and when the economics of salvage would justify their mining and recovery.

And as an aside, this has already been done. It is not a fanciful idea. In Israel they have been recovering many of their old dump sites for composting and recovery of metals and glass.

Modern incinerators such as the Zurn VKW system, incorporate heat recovery through the generation of steam, and are a technology in which direct recovery of certain values, that is, fuel values of the solid wastes can be utilized by the community in place of the burning of fossil fuels.

Furthermore, studies by the Bureau of Mines have indicated that incinerator ash can be considered as a raw material source for metals and glass and certain chemicals that may prove to have sufficient value to make the separation and extraction process worthwhile.

Indeed, as is being demonstrated by a few somewhat successful attempts at pyrolysis and composting and direct salvage, the basic landfilling and incineration processes can be supplemented by such salvage processes wherever the economics and the need for such resource recovery exists.

Stated bluntly: technologies for suitable and satisfactory solid waste disposal are available. There remains yet the task to plan, design, build, and operate such systems, thus eliminating once and for all the ugly open dumps or burning dumps that blight our country's landscape.

This may all sound too simple to be readily accepted, but please be aware that concepts of baling and rail haul and grinding and other such interesting aspects of solid waste management are but means whereby the utilization of landfills or incinerators become more effective or economical. They are in themselves only means for processing wastes and do not represent solutions to the ultimate disposition of the wastes.

COLLECTION

The other aspect of the problem is seldom discussed, and very poorly understood. Most of the six or more billions of dollars that we are spending annually on the handling of solid wastes are spent in the bringing together of the wastes into some location for salvage or disposal.

Most of these billions of dollars are being spent on collection systems that are little improved over those that served our grandparents. In trading the horse for the internal combustion engine, we have improved somewhat the speed with which door-to-door pickup can be accomplished, but really very little improvement.

The real inefficiencies and wastage of funds result from the fact that we have not developed better systems for collecting refuse in the last 50 years, and, unfortunately, we see very little being accomplished by way of using systems that will be more efficient, provide better sanitation, and some relief for the harried housewife from the ever-increasing task of collecting trash baskets full of refuse and emptying them into the conventional garbage cans to be carried to the curb for pickup.

Let us take a look at these refuse collection systems. A little more than half the work is being done by private industry under contract or through enfranchisement, with private collectors tending to concentrate more on the collection of commercial and industrial wastes, leaving the household refuse to be picked up by local government employees.

This seems to be particularly true in our very largest cities. The responsibility for household refuse collection is about split between private industry and government service in the middle-sized and smaller communities.

It is not wise to generalize as to whether private industry or government is doing the better job, for examples of the very best and the most miserable can be found in either private or public systems.

My personal observation is that a private collector can do as good and possibly a somewhat more economical job than government, provided that the contract services are being paid for at a rate that will allow the contractor to buy and pay for high-quality equipment and high-caliber employees.

Many communities buy cutrate services through loose bidding practices that place the collection contract in the hands of a private operator who is then insufficiently funded to do an adequate job.

Such collection systems usually offer the most deplorable services, with outdated and unsafe equipment, and with operating personnel hired from the skid rows of the community.

On the positive side, the American Public Works Association and the National Solid Waste Management Association, representing the

public and private sectors, have been working cooperatively with the Public Health Service in the defining of model contractual agreements to provide services that will protect the health and safety of the community and preserve the attractiveness of the city's streets and yards.

A few communities in the United States have taken advantage of the newer designs of refuse collection vehicles and are offering services that are significant improvements over the condition commonly accepted as average throughout the Nation.

Inglewood, Calif., a community of about 90,000 persons, is one such example. A young, aggressive, intelligent public works director has employed trucks uniquely designed to be driven and loaded by but one man in the curbside collection of household refuse. The men are carefully selected, they get premium wages, perform the collection service with energy and enthusiasm, and there is a standing line of recruits waiting to take their places as they move on to other city jobs after 3 years of service in the much-respected refuse collection system.

In parts of that city, a trial system involving the storage of household refuse in paper or plastic bags for cleaner and quicker loading onto the collection truck is starting to show considerable promise in reducing litter around the home, and in minimizing flies by eliminating the garbage can with its inevitable residues that remain to breed the next generation of flies.

Such systems will not be cure-alls, but represents a trend toward improved services to the homeowner, with perhaps the most important attribute being the lessening of fly and rodent populations through cleaner containment of solid wastes at the home, and somewhat less ugly systems for storage both at the home and at the curb during the collection period.

Inevitably, labor intensive systems will be displaced by systems which use mechanical systems for collecting the solid wastes from each residence. Pneumatic systems, developed in Europe, are slowly finding application in this country for high-rise apartments and hospitals.

The water transport of food wastes ground through kitchen garbage disposers is a 30-year-old fact in this country, but the possibilities of utilizing our sewerage systems for carrying greater quantities of organic wastes, such as paper, cardboard, plastics, et cetera, has been very superficially explored, even though it appears to be an idea that could transport considerable tonnages of materials now handled by human labor and hauled by trucks.

Looking far enough ahead, one could possibly envision a transition from glass and metal containers to those made of fiber or plastic, so that they, too, could be ground to the sewers for collection by the already existing sewerage system.

If fully automatic systems, using pneumatics or water conveyance, appear to be principally suited to the convenience and cleanliness of the more affluent, consider for a moment the dramatic improvement that would result from building such systems in congested slum areas, providing ready and convenient disposal of solid wastes in lieu of the all-too-familiar mounds of debris found in halls, alleys, and streets.

In summary, my plea is for a closer look at the neighborhood aspects of solid wastes management, recognizing that the most common trash dump is in our own backyard or alleyway or street side, and not just as the town dump.

How about a little more concern for the women of our homes who collectively spend more time with the solid waste problem than any other segment of our population? Maybe it's time we provide her with some options as to whether she would like to continue to be the Nation's top garbage collector.

And, Senators, I really don't say that facetiously. I think that we have spent far too little of our efforts in dealing with the problems in our own neighborhoods, while thinking too much about the town dump.

Senator BOGGS. I am sure that is true. But I was interested, as well, in your whole testimony, but when you mentioned that in Inglewood, Calif., the idea of having one man on the truck—how does he do that? How does he drive the truck and also collect?

Mr. BOWERMAN. It is quite fascinating to watch. The truck is designed with a jump seat at the curb side, and the man drives from a right-hand side position. He has the usual controls on the left side for going to the disposal site, or when he is driving in regular traffic, but on the collection route he half-stands and half-sits on this jump seat at the side of the curb. He drives up to the cans or the bags of refuse along the curb—the loading position is right behind the cab, so he simply steps two steps to the rear and tosses the material into the loading space behind the cab. He does not go around to the back end or front end of the cab.

It is one of those situations where the machine was built for the purpose, not the man simply adapted to an existing machine.

Senator BOGGS. I see.

LOS ANGELES

Mr. Bowerman, I understand, that you were instrumental in establishing the Los Angeles County system, and that the Los Angeles system is considered one of the best in the country today. Do you retain any position with the county?

Mr. BOWERMAN. No, sir; I have been with private enterprise for the last 5 years.

I did have the privilege of setting that system up.

Senator BOGGS. Could you comment on the administrative problems in setting up a regional organization?

Mr. BOWERMAN. Yes. I started out in 1948 to develop a program that finally came to fruition in 1957, with the opening of the first landfill in Los Angeles County operated publicly and open to the general public.

Please note that these things don't really just happen overnight. In spite of the fact that we are moving toward new technologies, my experience indicates it takes close to 10 years from the development of the new idea until it becomes a practically applied, widespread operation, and we need to do things right now to our environment; therefore, we should deal with the problems at hand with the technologies that we have at hand.

The system that I helped develop in Los Angeles County involved 76 different cities in one county. It involved a great deal of personal work on my part to deal with the individual city councils.

It was a selling job, Senator. It involved going to the cities and convincing them that what we proposed to do was to provide for

them a disposal service—not take away from them some of their prerogatives, but rather to give to them an opportunity to make use of a regional system, to their economic advantage.

I found quite the contrary on collection. The cities did not want a regional collection system, in part because of the old spoils system, if I may say so, but in part because each city likes to do it its own way. One city may have backyard collection, the next may have curb side collection.

And so I found strong resistance to setting up a regional collection system, but I found a warm welcome, eventually, for a regional disposal system.

Senator Boggs. Thank you.

RECYCLING AND REUSE

Mr. Bowerman. May I just comment on S. 2005 and the Boggs amendment?

Senator Boggs. I wish you would.

Mr. Bowerman. First, let me reemphasize that Zurn Industries and I strongly support recycling and reuse. We feel that this is ultimately to be one of our solutions—not the only solution, but one solution for solid waste management. However, recycle and reuse must be considered as supplemental to a disposal system.

You have to dispose of the refuse, whether you want to or not. You can elect to recycle and reuse.

CONSTRUCTION GRANTS

Second, I would like to support the position of Mr. Gershowitz on the construction grants. I feel, having been in public service and now in private industry, that loans, made available to both the public and private sector, would encourage a maximum participation of both private and public talent.

I would also emphasize that loans should only be for qualified programs, and here is where the Public Health Service must set up specific standards.

Also, I have a suspicion that someone receiving a grant is more apt to spend it on a speculative or risky process than on a loan, just because people are built that way. If you receive something as a gift, you treat it a little bit differently than if you have to pay the money back. I think that loans would make for qualified programs that would be really "hard-nosed" programs, real solutions, and not fly-by-night types of things.

I would like to support the National Materials Policy Amendment.

Senator Boggs. I appreciate that. Glad to have your views on it.

Mr. Bowerman. I would like to see it go further. I really feel strongly about this, and here I have had an advantage in working with Don Frey and Bob Crozier on the National Academy of Science/National Academy of Engineering study, and before that the National Academy of Science's study "Waste Management and Control." I am quite aware of the fact that these things don't happen in a year's time, Senator.

In order to determine upon a national materials policy, I think it is

going to have to be a continuing function. I think the idea is very sound, but I would like to see it on a continuing basis.

Senator BOGGS. Thank you.

Mr. BOWERMAN. One last suggestion. I feel there is a need for a strong manpower development program within the Federal Establishment.

I think the training programs that have been conducted by the Public Health Service, through the solid waste program, have over the years proved to be very effective. I participated as an instructor in many of these. I know that there is an enthusiastic response from the people at the local level who participate in manpower training programs. However, I would like to emphasize the fact that I think those training programs should be within a clearly identified solid waste program. I don't think they should be part of the general public health training program, because we are talking about experience such as running sanitary fills, and experience such as operating incinerators.

Senator BOGGS. Tied to solid waste disposal.

Mr. BOWERMAN. Yes, sir, so it should be oriented right into the solid waste program.

Thank you very kindly for your invitation.

Senator BOGGS. We certainly thank you and value your testimony.

(Following the hearing the letter below was sent to Mr. Bowerman by Senator Muskie:)

APRIL 21, 1970.

MR. FRANCIS R. BOWERMAN,
Assistant to the Vice President,
Zum Industries, Inc.,
Van Nuys, Calif.

DEAR MR. BOWERMAN: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formulation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide an answer to the following question:

Section 209 of S. 2005 authorizes the Secretary of Health, Education, and Welfare to recommend standards for solid waste disposal and collection systems. What form do you feel these standards should take? What do you consider the value of requiring the Federal issuance of recommended collection and disposal methods, similar to those in the Air Quality Act of 1967, as guidance to State and local governments?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution.

(Mr. Bowerman's response follows:)

ZURN ENVIRONMENTAL ENGINEERS,
LAND POLLUTION CONTROL DIVISION,
Arcadia, Calif., May 19, 1970.

HON. EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution,
U.S. Senate, Washington, D.C.

DEAR SENATOR MUSKIE: Thank you for your letter of April 21, 1970; I enjoyed the opportunity to present testimony to the Committee on Air and Water Pollution during the Washington, D.C., hearings on solid waste legislation. I also enjoyed your remarks at Congressman Ryan's Tenth Annual Westside Community Conference on April 18, 1970, at Riverside Church.

I endorse your stand on the need for meaningful legislation to protect and restore our environment and lend you my support in your efforts. I further

endorse Bill Ryan's strong stand in defense of environmental pollution control; both you and Bill have been long identified with the need for improved means for protecting the environment and fought the battle long before it became a popular one. I was pleased to present a discussion on the new technologies developing for the management of solid wastes at the Riverside Church Conference during the afternoon session following your presentation at the plenary meeting. I trust that we shall meet again at some future conference or hearing.

As to the question concerning Section 209 of S. 2005, I endorse the recommendation of standards for solid waste disposal and collection systems and feel that these standards should take the form of "performance" standards rather than specific detailed specifications. For example, standards can be expressed as to the desired end results for a given process procedure, such as the daily covering of sanitary landfills with earth or the limiting of particle discharges from incinerator stacks of not to exceed, say $\frac{1}{10}$ths grain per standard cubic foot of flue gas. In comparison, detailed specifications could be written which would describe the type of equipment that would be considered appropriate for the placement of daily cover on compacted refuse of sanitary landfills, and also a detailed specification could be drawn as to the type and manner of placement of the soil cover. On incinerator discharges, a detailed specification could be written that would require a specific type and size of hardware, and thus limit the selection of alternative means for achieving the desired end result, i.e., the control of concentration of particulate matter in the stack discharge. I firmly believe that standards to require performance to certain minimum requirements would allow the ingenuity of industry to provide the machines and hardware to achieve the desired performance level. Standards requiring specified hardware would tend to stultify and "cast in concrete" the machines and devices presently available and would undoubtedly result in a slower progress towards improved hardware technologies.

My very best wishes for your continued success, both politically and in your fight for a better environment.

Sincerely,

FRANK R. BOWERMAN,
Vice President.

Our next witness is Mr. Joseph W. Leonard, coal research bureau, West Virginia University, Morgantown, W. Va. Mr. Leonard, we are glad to have you here.

STATEMENT OF JOSEPH W. LEONARD, DIRECTOR, COAL RESEARCH BUREAU, WEST VIRGINIA UNIVERSITY, MORGANTOWN, W. VA., ACCOMPANIED BY HARRY SHAFER

I have to apologize to you, for I have a commitment I must attend to. But I understand that the distinguished chairman of the committee, Senator Randolph, of West Virginia, is going to be here. That is a happy coincidence.

Mr. LEONARD. I would like to introduce my colleague, Mr. Shafer, from Morgantown.

Senator BOGGS. Glad to have you here, Mr. Shafer. As I just said, we are happy that Senator Randolph, our distinguished chairman of the full committee, is going to be here. I ask you to excuse me.

Senator Randolph, I have a commitment at 12:30. If you will excuse me?

Senator RANDOLPH (presiding). Senator Boggs, we are very grateful that you moved these subcommittee hearings forward.

Senator BOGGS. Thank you.

Senator RANDOLPH. All members have attempted to be helpful. This is the fourth of the sessions that I have attended a part of, and we do the best we can.

Senator BOGGS. Thank you.

Senator RANDOLPH. We are delighted to have two gentlemen from

West Virginia with us this morning. We of course recognize the leadership of Mr. Joseph W. Leonard.

Mr. Leonard, your background of creative efforts in the fields that are of interest to us. And West Virginia, as the largest coal-producing State, is involved to a very great degree in what is happening these days.

I read day before yesterday a column by Maury Siegel in the Washington Star commenting on the candidacy of of Sam Huff for the Democratic nomination for Congress from the First District of West Virginia. And Mr. Siegel is an excellent sportswriter, but it shows that sometimes, persons that move into other fields are not perhaps as well informed. He called West Virginia a hard coal State. And Mr. Leonard, it is a soft coal State, isn't it?

Mr. LEONARD. This is correct, sir.

Senator RANDOLPH. We have no hard coal in West Virginia, but we have, of course, plenty of soft coal.

Incidentally, Maury had Mr. Huff campaigning in four or five counties that he listed, and all of them were in the area of the Second Congressional District of West Virginia.

Mr. Hewitt, who is sitting here this morning, of our staff, is Mr. Jefferson County. J.B., he had Mr. Huff campaigning in Jefferson County. So you see what happens sometimes, when men talk and write about subjects on which they are not informed. We may strike all this from the record, but it doesn't hurt to talk about it at the moment.

Mr. Leonard, because you are informed, and you come to talk with us today, and we are intensely interested in research, affecting coal and its production and use—I do know that at several locations in our State coal research activities are being pursued, and these activities are Federal, State, and often private sponsorship, in nature.

COAL RESEARCH PROGRAM

One of the most exciting and I think productive of these programs is at the university in Morgantown, where we have a school of mines, and we also have a coal research bureau. For many years this important work has been carried on in the bureau, in a variety of what I call imaginative research projects, and there is a potential impact and not only in West Virginia, by what you are doing, Mr. Leonard, but throughout the country. Certainly the bureau's interests are evidenced in its study of waste materials that are produced by the burning of coal. While coal is our most abundant fuel, and the one in widespread use, it also creates significant amounts of residues, and these of course have to be disposed of somewhere, and in some method. So it is primarily the problems of coping with waste materials that concerns us as members of the subcommittee in these hearings.

The West Virginia University coal research program is intimately involved in solutions, at least partial in nature, to these problems, and you have done not only interesting work, but highly significant work in converting coal waste to what I would call useful purposes; notably, a process for manufacturing the building bricks from fly ash, and the other programs that you have brought forward.

Your work has carried you into other fields, but again, and not

unpleasantly, I think, Mr. Leonard, you have been creative and resourceful, you and your associates, and I think you understand the problem. You understand that there is a need for recycling. You understand this very well, by what you have already learned and accomplished, and so I welcome you as a witness. And Mr. Shafer, we are glad to have you accompanying Mr. Leonard today.

Mr. SHAFER. Thank you. It is a pleasure to be here.

Senator RANDOLPH. And what you say, Mr. Leonard, will be of value to us. Will you proceed in your own way to discuss the matters with which you are intimately and so effectively associated.

Mr. LEONARD. Perhaps a few comments about our history.

The coal research unit was estbalished in 1961, to assist with the coal research and coal-related research problems. We were placed in the school of mines, and since that time we have been actively pursuing a number of areas of coal research. It is very appropriate that people with mining experience be included in any solid waste program, because many of the methods that we use to recover values from solid wastes have been in existence for years as part of that segment of mining technology known as mineral beneficiation or mineral processing. So when we talk about extracting or recovering values from solid wastes, those of us who are in mining feel very much at home.

After all, solid waste, to us, is just simply an artificial mineral deposit, to be attacked in a manner similar to that which a mining engineer will attack a natural mineral deposit.

When we started on the program that led to new uses for solid waste, our objective was somewhat different than our present objective. We were trying to find a backdoor approach to the utilization of coal, and here, 7 or 8 years later, we find that without any previous planning, and by sheer coincidence, we run headlong into an area of high national priority, making use of solid wastes.

Senator RANDOLPH. Mr. Leonard, you said you were trying to find uses for coal?

Mr. LEONARD. Yes.

SYNTHETIC FUELS

Senator RANDOLPH. You will recall, of course, your knowledge of the subject, when we first initiated the effort there, we were carrying out the provisions of the Synthetic Fuels Act, of the middle 40's.

Mr. LEONARD. Yes, sir.

Senator RANDOLPH. Where under the impact of the conditions of war, with the possible stoppage of shipments at sea, with the menace of the German submarines, we were thinking in terms of the production of gasoline, gasoline that could be used to fuel aircraft, and so we turned to not the possibility of doing it at a price commensurate with that of oil products, but for coal products, because we wanted to know if we could do it, if price was not involved.

Of course, it was determined there and at other points that it could be done. I want the record to indicate that I recall when we had gasoline processed from coal, and this was done in a program at Morgantown and other places, and I flew a plane from Morgantown to Washington with gasoline that had been processed from coal, and we made it safely across the Alleghenys. That is the first and only flight in this country that has ever been carried forward by coal, gasoline that came from coal. We had to add some lead, which isn't too popular now.

I am sorry. A period of nostalgia, but remembering those events, somewhat the hazards of that trip, you know. But you were saying, find uses for coal, and yet as you have attempted to find those uses, not so much by the backdoor, but while doing that, you found something else, answers a need, you believe, a need in today's environmental struggle in which we are all engaged. Is that right?

Mr. LEONARD. Yes. This research that we have done was an appendage to the coal utilization picture, but I believe it is even more timely in the solid waste disposal picture. Our Nation's growing economy has burdened us with mammoth problems of solid waste disposal and has caused poor use of thousands of acres of valuable land for disposal areas. The coal and coal consuming industries, directly or indirectly, generate large tonnages of solid wastes in many forms—coal ash, preparation plant refuse, mine drainage sludge and anthracite and bituminous culm banks.

COAL WASTE UTILIZATION

Current annual production of coal ash alone exceeds 30 million tons. Annual production of all solid coal wastes exceeds at least 120 million tons and possibly as much as 200 million tons. In 10 years, these annual figures should exceed 50 million tons and 200 to 300 million tons, respectively.

Potentially, however, these coal associated wastes can cease to be a problem and instead provide an answer, in whole or in part, to other major national problems including housing and land shortages. Currently, only a small fraction of coal wastes are utilized in such applications as concrete, cement, and lightweight aggregates and much research is needed to promote greater utilization in these and other areas.

Much greater emphasis on coal waste utilization is needed. With adequate research funding, successful applications of coal wastes in production of low-cost housing components are highly probable. Interior panels, fired and unfired brick and block, grouting, insulation, tile, and virtually every major structural component can conceivably be made from coal wastes at low cost.

BRICKS

One major example of how solid waste disposal and pollution control can be made economically attractive and profitable to industry, and thus readily accepted, are the processes for producing structural products from flyash developed by West Virginia University and sponsored by the Department of the Interior's Office of Coal Research and Bureau of Mines.

Mr. Shafer, I wonder if you would display some of the bricks and some of the mineral that we produce.

I would like to digress from my text for a moment, and make some comments about these.

Senator RANDOLPH. I would suggest, Mr. Leonard, that Mr. Shafer can stand here, and I would want the members of our audience, as well as the chairman, to see and then, of course, they will listen to your presentation. If you will just stand there somewhere so they can also see.

Mr. LEONARD. We have in Morgantown a pilot plant for turning

coal ash, which originates from powerplants generally in the metropolitan area, into useful products. And these fired structural products that you are looking at are made entirely from coal ash.

The process appears to be quite economical. We have detailed cost studies. I believe we can produce bricks at about $30 a thousand bricks. Actually we make many other types of structures, but bricks are a very handy display piece, and they are handy to bring here. We have rather large blocks that we fire.

Senator RANDOLPH. How would the weight of this brick be in comparison with the regular brick?

Mr. LEONARD. This is about two-thirds the weight of regular brick, Senator.

Senator RANDOLPH. That is to its advantage, then?

Mr. LEONARD. Yes. This lends itself well to high-rise construction, and to handling, and——

Senator RANDOLPH. Has this product been used in housing projects?

Mr. LEONARD. This is still in the research stage.

Senator RANDOLPH. Still in the research area?

Mr. LEONARD. We are at a point where I think we may be ready to go commercial. I think that we can equip entrepreneurs with enough information on technology to allow them to go commercial with some speculation.

Senator RANDOLPH. Now this information, know-how; that would be given, free?

Mr. LEONARD. Yes.

Senator RANDOLPH. There is no cost attached to it?

Mr. LEONARD. It is public property.

Senator RANDOLPH. Public property; yes, sir. And then the company or companies that believed that this was a product that could be used, they could move it very quickly, if they felt that it does what you say, because it would seem that it would be practical and feasible, and what would the cost be?

Mr. LEONARD. Yes.

Senator RANDOLPH. What would the cost be?

Mr. LEONARD. They would run about $30 per thousand bricks. Of course cost is dependent upon location. This would be obvious. Our costs range anywhere from $17 to $33 a thousand.

Senator RANDOLPH. What is the cost of our regular brick?

Mr. LEONARD. The current selling price of average, regular grade brick, would run around $65 a thousand.

Senator RANDOLPH. And what is this cost?

Mr. LEONARD. Between $17 and $33 a thousand, to produce.

Senator RANDOLPH. This then is less than one-third.

Mr. LEONARD. Yes.

Senator RANDOLPH. Is that correct?

Mr. LEONARD. Yes. It is about a third to a half the cost of regular brick.

Senator RANDOLPH. A third to a half.

CANADIAN PLANTS

Mr. LEONARD. It is an extremely attractive economic proposition, and we expect to see probably the first plants go in in Canada. There are people working on this now.

Senator RANDOLPH. Why would Canada be the first?

Mr. LEONARD. Apparently the Canadian Government has been very active in solid waste legislation, and they have a business structure that is based less on free enterprise, that will insure the succes of the project. It does look like we may have our first two plants there.

Senator RANDOLPH. Let me ask you, Mr. Leonard, about the possibility of plants in West Virginia. Now the reason I mentioned this situation is because as you well know, we have brick plants in the State of West Virginia. We have, I recall, one in the Grafton area. I should remember the actual locality. I know exactly where it is, it is in the Grafton-Clarksburg area. We have plants in Martinsburg, W. Va. We have plants at North Mountain—J.B., am I right?

Mr. HEWITT. Yes, sir.

Senator RANDOLPH. And maybe some other plants, North Mountain being in the vicinity of Martinsburg, so perhaps, although I am not sure, we would have several brick plants that in fact employ several hundred persons at the present time, in West Virginia.

Now what interests have those owners shown toward this effort?

Mr. LEONARD. The greatest interest to date comes from the Charleston area, where the brick producers in that area have cooperated through and with the power company, to undertake rather extensive engineering studies on this brick.

Senator RANDOLPH. Well, now, United Clay Products, I recall, has two plants in West Virginia, and maybe three plants, but United Clay is a very large concern. Have they shown an interest, as has Mr. Taylor Chewning, the president of that company, whom I know? Has he knowledge of what you are doing?

Mr. LEONARD. No, to answer your question directly, I am not aware that he is interested in this, or that he has made any inquiries.

We have had inquiries from the president of the West Virginia Clay Products Co., and also from the Charleston Clay Products Co.

NEW INDUSTRY

Senator RANDOLPH. I think it is very important, Mr. Leonard, to emphasize what you have told us, and that is that here is a brick that is less in weight than the present brick, that is much less in cost than the regular brick.

Mr. LEONARD. Yes, sir.

Senator RANDOLPH. Is this right?

Mr. LEONARD. The costs that I am giving you are production costs, and the cost I gave you for clay type bricks are retail costs. But we have made some studies, in cooperation with the West Virginia clay industry, and find that the cost of their raw material is so high that on the basis of raw material purchases alone, their cost is considerably higher than the cost of the flyash brick. The interesting thing about the flyash bricks is that it fires in short periods. The economics is great. For example, it will take perhaps 90 hours to fire a clay brick. We can fire a flyash brick in 24 hours. This is because the flyash brick is already free of most water, and all of the phase and state conversions in the chemistry of the substance was already completed, when the flyash was burned at the powerplant. We have many things working for us, all of which result in a much shorter firing cycle. The eco-

nomics, Senator, are an individual thing, and they have to be examined at each site in question. The economics of these bricks are quite favorable, in just about all instances.

Senator RANDOLPH. Proceed. Perhaps I broke the continuity of your discussion of these products, but I am intensely interested in the practical aspects, the marketing of these products, as well as, of course, their manufacture.

Mr. LEONARD. Yes.

Senator RANDOLPH. And to me, you open up a very challenging opportunity for plants in West Virginia, that are now clay brick in nature, that they become flyash in nature. Is this correct.

Mr. LEONARD. This is correct.

Senator RANDOLPH. I am not attempting to close out an industry, but certainly there is opportunity here, apparently, to create a new industry. Is that not correct?

Mr. LEONARD. Yes. The interesting thing about it for West Virginia is that we have high valued buff-burning coal ash in some of the places where the available clay burns red. Hence, this does offer interesting and compatible economic possibilities in that different colored brick could be produced. I will continue.

As a result of relatively modest Federal research funding, these processes have been developed to the point that brick, block-an mineral wool, equivalent or superior in quality to their conventional counterparts, can be manufactured at significantly lower costs and marketed at extremely attractive profit margins. Research efforts of this nature should and can be the underlying theme of environmental control—development through research of methods of using our wastes in a manner which is attractive to industry and compatible with our economic system.

SWEDEN

Many other nations have made great strides in using coal wastes for housing and housing components. In Sweden, for example, coal wastes are the primary raw material for building construction and eclipse all other materials in volume used. Over 80 percent of all flat roofs in Sweden are composed of a structural product manufactured from coal ash. In England coal ash is used in constructing 13 percent of all walls. In the United States, however, only about 16 percent of all coal ash, less than 1½ percent of our coal wastes, is utilized.

We annually generate enough coal waste to meet our Nation's total low-cost housing needs. However, instead of emphasizing the needs to utilize these materials, we cover hundreds of acres of sorely needed land with disposal piles. If the annual production of each major mineral used in the United States was placed in piles, only five piles would be bigger than our coal ash pile. These piles are coal itself, iron ore, stone and gravel, and cement. If these coal wastes were added to the ash pile, the new pile would dwarf everything except sand and gravel, stone, and the coal pile from which the waste came.

Coal wastes are a virtually untapped mother lode of building materials and minerals which are not now utilized due to various technological and economic limitations. However, with a greater awareness of our growing problems, more and more demands are placed on Government and industry and these demands could shift the picture from

one of disposal without reuse toward one of maximum public benefit and conservation of land and materials. The potential for meeting our Nation's low-cost construction needs exists in coal.

As you consider the problems of solid wastes, remember that coal wastes produced in 1 year alone could cover the District of Columbia to a depth of over 1 foot. We cannot afford to overlook this combined problem and opportunity any longer.

Thank you, Mr. Chairman.

CONSTRUCTION MATERIALS

Senator RANDOLPH. Mr. Leonard, you have said that it is economically feasible, this process, and that there are ways that are now proven, and are available, for converting coal wastes into a variety of building materials. Now has there been any move—you explained that there has been an agreement—toward taking advantage of these opportunities, beyond what you have indicated as you have talked?

Mr. LEONARD. There has been considerable movement. There is much activity which appears to offer the promise of results. Much activity, for example, in the Detroit area, in Colorado, in New Jersey, New York, New York City, Pittsburgh and Charleston, W. Va. There are people in these areas who have spent significant amounts of time and significant amounts of money on examining the feasibility of going into business. Of course, I mentioned earlier the people in Edmonton, and Toronto, Canada. I think they will be the first in. They seem like they are coming on strong. And of course, as we continue our present research on these bricks, we are able to gain more and more knowledge. This is the thing that we are concerned with now.

Senator RANDOLPH. You have an improved product, then, that you think is in being?

Mr. LEONARD. Yes, it is constantly being improved, both technically and economically, and we are reaching toward a point where we think the product is going to become economically and technically irresistible. We feel that the economics and the technology are approaching that point now.

Senator RANDOLPH. You look upon your role, Mr. Leonard, as one of indirect selling, as well as improving this product through research and experimentation? You put yourself in the position of attempting to create market interest?

Mr. LEONARD. No, we are strictly a technology-based organization. Of course, we can create market interest by making a better product, and cutting economics and costs and doing everything we possibly can to highlight the values of this product, so that I guess you might say it is a subtle effort to influence the uses of this material, but the activity of selling is somewhat out of our mandate of responsibility.

Senator RANDOLPH. Mr. Leonard, this may be a facetious comment, but I don't mean it in that way, the regular brick has no hole in it. You have a hole in this brick. What is the point?

Mr. LEONARD. Oh, yes. Well, when I mentioned about being one-third lighter, I mean the substance is one-third lighter. There is no overriding reason for the hole, except to say that there are some bricks made this way, and we liked it, so we decided we would put holes in; they are easier to carry. Also, they reduce the bulk weight of the brick

without reducing strength below specifications. We can make them without holes, we can make them with larger holes, or many small holes. We have stayed with this pattern, because it is a popular clay brick pattern, and the bricklayers that we have talked to like this arrangement. But there is no——

Senator RANDOLPH. You mean they put their fingers in and handle them?

Mr. LEONARD. Yes, they pick them up easily.

Senator RANDOLPH. I can understand this.

Mr. LEONARD. They like this. This is not disguising some sort of a deficiency in technology. It is just a form that we like, and we have been using.

Senator RANDOLPH. Well, you have discussed, Mr. Leonard, the conversion of coal wastes into construction materials.

Are there possible uses that might be made of residues, other than the ones you have told us about?

Mr. LEONARD. Yes. We have proposals in to HUD, for example, to use coal bank and coal powerplant refuse, for the manufacture——

Senator RANDOLPH. You say coal bank?

Mr. LEONARD. Coal refuse bank, rejects from mines.

Senator RANDOLPH. Oh, yes.

Mr. LEONARD. And proposals in to HUD to take this material and turn it into a lightweight interior wall construction material.

Senator RANDOLPH. That has been done in some foreign countries?

Mr. LEONARD. Yes, but in a form different from what we have in mind.

Senator RANDOLPH. Yes.

Mr. LEONARD. But we are led to believe as a result of their successful experience that we can emulate it by making alterations to the material, by making alterations employing simple, low-cost procedures which will allow us to produce certain types of interior paneling. We are not certain that this can be done, but we believe it can be done.

FLYASH UTILIZATION

Senator RANDOLPH. What about the combustion products of coal? Are these waste in nature? Am I correct in saying that?

Mr. LEONARD. Yes, these are wastes and the combustion products of coal, of course, the solid waste, would be so-called flyash. Flyash is very fine, and it is called flyash because it tends to fly out of the boiler. Because it is entrained with the air and is carried out. We also produce bottom ash, which is generally coarser than the flyash, and is not entrained with the air and, hence, falls into the bottom of the boiler.

Now we do produce other combustion products, sulfur oxide gases, for instance.

Senator RANDOLPH. This could be gaseous wastes?

Mr. LEONARD. Gaseous wastes, air pollutants.

Senator RANDOLPH. What about particulates?

Mr. LEONARD. Yes. We have aerosols that come from powerplants. These would have to be largely marketed as some sort of a chemical raw material.

Senator RANDOLPH. Now there are pollution regulations for air,

and what about combustion of coal? Because of these air pollution regulations, I expect there is a restriction in some areas. Is this right?

Mr. LEONARD. Yes. There are a number of areas in the United States where the restrictions are becoming more and more stringent in the use of coal, to the point where we have lost some coal markets and we are going to lose more.

COAL GASIFICATION

Senator RANDOLPH. What about the gasification process?

Mr. LEONARD. The gasification of coal would be one way to help in connection with the air pollution problem.

Senator RANDOLPH. I remember when we carried on experiments in connection with the synthetic liquid fuels efforts, back in the 1940's, with the program in, I recall, Alabama.

Have you ever been there?

Mr. LEONARD. Yes.

Senator RANDOLPH. Now I have no further questions. I don't want to cause you to stop your statement or any further comments you or Mr. Shafer would have, Mr. Leonard. Is there something further now that you want to say?

Mr. LEONARD. Nothing further, except to say thank you for the opportunity to be here and to tell you about the West Virginia program.

Senator RANDOLPH. Well, you tell me a very interesting story. I think it has the basis of that which you have already done, of the creation of new markets for new products, and once again, I presume I am provincial to agree, but I am very happy that West Virginia is improving the record, and that there are such persons as you, Mr. Leonard, who are continuing this effort to use the wastes of our product, coal, to benefit not only commercial enterprise, but ultimately, to take that which would be frankly an eyesore, in some instances, as you and I know, and even deleterious to health and to bring it into a new being.

Isn't that actually a benefit to mankind?

Mr. LEONARD. Yes, sir.

Senator RANDOLPH. Thank you very much.

Mr. LEONARD. Thank you, sir.

Senator RANDOLPH. I have here a paper by Mr. J. S. Poliskin, the supervisor of raw materials for Colt Industries comments that the "reuse of the steel in scrapped automobiles is hindered by the retention of copper in wire conductors and small motors which are costly to remove. Lower copper in the scrap can be achieved by using aluminum for the electrical conductor wiring and ceramic ferrite permanent magnets for the stators in small motors. During melting and refining of this scrap, the aluminum will oxidize and enter the slag, together with the ceramic oxides. The steel produced from this scrap will be low in copper." I would like to insert this paper in the record at this point.

(Letter and paper referred to follow:)

COLT INDUSTRIES, CRUCIBLE INC.,
Pittsburgh, Pa., February 13, 1970.

Senator JENNINGS RANDOLPH,
Senate Office Building,
Washington, D.C.

DEAR SIR: In view of your interest in the control of pollution and waste disposal, I am attaching a paper on methods of alleviating future discarded auto-

mobile disposal problems. Specifically, the paper shows how to reduce the copper contamination which now hinders the recycling of automobile scrap steel. This is achieved by the use of non-contaminating alternate materials, aluminum and ceramic, for copper in the electrical system of the car.

I hope you find it of interest.

Yours very truly,

J. S. POLISKIN,
Supervisor, Raw Materials.

AUTOMOBILE STEEL SCRAP OF LOW-RESIDUAL COPPER

(By J. S. Poliskin, Supervisor, Raw Materials, Colt Industries, Crucible Inc., Materials Research Center, Pittsburgh, Pa.)

ABSTRACT

Re-use of the steel in scrapped automobiles is hindered by the retention of copper in wire conductors and small motors which are costly to remove. Lower copper in the scrap can be achieved by using aluminum for elecrical conductor wiring and ceramic ferrite permanent magnets for the stators in small motors. During melting and refining of this scrap, the aluminum will oxidize and enter the slag, together with the ceramic oxides. The steel produced from this scrap will be low in copper.

AUTOMOBILE STEEL SCRAP OF LOW-RESIDUAL COPPER

(By J. S. Poliskin*)

The accumulation of scrapped, obsolete automobiles has been identified as an esthetic and resource problem within the United States. (1) The federal government, through such offices as the Bureau of Mines of the Department of the Interior, the Business and Defense Services Administration of the Department of Commerce, and the Bureau of Solid Waste Management of the Depeartment of Health, Education and Welfare, has studied the automobile disposal problem. These bureaus concerned with solid forms of environmental pollution and the conservation and use of resources of the U.S. have conducted investigations and sponsored research on this problem. The largest automobile producer in the U.S. has reported [2] that the accumulation of scrap automobiles rose from about 14 million in 1960 to about 18 million in 1967. The Institute of Scrap Iron and Steel has sponsored conferences and urged research and other assistance in the disposal of the mounting number of scrap automobiles. Some legislators have considered imposition of a tax on the sale of an automobile to pay for its ultimate disposal.

The components of a typical scrap car (2) have been detailed as:

	Pounds
Hulk or body	1,100
Engine and transmission	850
Heavy melting, frame, axles, drive shaft	900
Combustible and debris	400
Glass, miscellaneous	90
Total	3,340

The major disposal problem resides in the hulk which remains after removal of all the other parts listed above. The removed parts are usually salvaged separately or sold as replacement parts for other cars. The sole large outlet for the hulks is as scrap for remelting into steel. However, technological advances of the past decade in steelmaking have imposed economic and quality limitations on the use of car scrap. Improvements in blast furnace productivity of molten metal and increasing adoption of the fast-moving basic oxygen furnace have resulted in reducing demand by the steel industry for scrap in general and high impurity bearing automobile scrap in particular. Basic oxygen furnaces normally take only about 30% scrap compared to 50–100% scrap in open hearth furnaces and 100%

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*Supervisor, Raw Materials, Colt Industries, Crucible Inc. Materials Research Center, Pittsburgh, Pennsylvania.

scrap in electric furnaces. However, increased use of scrap by preheating it externally to the basic oxygen or electric furnace is under development and will lead to greater scrap demand.

Industry has not yet developed economic methods for processing all used steel products, particularly automobile bodies into acceptable grades of steel scrap. As others have pointed out (1),(2), a major hindrance to the greater acceptance of automobile scrap for steelmaking is its copper content. Despite removal by stripping of the large copper bearing components such as the radiator, generator and starter, much of the copper in electrical conductor wiring and small covered-over accessory motors remains in the hulk because the expense entailed in its removal is considered excessive. This applies to the two common methods of processing hulks for scrap, i.e., baling or compressing into No. 2 bundles which retain all the attached impurities, or shredding into small pieces from which some of the impurities may be removed. When the product from either of these processes is melted in steel furnaces, the copper alloys with the iron and is practically completely recovered in the steel product. Some reduction in copper can be attained by reacting molten iron with sodium sulfate(4),(5),(6), but none of the melting and refining methods common to the steel industry today are economically capable of removing copper from steel.

Although acceptable in some applications, the presence of copper is considered harmful in steel for hot working and deep drawing processes. For general use in the steel industry, scrap with 0.15% Cu maximum is considered a desirable goal. However, all the commercial processes now in use for preparing automobiles for scrap have a product with copper content in excess of that value. The lowest copper presently available is in clean scrap obtained from shredded or fragmentized cars.

A comprehensive study (3) of scrap quality for the Institute of Scrap Iron and Steel Inc., and the American Iron and Steel Institute reported that No. 2 bundles produced mainly from scrapped automobiles had an average of 0.48% Cu. with a wide range of 0.0% to 1.36%. Melts of 92 automobiles by PPG Industries showed 0.40% Cu. (4) Shredders followed by magnetic separators have successfully removed much of the tramp materials including some copper from the steel in the hulks. Thus, commercially shredded cars have melted in at about 0.22% Cu. However, shredders represent a large investment, require a large volume of cars for steady feed, and require heavy, costly maintenance.

Shredders have been estimated at costing over $2 million for a capacity of up to 15,000 tons scrap per month. A 100-ton lot of scrap, obtained by processing automobiles through a ripping operation before shredding and additional screening and magnetic separators after shredding, melted to 0.16% Cu. Other scrap yards, without shredders, by exercising great care and expense in hand labor have brought the copper down to similar low levels. Thus, with high expenditures in capital equipment and labor, the copper can be reduced to about the target level. On the other hand, the increasing application of electrically driven accessories in modern automobiles, such as for raising windows and seats, will result in higher copper residuals in future automobile scrap.

A definite, direct way to lower copper in automobile scrap is through the use of less copper in the parts of the automobile which are critical to steel scrap recovery. As the normal electrical functions of the automobile must be maintained, a successful solution to the copper-in-scrap problem requires that other materials, suitable for both electrical properties and acceptability for steel melting should be used in place of the copper. Such materials are aluminum for electrical conductor wire and ceramic or ferrite magnets for stators in small electric motors.

Aluminum and copper are the two common commercial metals suitable as electric conductors. The conductivity of aluminum is 62% that of copper, but because aluminum has less than one-third the specific gravity of copper, a half-pound of aluminum can replace approximately one pound of copper as an electrical conductor. The diameter of aluminum conductor may be approximately 50% greater than an equivalent copper conductor, hence appropriate connectors must be installed for aluminum service. These facts are well known and have been used as a basis for introduction of aluminum as an electrical conductor in other industries and for overhead transmission lines. Also, in 1951, aluminum wiring was actually used in automobile harnesses because of a copper shortage at that time.(7) One problem encountered was corrosion of hood-exposed terminals, but this should be controllable.

One particular property of aluminum, not hitherto fully credited in its usual applications, should be considered in the overall automobile conductor wire applications. Aluminum is more easily oxidized than iron whereas copper is less readily oxidized than iron. Consequently, during melting and refining of steel scrap containing aluminum and copper wire in industrial furnaces, the aluminum will oxidize enter the slag, and separate from the steel while the copper will dissolve in the steel.

Thus, the steel produced will be essentially free of aluminum, but will contain all the tramp copper. The decrease in tramp analysis will be the amount of copper replaced by aluminum in the steel source. Indeed, it is normal practice in the steel industry to deliberately add aluminum to molten steel after refining to act as a deoxidizer and float away from the steel. In the U.S. about 25,000 tons per year of aluminum are used for this purpose. Aluminum wire for the parts of the automobile electrical system critical for steel scrap recovery can total more than 10,000 tons per year.

In the second application under consideration, electric motors have traditionally used stators wound with copper wire. In recent years, ceramic permanent magnets of barium or strontium ferrites have been developed and widely used as stators. Rated on usual terms of price and technical performance in industrial application, the ferrite stators are excellent. This is true for small motors of the types used with automobile accessories such as window and seat lifters, and many ferrite stators are already used in such applications. Many of these small motors remain with the steel after scrapping the car whether it be by baling into No. 2 bundles or shredding . Further conversion to ferrite stators in the accessory motors will contribute to lower copper content in the steel scrap piles of the future.

Alleviating the automobile scrap disposal by changing the materials in the electrical system adds a new dimension to the usual concepts of materials engineering. It considers both the needs of the immediate consumer of the initial product, and the needs for recycle of the scrapped product after its initial useful life is completed. This allows nonrenewable materials to be recycled, mineral resources to be conserved, unusable and unsightly scrap piles to be minimized. Fortunately, in these cases, aluminum wire and ferrite magnets can be made to suit the general technical requirements of the application and are readily available from many sources at competitive prices.

In summary, the ease of reaction and separation of foreign materials in steel refining processes should be considered by designers of systems which may enter the steel scrap market after their initial useful life is over. This factor can be particularly pertinent in the design of electrical systems for automobiles and other large steel products and appliances.

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(3) W. L. Swager. Battelle Memorial Institute 1960. The Measurement and Improvement of Scrap Quality.

(4) F. A. Settino, E. J. Stofka. Treatment of Molten Automotive Scrap to Reduce Copper Content. PPG Industries for Bureau of Mines, Contract 14–09–0070–363.

(5) H. V. Makar and B. W. Dunning. Use of Sodium Sulfate for Copper Removal from Molten Iron. Journal of Metals, July, 1969, pp. 19–22.

(6) F. C. Langenberg and R. W. Lindsay. "The Removal of Copper from Iron-Copper-Carbon Melts," Contributions to the Metallurgy of Steel, No. 51, A.I.S.I., March, 1957.

(7) Metalworking News, October 6, 1969, p. 22.

Senator RANDOLPH. I may say now that pertinent materials and statements received subsequent to today's session will be included at this point in the record. On Tuesday at 10 a.m. we will have our next meeting. Thank you, ladies and gentlemen.

AMERICAN MINING CONGRESS,
Washington, D.C., March 17, 1970.

Hon. EDMUND S. MUSKIE,
Chairman, Air and Water Pollution Subcommittee,
Senate Public Works Committee, Washington, D.C.

DEAR MR. CHAIRMAN: The American Mining Congress appreciates your invitation to testify before the Subcommittee on Air and Water Pollution on solid waste problems associated with the mining and mineral industries and potential reuse of mining and mineral waste.

We are pleased to submit the attached statements and respectfully request that they be placed in the record of hearings that your subcommittee is conducting on solid waste disposal legislation.

Mining in the United States is a diverse enterprise encompassing a myriad of mineral commodities which are extracted by differing techniques and procedures. Since mining occurs throughout the nation, mining methods are influenced by climatic and geographical considerations. To attempt to discuss the solid waste disposal problems of each and every mineral commodity in this presentation could prove burdensome and confusing.

In 1969 a report on *Solid Waste Management* was prepared for the Office of Science and Technology. This is an attempt to provide a comprehensive assessment of solid waste problems, practices, and needs. Attached is a copy of a table contained in this study showing the generation by type of solid wastes from the mineral and fossil fuel industries. Based on these 1965 figures, the mining of copper and iron account for more than 60 percent of the solid waste generated by mining.

In preparing its testimony, the Mining Congress felt it appropriate to focus on these two mineral commodities. The attached statement on iron ore was prepared by Mr. Joseph S. Abdnor, Vice President, Pickands Mather & Co., Cleveland, Ohio. Mr. Abdnor also serves as chairman of the AMC Special Committee on Surface Mining.

The second statement on copper was prepared by Mr. David Swan, Vice President-Technology, Kennecott Copper Corporation, New York, New York. Mr. Swan serves as chairman of the AMC Environmental Matters Committee.

Although these statements direct themselves to specific mineral commodities, many of the principles and problems discussed are applicable in varying degree to mining in general.

Sincerely,

J. ALLEN OVERTON, Jr.,
Executive Vice President.

GENERATION BY TYPE OF SOLID WASTES FROM THE MINERAL AND FOSSIL FUEL INDUSTRIES (1965)

Industry	Mine waste	Mill tailings	Washing plant rejects	Slag	Processing plant wastes	Total (thousands of tons)
Copper	286,600	170,500		5,200		466,700
Iron and Steel	117,599	100,589		14,689	1,000	233,877
Bituminous coal	12,800		86,800			99,600
Phosphate rock	72		54,823	4,030	9,383	68,308
Lead-zinc	2,500	17,811	970			20,311
Aluminum					5,350	5,350
Anthracite coal			2,000			2,000
Coal ash					24,500	24,500
Other [1]						229,284
Total	419,571	288,900	144,593	23,919	40,233	1,146,500

[1] Estimated waste generated by remaining mineral mining and processing industries.

STATEMENT OF JOSEPH S. ABDNOR, VICE PRESIDENT, PICKANDS MATHER & CO., ON BEHALF OF THE AMERICAN MINING CONGRESS SPECIAL COMMITTEE ON SURFACE MINING

Mr. Chairman and members of the committee, I am Joseph S. Abdnor, a vice president of Pickands Mather & Co., Cleveland, Ohio, and chairman of the American Mining Congress Special Committee on Surface Mining.

The American Mining Congress is a national trade association of U.S. companies that produce most of the nation's metals, coal, and industrial and agricultural minerals. Its membership also includes more than 200 corporations that manufacture mining and mineral processing equipment and supplies, as well as financial institutions with a business interest in the mining industry.

We are pleased to have this opportunity to make this presentation to your committee in connection with its consideration of legislation relating to solid wastes. The extraction of solid minerals from the earth necessarily creates a solid waste, as that term may be used in the broadest sense. The disposition of such waste, as well as ultimate extraction of value therefrom, has long been a prime concern of the American mining industry.

The scope of mining in the United States is extremely broad in the geographical sense, in the many different minerals mined, the various types of mining procedures, and in the varying conditions under which mining is conducted. There are few men who can speak with direct knowledge of all of these subjects related to mining, and certainly I am not one of these.

However, substantially all mining involves the extraction of solid waste material as well as minerals and is confronted with the problem of disposition of such wastes. In many, but not all cases, there is a potential recoverable value in material which has no present economic value and is, therefore, characterized in the broad sense as "waste." If I may be permitted to relate my discussion to the segment of the mining industry in which I am the most familiar—that is the mining of iron ore—I think I will be able to contribute to your consideration of the overall problem of the solid waste produced by mining.

Iron ore mining is not the largest contributor to mining waste by any means, but in 1966 the Bureau of Mines did calculate that iron ore contributed 19% of the total waste that results from mining and mineral processing. Typical of a great many minerals, the proportion of waste produced to total material extracted has increased, and will continue to increase, because of the depletion of high-grade ores, which necessitates the mining of material with a lower mineral content. In common with many other types of mining, iron ore mining has a relatively long history of large and extensive mining operations dating back to the turn of the century. In these 70 years past, our industry has created many million tons of waste material. It goes without saying that this waste was necessarily left in the general areas of the mines.

Historically, the iron ore produced was direct shipping ore. This means that in open pit mining, the earth and rock material which constituted the surface overlaying the iron ore was removed to expose the mineral. Once exposed, the ore, in its natural state, was loaded onto railway cars and transported to the steel mills. The waste material in this type of mining was essentially the earth and rock "stripped" off the mineral.

Quite simply, there were only two places to dispose of this surface waste. One was the return to the mine excavation from which the mineral had been removed. There were two insurmountable obstacles to this disposition. First, the waste was produced before the mineral was removed so it was obviously impossible to return it to the same pit. Second, even if another pit existed within economic hauling distance, good mining and conservation practice prohibited the covering of the exposed pit area because of the possible existence of low-grade mineral in the bottoms of the pits, which was not then, but eventually could become a national asset as a mineral resource. The owners of the mineral land prohibited the deposit of waste in the pit for this reason, and, the state of Minnesota, by law, established the same prohibition as to state-owned lands.

The wisdom of protecting the low-grade ores in pit bottoms has been demonstrated by the fact that these pit bottoms, in many cases, contained magnetic taconite rock, which, in recent years, has become a primary source of iron ore as a result of important technological developments.

Because of the absolute obstacles to the deposit of earth and rock waste in pits, there remained only one other alternative—creation of waste piles on the surface. The size, contour, and location of these waste piles was determined by the topography of the area, and economics, both of haul and lift, as well as the encumbrance of a minimum of surface acreage.

In mountainous or hilly country, a waste pile becomes another hill. Admittedly, the ecological considerations were not paramount in the minds of the early iron miners. Nevertheless, this waste material was earth surface which readily produced plant life and, in a few years, the natural reproduction of grasses, brush, and trees blended many of these piles into the total landscape

of the hilly area of the iron range country of the Lake Superior district. It might be noted that many of these existing piles of surface waste were the result of mines long ago exhausted and are no longer under the ownership or control of the mining companies.

In more recent years, the environmental effect of surface waste piles has become important to the mining industry. The piles are now being shaped to better fit the contour of the area. They are being planned so as to reduce and, eventually, eliminate erosion from water runoff. They are also being planted with grasses and trees to enhance their appearance. Minnesota, for example, has enacted legislation giving the state's chief conservation official complete control over these waste piles to assure proper planning for environmental purposes.

As I have indicated, the second and admittedly paramount consideration in years past has been in the economics of handling waste material. To the operator moving millions of tons of surface waste, every mile of haul to a place of deposit is a serious economic factor. This nation has always demanded a low-cost iron ore to provide industrial and consumer products of steel at a price which would make such steel products available to and for the benefit of our total society. Without low-cost iron and steel, the industrial development of this nation might never have occurred. Our people could never have availed themselves of automobiles, appliances and all the other steel products that are commonplace. This is in sharp contrast to many other nations of the world.

Today the basic price of iron ore containing 51.50% iron delivered to the steel plants on the Great Lakes is only $10.80 per long ton of 2,240 pounds. On this basis, the price of a good shipping ore of 58% iron at the Lake Erie ports is $12.16 per long ton and the value of that ore at a mine in Minnesota, before transportation costs are added, is just $8.07 per long ton. Any iron mine which cannot provide iron ore of suitable grade within this price range simply cannot operate. Every item of cost must be separately scrutinized and any long haul of mine waste would be economically prohibitive. On the other hand, the iron mining industry can and will handle its waste piles in accordance with appropriate environmental practices.

This surface material consisting of earth and rock is the first kind of waste that is common to most mining operations. The proportion of earth and rock will vary and the proportion of waste material to ore shipped will vary throughout the total mining industry. Except for some nominal value as earth or rock fill for such purposes as road or dam construction in the immediate vicinity of the mine, there is no value to be recovered in surface waste. I have no estimate of the total amount of this type of waste that exists throughout the United States. Unquestionably it runs into many hundreds of millions of tons. It is fortunate that most of this waste exists in the more or less remote areas of the nation where solid mineral mining occurs, and a good many of the old waste piles have blended into the landscape as nature has restored foliage to these piles.

After the mining of direct shipping ore was well underway, the next notable event in the process of iron mining was a turn by the industry to the beneficiation of lower-grade natural ores. These ores were not good enough to ship to the steel mills as mined. Typically, they contain 35–50% iron. The first process to raise this iron content is to wash out the sand with water, thus improving the grade of the remaining iron material. Another process involves jigging, by which the ores are put through a moving screen and gravity process to separate the rock from the better iron material. The third widely used process is known as heavy media separation, by which a gravity process in heavy density liquid separates the iron ore particles from the lighter-weight sand. These processes are not unique in the iron mining industry and will illustrate another development of waste in mining.

First, the mines with lower-grade ore created the waste resulting from removal of surface material, just as in the case of direct shipping ore, and the comments with respect thereto generally apply here.

The iron ore mines which beneficiate the ore in the manner above indicated create additional waste which may be particularly pertinent to your legislative consideration.

The fine sand which is removed through washing or heavy media separation is known as the "tailing" and is transmitted by hydraulic process to a tailing basin. The basin is located in a low or swampy area, if such is available, so as not to encumber land tillable or suited for more productive purposes. The water is taken off the basin and usually returned to the beneficiation plant for further

use in processing. Otherwise, the water is put into settling basins for clarification. The tailing from beneficiated natural ores will sustain plant life, and ground cover can be developed. In many cases, a low, swampy area can be reclaimed to a useful purpose by filling with tailing and planting with grasses.

The next additional waste created in large quantities in the beneficiation process is mineral-bearing rock. This mineral-bearing rock may contain from 33% to 47% iron, but the upgrading of most such rock on an economical basis is impossible under present beneficiation process. The more commonly encountered mineral-bearing rock is separately identified in the iron ore industry. Lean ore is the name given to more or less conventional rock containing iron units, but with a rock structure that prohibits economic separation of the iron. Paint rock is a high alumina-bearing rock where again the structure is not amenable to presently-developed beneficiation processes. Taconite is the name commonly given to the mother lode rock of the entire iron range. Oxidized taconite is taconite rock which has been partially decomposed by the leaching processes of nature. This is a nonmagnetic material of which there are billions of tons on the Minnesota iron range and only a relatively small proportion is represented by the amounts encountered in present-day mining of low-grade mines. The mining industry is endeavoring to find economic methods for the recovery of iron units from oxidized taconite so that vast new mines can be opened where millions of tons of such material now exist.

The last general type of rock-bearing material is magnetic taconite which has not been decomposed. In the past 30 years, economic methods of mining and processing magnetic taconite have been developed, but the quantities encountered in natural ore mining do not now justify the required investment in a processing plant. Later, reference will be made to taconite mining on a large scale.

The mineral-bearing rock not susceptible to presently-known methods of processing is encountered in two ways. First, it is encountered in the mining process and must be removed to gain access to the ore susceptible to beneficiation. Second, the beneficiation process separates a good deal of this mineral-bearing rock from the beneficiated ore.

Illustrative of quantities is a typical iron mine managed by my company. During the life of the mine for every ton of beneficiated iron ore produced, we have mined .7 of a tone of fine sand that went to the tailing basin, and 1.8 tons of mineral-bearing rock. There were also 1.7 tons of surface material removed for every ton of ore shipped.

Good mining and conservation practice requires that mineral-bearing rock be separately stockpiled according to its type, thus preserving this material for possible future use in extraction of minerals. I believe that these low-grade mineral-bearing stockpiles of rock in the iron ore industry, may be typical of other segments of the mining industry. In the broad sense, this mineral-bearing rock is now considered to be waste, but it is not wasted. Available quantities are in the hundreds of millions of tons. The mining industry continues its research efforts to find an economic method of recovering the minerals from this potential reserve.

As stated above, the mother lode of the Minnesota iron formation is a solid iron-bearing rock known as taconite. Taconite rock typically contains 30–35% iron. The natural ore mines are the pockets in this vast layer of rock in which the leaching processes of nature have caused decomposition and washed away a part of the silica leaving high-grade ore and low-grade ore in its natural state. With extraordinary foresight into the time when natural ores would reach exhaustion, more than 50 years ago, the scientists of our universities and the mining industry literally attacked this rock in an effort to extract a commercial grade of iron ore from it. Success was achieved in magnetic taconite.

Taconite is one of our hardest and toughest rock formations. It could not be penetrated with conventional mining drills. The scientists developed a jet piercing drill. With this machine, a circular hole is created by heating the rock and then applying cold water under pressure with a resulting spalling off of rock particles. The drill holes are packed with explosives and the rock is shattered for transportation to the crushing mills. Huge crushers reduce the rock to 1-inch size before it is transported to the grinding mills to be pulverized. Once the rock is ground to the consistency of talcum powder, it is conveyed over magnetic separators where iron-bearing particles are separated from the fine sand thus created. The iron particles cannot be used in the steel mills until they are agglomerated into pellets about ½-inch in diameter through an intensive heat-treating process. The taconite pellets produced in the United States contain 62–65% iron

and provide an excellent furnace feed for the steel mills. Although the taconite processes are much more costly than those used in natural ore, they have become feasible because of the somewhat higher value of the shipping product. The price of taconite pellets containing 63% iron at lower Lake Erie ports is $16.76, and the value at the mines in Minnesota is $12.76.

The first waste encountered in taconite mining is the surface waste just as in the case of natural ore. The taconite miners encounter some mineral-bearing rock which cannot be processed under present techniques but the proportion is not as great as in the low-grade natural ore mines. Here again, however, whenever feasible, this iron-bearing rock is separately stockpiled with the hope that future technology will make it possible to extract the iron material from it.

The fine sand, or silica, separated from the taconite ore is in greater proportion than that of low-grade iron mining and, having been subjected to extensive grinding, it is much finer.

The proportion of waste to taconite pellets shipped in the large taconite mine we operate is about 4 to 1. For each ton of pellets shipped, we can expect to remove about 2 tons of surface and rock. For each ton of pellets produced, about 2 tons of tailing will be conveyed by hydraulic process to our taling basin. Where a tailing basin area is available, it is typically a low area requiring a minimum of diking just as in the case of natural ores. The fine sand created by pulverizing rock is an inert, non-toxic material with very little nutrient to sustain plant life. We have devoted a great deal of research to economic methods for developing plant growth on our tailing basin and the industry has achieved significant progress in this effort. You can be assured that we are developing methods for growing grasses on our taconite tailing basins that will contribute to the total environment of the area in which they are located. We will have developed a grassland beneficial to wildlife or domestic uses where only low wastelands or muskeg previously existed.

This discussion has been devoted to surface mining. Without belaboring the record, it can be said that the waste problems of underground iron ore mining are much the same as in surface pit mining. Proportions of waste to mineral in the natural ore underground mines is generally less because no surface stripping is involved. Underground mine development does require removal of earth and rock for underground shafts and drifts required to reach the ore bodies. The large waste piles evident upon the Mesabi Range in Minnesota, now devoted entirely to open pit ore, simply do not exist on a comparable basis in Michigan where, historically, most ore was produced by underground methods.

The problem of waste in iron mining can thus be summarized. We do create tremendous amounts of waste, as that term is used in the broad sense. The surface waste of earth and rock can be, and now is being, piled in accordance with good environmental practices. New hills will be created, but these hills will be carefully shaped and will bear foliage. They will contribute favorably to the habitat of wildlife and farsighted people, such as the commissioner of conservation in Minnesota; can forsee the day when these hills will contribute to recreational activities of the area.

Our mineral-bearing rock is separately piled and awaits the time when our scientists have developed technology for the economic separation of the minerals therefrom. Our tailing basin areas ultimately improve the environment when they are no longer required for mining.

While our experience in iron mining does outline the broad scope of mineral waste creation and disposition, it cannot be completely illustrative of all types of mining in the United States. Disposition of waste in piles obviously will not sustain plant life where there it little or no moisture. Nevertheless, such waste piles may well fit into the total environmental picture.

In conclusion, let me emphasize that the mining industry has long devoted a costly effort to the study of disposition of its waste material. Although much success has been achieved in this endeavor, the iron mining industry still welcomes the efforts of the mining colleges of our great universities and the work of the federal Bureau of Mines. We would be equally grateful for any further research and study that may be forthcoming from governmental agencies toward the improvement of methods of extracting mineral from mineral-bearing rock and any oher improvement that can be achieved in handling of mine wastes otherwise.

STATEMENT OF DAVID SWAN, VICE-PRESIDENT, KENNECOTT COPPER CORP., IN BEHALF OF THE AMERICAN MINING CONGRESS ENVIRONMENTAL MATTERS COMMITTEE

I welcome the opportunity as Chairman of the Environmental Matters Committee of the American Mining Congress to present our views on problems associated with the generation of solid waste by the domestic mining industry. The American Mining Congress is a national trade association of U.S. companies that produce most of the Nation's metals, coal and industrial and agricultural minerals. Its membership also includes more than 200 corporations that manufacture mining and mineral processing equipment and supplies, as well as financial institutions with a business interest in mining.

My statement, as mentioned in the introductory material submitted by Mr. Overton, will deal specifically with copper mining, and the benefication of copper ores. I have chosen to limit my testimony to the copper industry because I am more familiar with that industry and its problems; also, the problems associated with copper mining are typical of most underground and surface mining operations regardless of the mineral recovered. Furthermore, as you will note from the table accompanying Mr. Overton's statement, copper mining generates a substantial portion of the total residue from all types of mining operations.

At the outset, I believe it would be helpful to discuss briefly how and what types of solid wastes are generated in the mining and benefication or ore. Basically, there are three categories of solid waste: (1) mine waste; (2) mill tailing, and (3) smelter slag. The largest quantity of waste results from the overburden that must be removed in surface mining to make ore available, together with the waste removed in conjunction with the actual mining of ore. I would like to define ore as I am using the term to be rock that contains sufficient mineral to make its extraction economically recoverable and marketable. This definition then contrasts ore with other mineral-bearing material from which the mineral cannot be economically recovered. All mine waste and overburden falls into one of four categories. These categories are: (1) material that is barren of minerals and has no significant value for any other use because of its physical structure or location; (2) material that is barren of minerals but, because of its physical structure or location, has potential value as land fill. dam construction, road fill, etc.; (3) material that has an intrinsic value in contained minerals, but which cannot presently be recovered because of technological or economic factors; (4) material that contains minerals that are recoverable with current technology and under present economic conditions.

Virtually all ore mined in the United States must be beneficiated prior to the final recovery process. In the case of copper mining, this is accomplished in a concentrator that processes ore containing from 10 to 20 pounds of copper per ton of ore to produce a concentrate that is usually more than 20% copper. The waste material that is discarded from this process is called mill tailing. Tailing are finely-ground particles discarded in slurry form into collection ponds. These ponds are normally situated near the concentrators on low terrain, and ponding is accomplished by the construction of dikes or dams. Mill tailing in the case of copper mining will normally contain a small percentage of copper because present technology is such that all of the mineral cannot be economically recovered from the ore. The bulk of the tailing pond is constantly wet, maintaining a stabilized surface, but in some tailing ponds a portion of the surface will be dry.

Concentrates must be further processed to recover the metal and, in the case of copper, this recovery is accomplished in a smelter. The residue, or waste material, generated in the smelting process is called slag. Slag is a lava-like material, fairly high in iron content, abrasive and inert. It is normally piled on a dump in close proximity to the smelter. The quantity, or volume, however, is relatively small compared to the quantity of mine waste and tailing generated by the copper industry. In the report prepared for the office of Science and Technology, it is noted that of the approximately 470 million tons of solid waste generated by the copper industry in 1965, 62% constituted mine waste, 37% was mill tailing, and 1% was slag.

Turning then to the environmental problems created by the generation of solid waste, I will discuss them as they relate to each type of waste. Certain of the problems as we see them are common to all three types of wastes; others are unique to each type. The mining industry for many years has been concerned with the aesthetic problems involved in depositing mine waste, mill tailing and

slag on the surface of the earth. Economics dictate that mine waste must be deposited in the proximity of the mine. The quantity, or volume, of material placed on these piles, or dumps, varies with the size of the mining operation but, in all cases, they are large enough to be obvious to passers-by and persons living in the area. To a somewhat lesser extent, the same problem applies to tailing ponds, and to a more limited extent, slag piles are unattractive. One of the more fortunate facts of life for our industry in the present situation is that mines are usually located in areas of low population density, far removed from the main routes of transportation, and generally are operated in rugged terrain. In these instances then, it may be said that while mining may change the topography, the result may be as attractive and more interesting than the original terrain from an aesthetic point of view. For example, the Bingham Mine in Utah attracted more than 200,000 tourists during 1969. The point I would like to make here is that aesthetic problems involved with waste dumps and tailing ponds are dependent upon both topographic and geographic conditions.

Wind erosion is a problem with some copper tailing ponds when it is not possible to keep the entire surface wet or under water. In such cases strong winds can pick up the fine particles creating a dust problem. The physical structure of slag piles and most waste dumps, however, is such that erosion is not a problem.

As stressed earlier in my remarks, much of the mine waste, and all mill tailing and slag, contain varying amounts of minerals. Furthermore, after all of the economically recoverable ore has been removed from a surface mine, mineral-bearing material will invariably be left in the walls and bottom of the mine. Although these materials are not recoverable with present-day technology and economics, it has long been recognized by the mining industry that today's waste will supply tomorrow's metals. It behooves us, therefore, to concern ourselves with conservation of our natural resources by striving to deposit that portion of the mineral-bearing waste that may in the future be economically reprocessed in such a manner that it can be recovered. By the same token, many abandoned mines cannot be filled up with waste, or other material, because improved technology may be expected to result in reclassifying them as a mineable ore body. This effort in the interest of conservation of resources, I might point out, is not always compatible with attempts to deal effectively with the aesthetic problems associated with the solid waste.

I believe that as I outlined some of the problems associated with the generation of solid waste by the mining industry the solutions to some of those problems were fairly obvious and, perhap, it was equally obvious in the case of others that solutions would be very difficult to come by.

In the case of mine waste, when the mine is located in rugged terrain, it is frequently possible to select sites for waste disposal that are out of sight to the general public. When such procedure is not possible, waste dumps can frequently be made more attractive by planting some type of vegetation on the slopes and surfaces. Planting cannot be successfully accomplished, however, until deposition of the material is completed.

There are many examples of successful reclamation of land despoiled by early-day mining practices in the Midwestern and Eastern United States. Where favorable climatic and soil conditions combine, mining companies have constructed parks, produced timber, and provided vegetation for grazing of cattle and farming. Attempts to revegeate mine waste deposits in the arid West have been less successful. The problems of establishing vegetation on overburden piles in the Western United States are many and differ greatly from those occurring in regions with more favorable conditions. Considerable research has been conducted by the mining industry in an attempt to solve these problems. While the results are not yet conclusive in the sense that wide-spread revegetation has been accomplished, it is apparent that revegetation is possible, and that answers to at least some of the problems are beginning to accumulate. It should be noted here that results of such research and revegetation attempts are not restricted to mined areas and may be useful in all future arid land revegetation. One of the problems confronting the mining industry in research directed to revegetation in the Western States is the time required to adequately test the plant species in the methodology of planting and fostering growth. If he reclamation studies and trials are conducted during periods of abnormal climatic conditions, the results obtained may not be applicable to the range of conditions under which the plants must survive. Thus, several years may be required before it is possible to truly evaluate this research.

Difficult as it is to find satisfactory means for land reclamation where mine

waste is involved, the problems posed by mill tailing are considerably more challenging. Tailing from milling copper ore contain no nutrients and have poor soil texture. The company I represent has been seeking solutions to environmental problems associated with tailing ponds for more than twenty years. Vegetative stabilization of the tailing failed because of the abrasive action of airborne sand particles which buried the plants, or cut them off at ground level. Recent investigations in conjunction with the U.S. Bureau of Mines indicate that chemical stabilization techniques might be used to control the sand movement until planted vegetation can take hold. Another possibility under investigation is the use of granulated slag spread over the surface of inactive tailing pond areas to prevent wind erosion. If successful, this method would have the unique feature of utilizing one form of solid waste to solve another solid waste disposal problem. These are but two examples of the effort by the mining industry to solve its tailing disposal problems.

Thus far I have discussed problems associated with aesthetics and erosion and the general area of land reclamation. It is recognized, however, that utilization is preferable to stabilization and revegetation because full use would (1) eliminate the waste, and (2) broaden the mineral resource base. Some mineral wastes are suitable for disposal as land fill, dams and road fill, and other waste can be utilized as raw materials for making brick, rock wool, concrete, ceramic and other products. The total amount so consumed is, unfortunately, relatively minor when compared to the immense tonnages of waste generated each year. As noted previously, however, much of the waste generated contains minerals in varying amounts that cannot be recovered with present technology. Technology, however, is not static. Wastes deposited early in the 20th Century were of fairly high-grade mineral content because beneficiation and smelting refinements had not then been perfected to the extent that they are today. Consequently, a considerable portion of the waste deposited 50 years ago can today be reprocessed to produce metal at a profit.

The mining industry has long recognized that a substantial portion of the solid waste it generates is a potential mineral resource and must be preserved as such. Technology has been developed, and operations have already been established within the copper industry to recover a considerable portion of the copper contained in the mine waste material. This recovery is accomplished by a leaching process, wherein acid solutions are pumped to the top of waste piles and allowed to percolate through the waste, dissolving the copper mineral in the process. The copper is recovered from the solution with the use of various forms of shredded scrap iron, to produce a precipitate of copper. The stripped solution is then recycled to the top of the waste pile, and its acidity restored if necessary. This technological development by the copper industry is significant for three reasons. First, a valuable mineral resource is recovered that would otherwise be lost. Secondly, some two pounds of scrap iron, a solid waste product, is consumed for each pound of copper recovered; and, equally important, acid manufactured from the sulphur dioxide generated in the smelting process is utilized.

Recycling—or perhaps a more descriptive term for the mining industry would be "reprocessing"—of mineral-bearing solid waste is an essential factor in the conservation of our nation's mineral resources. It should be emphasized, how ever, that improved recovery of the minerals in today's waste will be needed supply the increasing demands of metals in the future. Regardless of the efficiency and volume of such recovery, it is on the primary production that the nation must rely to meet its future minerals demand. While I am on the subject of recycling, I would like to point out that approximately half of the copper produced in a given year is derived from collected scrap. The intrinsic value of copper and most other non-ferrous metals is such that only a small quantity is inadvertently discarded.

I have been asked to comment briefly on what should be done in the future to solve the problems associated with the generation of solid waste in the mining industry, or "where do we go from here?" To a significant extent my suggestions involve—more of the same.

When the solid waste is barren of minerals, the perfect solution would be complete utilization. This suggests more research and development to uses for the waste in unrelated industries, such as, construction, ceramics and glass. To be practical, however, we must recognize that complete utilization is not now, and may never be, possible. Continuing efforts in the areas of land reclamation, earth stabilization and revegetation are essential. As ore deposits are dis-

covered and mines are opened in the future, the mine operators will make aesthetics an important consideration in their mine planning. There are outstanding examples, such as American Metal Climax's Urad Mine in Colorado, where by imaginative planning access roads and surface facilities have been constructed and waste dumps located so as to minimize scarring of the landscape. Of course, each mine is unique in that respect, so the problems do not lend themselves to government standards or regulations, but I believe the mining industry has already demonstrated an awareness of its responsibility to the public needs and will continue to do so.

When the solid waste contains minerals, even in relatively minor amounts, it must be preserved as a mineral resource and remain accessible for reprocessing and the ultimate recovery of the minerals. Meanwhile, research and development efforts will be continued by the mining industry to improve recovery methodology. In situations where present technology is not sufficiently advanced to enable reprocessing of the waste, efforts are being directed to the elimination or reduction of erosion and aesthetic improvement while retaining its availability for future use.

I have attempted in this brief testimony to describe in general terms how and what kind of solid waste is generated in the mining industry. Using the copper mining industry as an example, I have endeavored to explain the problems associated with solid waste and the effort that is presently being made and can be made to solve those problems. In conclusion, I wish to say that although a great deal has been accomplished to reduce the adverse effects on our environment of solid waste disposal, the mining industry is fully cognizant of the urgent need for further improvement and will welcome assistance in any form and from any source to win the battle.

(Whereupon, at 1:10 p.m., the committee was recessed, to reconvene at 10 a.m. Tuesday, March 3, 1970.)

RESOURCE RECOVERY ACT OF 1969

TUESDAY, MARCH 3, 1970

U.S. SENATE,
SUBCOMMITTEE ON AIR AND WATER POLLUTION,
COMMITTEE OF PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in room 4200, New Senate Office Building, Senator Joseph M. Montoya presiding.

Present: Senators Randolph, Montoya, and Cooper.

Also present: Richard B. Royce, chief clerk and staff director; Barry Meyer, counsel; Bailey Guard, assistant chief clerk (minority); Leon G. Billings, Richard D. Grundy, and Adrien Waller, professional staff members.

Senator MONTOYA. I would like to present at this point two of my constituents from New Mexico, Gary Wayland from Albuquerque and Bernard Teba from Santa Fe. They are here as nominees for the Presidential Classroom for Young Americans. Would you stand up and be recognized?

We are proud to have you here this morning. Maybe you can take some good news to New Mexico about what we are doing here.

Our first witness is Dr. Richard D. Smith.

STATEMENT OF DR. RICHARD D. SMITH, PRESIDENT, ACCOMPANIED BY WILLIAM C. DELL, VICE PRESIDENT, COMBUSTION POWER CO., INC., PALO ALTO, CALIF.

Senator MONTOYA. You may proceed and start your presentation.

Dr. SMITH. Mr. Chairman and members of the subcommittee, first I would like to thank you for the opportunity to appear before you today to discuss the technical and economic feasibility of combustion of solid wastes for the production of electric power.

With your permission, I would like to submit my prepared testimony for the record and summarize briefly for the committee with a few charts we have brought with us.

Senator MONTOYA. You may do so.

(The statement referred to follows:)

TESTIMONY OF COMBUSTION POWER CO., INC., PRESENTED BY DR. RICHARD D. SMITH, PRESIDENT

COMBUSTION OF WASTES FOR POWER PRODUCTION

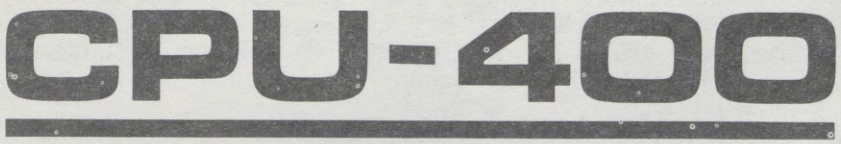
Senator Muskie, Members of the Subcommittee, it is a pleasure to appear before you today to discuss the combustion of solid wastes for the production of electric power.

Before discussing the technical aspects of the subject, a few words about Combustion Power Company may be of interest for background. Our professional staff

is drawn entirely from the space and defense industry. We are applying management skills and advanced technology, learned in our earlier work, to the problems of solid waste and other forms of pollution. Our research and development program on solid waste which will be discussed here today is wholly supported by the Bureau of Solid Waste Management, Department of Health, Education, and Welfare. As a result of this Federal support, it has been possible to pursue research and development goals far more ambitious than would normally be possible.

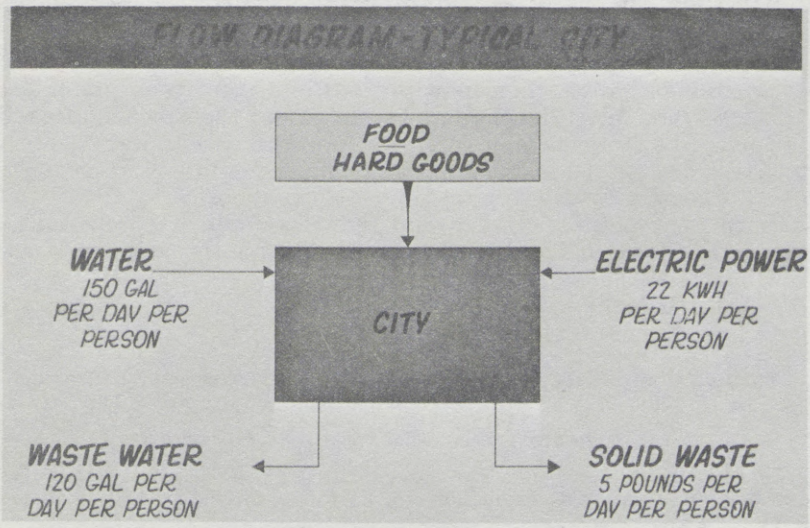
The recycle or reuse of the resources in solid wastes is only practical if the recycled product is readily marketable; this implies that the price is competitive with existing sources of supply and the quantity of the product is not so large as to flood the marketplace. Since a significant amount of research and development is required to perfect any process for recycle or reuse of solid waste, it would be desirable for the products from that process to have the broadest possible market appeal. Ideally, they would be marketable in every town and city in the country.

After considering several types of products that could be made from solid waste, electric power was selected as the one which was most readily marketable. It is routinely consumed in every city in the nation, its price is stable, it is in short supply now and will probably continue to be in the near future.



Chart—Title sheet

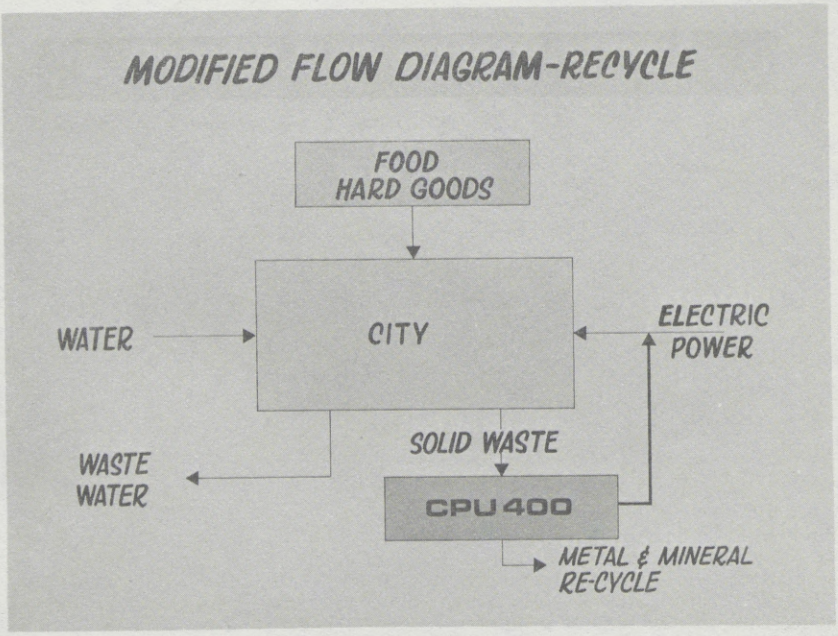
Following the selection of electric power as the product to be derived from solid wastes, studies were undertaken to define the best system to accept the cities refuse and generate electric power. These studies showed that a package plant of 400 tons/day capacity would fit well with our towns and cities; that package plant is designated CPU–400 and it is the objective of the research and development program in which we are engaged. CPU–400 stands for Combustion Power Unit–400; 400 is the plant capacity in tons/day, the output of 160,000 people.



Chart—Flow diagram—Typical city

To better appreciate the manner in which the CPU–400 would be integrated with a city, it would perhaps be instructive to examine the flow diagram of mate-

rials and energy for a typical city. Flowing into a city are food and hard goods, water, and electric power or fuel. The majority of materials entering a city also must exit from it. Waste water, in an amount almost equal to the water supply, is a dilute solution containing organic wastes, chemicals, and bacteria. Solid waste is comprised largely of the used (but not consumed) hard goods which flowed into the city.

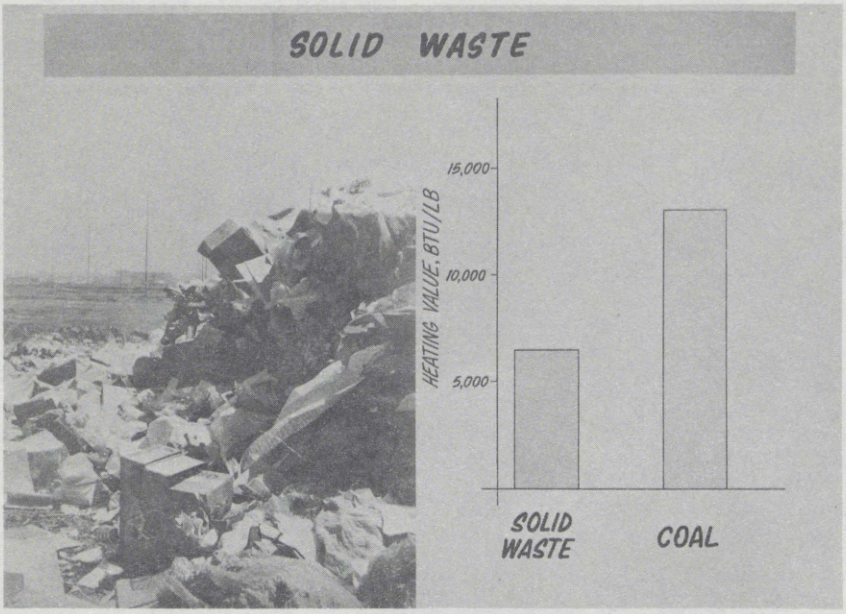


Chart—Modified flow diagram—Recycle

The most efficient recycle mode is the direct conversion of solid wastes to a product used by the same city. The direct conversion of waste water to drinking water is an example of a direct recycle mode that is seriously being considered as water shortages mount in many of our major cities. Direct conversion of solid wastes is not so obvious.

As shown in the chart, the CPU–400 accepts the solid waste of the city and produces electric power, which is consumed directly in the city. The amount of power generated from solid wastes will be approximately 5–10% of the total power consumed by the city. Solid waste used as a fuel to generate power conserves natural resources of fossil fuel or nuclear fuel that would normally be consumed for that purpose.

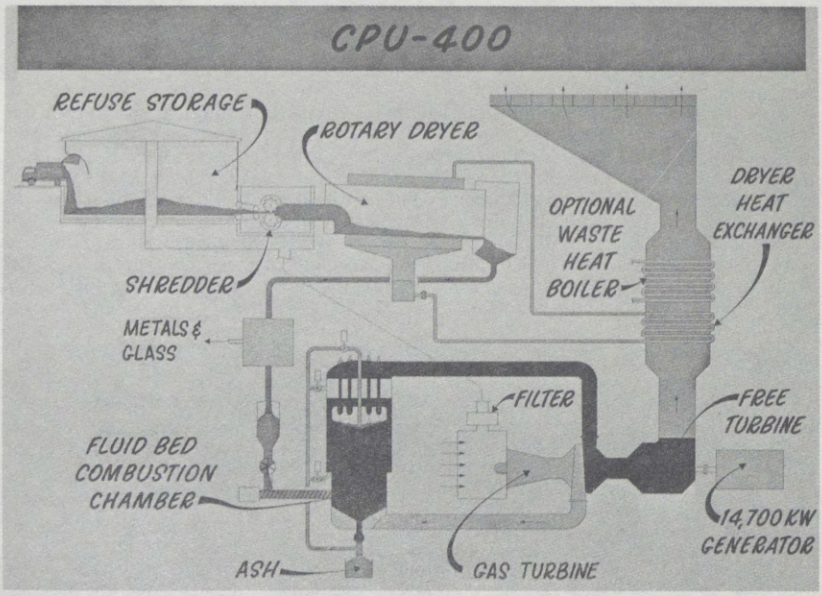
Sterile ash will be produced by the CPU–400 in addition to electric power. This ash will contain virtually all those metals and minerals contained in the solid waste. The combustion process acts to concentrate these materials (by a factor of 25 to 30) by removing the large volume of cellulosic materials from the solid waste. This cellulosic material, a hydrocarbon and hence converted to carbon dioxide and water by combustion, is "in adequate supply in both quantity and quality for the foreseeable future" according to a recent survey of the Availability, Utilization & Salvage of Industrial Materials conducted for Senator Boggs by the Library of Congress. The materials which are in short supply in this country and hence, the prime candidates for reuse are the materials that are concentrated in the ash. It is not known yet whether the sterile ash can be converted entirely into marketable products by a direct recycle in each town and city. Certainly the steel scrap is marketable; the Bureau of Mines is conducting research on methods to remove gold and silver from the sterile ash. In all probability though, the processing plants for the extraction of minerals from the ash will not be economically attractive for construction in every city; large central processing plants might be more attractive. Additional research is required in the area of mineral reclamation from solid waste ash.



Chart—Solid waste

Solid waste is an excellent fuel. As shown on the photo on the left of the chart it is comprised largely of paper and paper products. Solid waste, assuming a 20% moisture content, has a heating value of 5000 Btu/lb ; 6300 Btu/lb when dry. As shown on the right side of the chart, this compares favorably with coal. The heating value of the highest grade coal is 14,000 Btu/lb but many coals have a heating value of 6000 Btu/lb and below.

A portion of the cost of any fuel is its transportation cost. Solid waste, as a fuel, is not burdened with this added cost as it is generated in the city in which it is used. A disadvantage of solid waste as a fuel is that it contains polyvinyl-chloride plastic which produces hydrochloric acid vapor when it burns.



Chart—CPU–400

This chart shows a schematic of the CPU–400. Solid waste is received from municipal trucks and stored temporarily in a rotary storage area. All of the solid waste is shredded in a high capacity shredder; no separation or sorting is accomplished prior to shredding. After shredding, the solid waste is dried in a rotary dryer using waste heat from the exhaust of the gas turbine. The purpose of drying is to assure that the refuse entering the combustion chamber has a predictable and uniform burning rate.

After drying, the shredded solid waste is passed through an air classifier to separate out pieces of metal, glass, and rocks. The iron and steel is easily separated from the glass by a magnet. The remaining material, largely combustible, passes through a rotary air-lock feeder into the high pressure fluid bed combustor.

Air is compressed by the gas turbine compressor to a pressure of 100 pounds per square inch and supplied to the fluid bed combustor. The fluid bed combustor is composed of a container of sand which is being kept in a fluid-like by the passage of air up through it. Literally, it appears to be boiling as water would boil in a heated pot. The sand is at a temperature of 1650°F (glowing red) and as the shredded solid waste is injected into it, rapid and thorough combustion takes place. The compressor supplies about four times the amount of air needed for complete combustion of the solid waste.

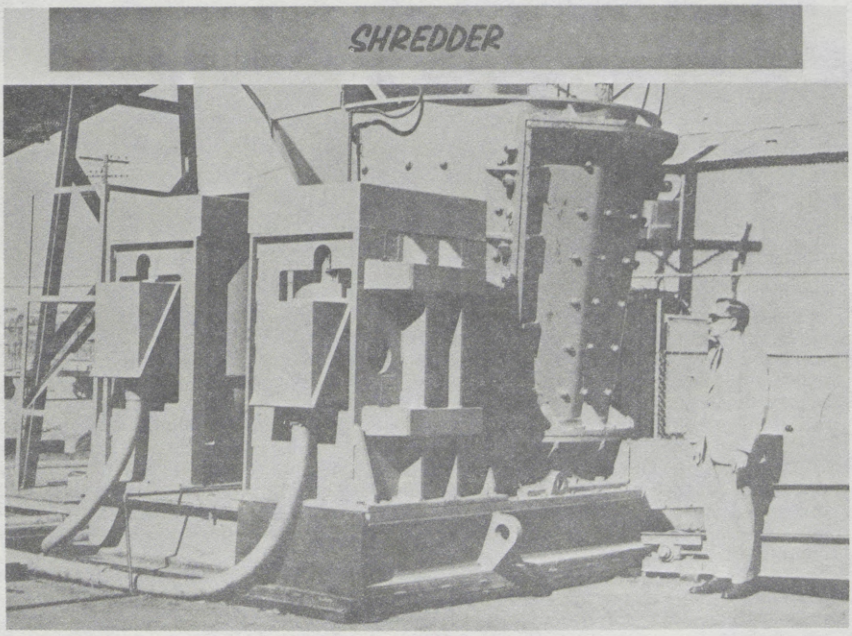
Fluid bed reactors are well known in the chemical processing industry; they are now being considered by the Air Pollution Control Administration for large coal fired boilers because they can capture the majority of pollutants from burning fuel before those pollutants are released to the air. It is for this reason that the fluid bed reactor was selected for the CPU–400. In the CPU–400 application, the capability of the fluid bed to remove pollutants will be used to remove the majority of the hydrochloric acid vapor from the combustion of polyvinylchloride plastic. The fluid bed will also be effective in removing sulfur dioxide and as well as other pollutants that may be present in solid waste in the future.

Ash from the solid waste will either remain in the bed or be elutriated with the hot gas leaving the bed. Ash remaining in the bed will be removed periodically through an opening in the bottom of the bed and sorted from bed material.

Ash elutriated from the bed will be separated from the hot gas in highly efficient particle separators. The separators serve a dual purpose; they protect the turbine from erosion and they prevent air pollution by preventing discharge of particulate matter.

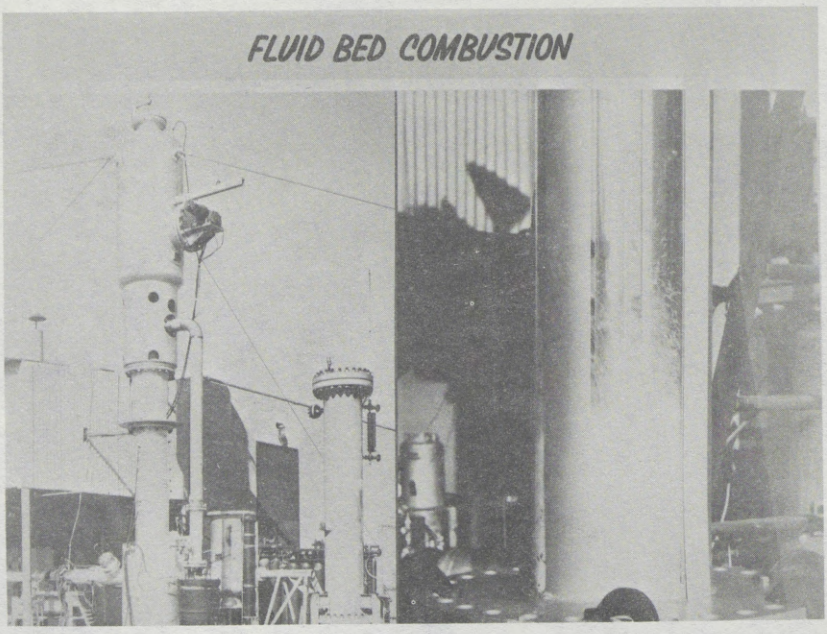
The hot gas leaving the particle separators passes through a turbine in which it is expanded to nearly atmospheric pressure; after expansion its temperature is still fairly high, 930°F. The turbine drives the compressor and the electric generator that produces the power output of the plant. The hot gas, at 930°F passes through a heat exchanger to supply heat to the dryer and through an optional waste heat boiler before being exhausted to the atmosphere.

The CPU–400 plant will produce 15,000 kilowatts of electric power as a base load plant. Because of the simplicity of the gas turbine however, it is possible to make this small 40 ton/day plant comparable in overall efficiency with a larger plant of conventional construction.



Chart—Shredder

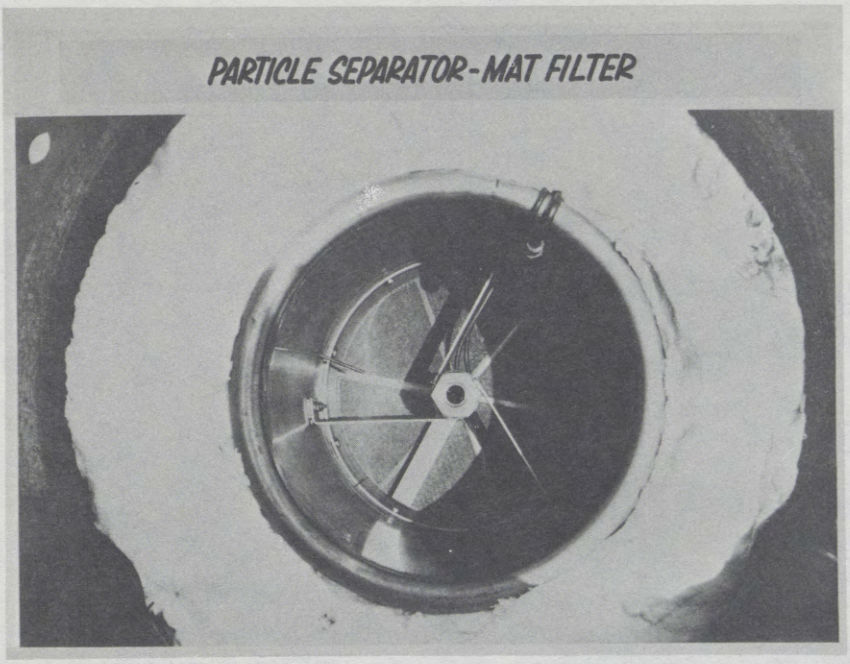
Several components of the CPU–400 are already well into the development stage. Shown here is the shredder, an Eidal International Company SW–750, which was originally developed by that company to shred auto bodies. Several installations are in daily operation. It has been adapted for shredding municipal solid waste, a less arduous job, but its inherent ruggedness will allow it to cope with the occasional car axel that finds its way into the garbage can.



Chart—Fluid bed combustor

One of the key components of the CPU–400 is the low pollution fluid bed combustor; shown on the left side of the chart is a photo of our subscale fluid bed combustor. This fluid bed combustor was successfully operated at 1650°F and 100 psia with actual refuse, gathered in Albuquerque, New Mexico as a matter of fact.

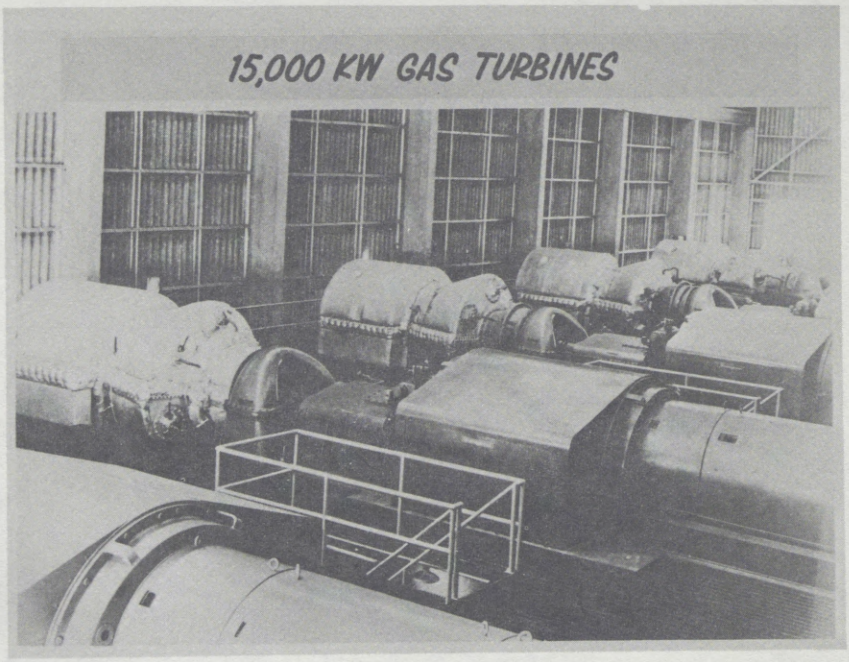
The photo on the right side of the chart is a close-up of a fluid bed in operation. For ease of observation, the bed is contained in a plastic tube and operated at ambient conditions. Note the highly turbulent nature of the bed with bursting bubbles of air and sand on the upper surface. The dark specs are pieces of solid waste.



Chart—Particle separator—Mat filter

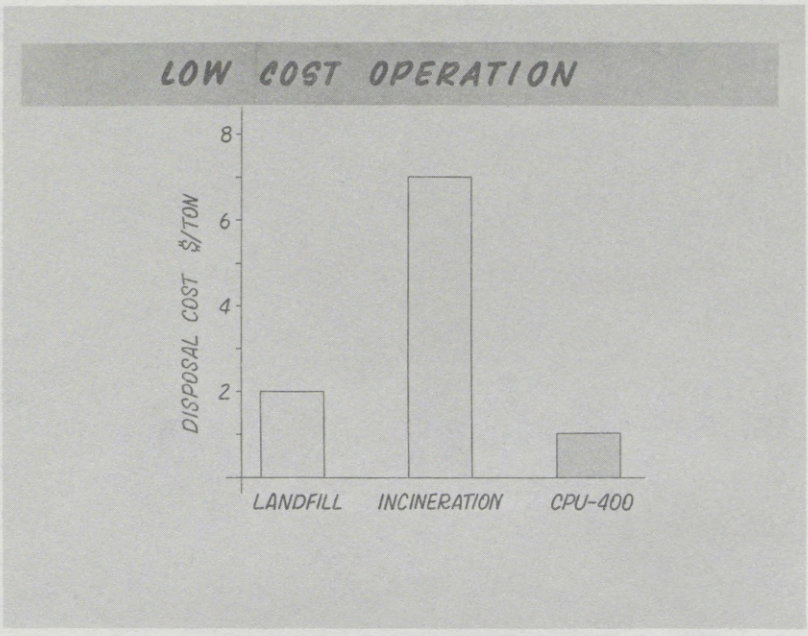
Removal of the particulate matter from the hot gas leaving the fluid bed is one of the most technically challenging areas of the CPU–400 development. Particle removal is routinely accomplished today at temperatures up to 700°F; the CPU–400 requires that particulate removal be accomplished at 1650°F. Subscale tests of three types of particle separators have been conducted at 1650°F and 100 psia; inertial separators, electrostatic precipitators, and mat filters were all tested. This chart is a photo looking at the downstream side of the mat filter. The results of the tests showed that particulate could be efficiently separated from gas at these elevated temperatures.

Combustion Power Company was joined by a strong team of subcontractors, each an expert in his field, in advancing the technology of high temperature particle separation. Major contributors were the Donaldson Company who supplied the inertial separator, and Research-Cottrell Inc. who supplied the electrostatic precipitator, and the Marquardt Corporation who conducted the testing.



Chart—15,000 kilowatts gas turbine

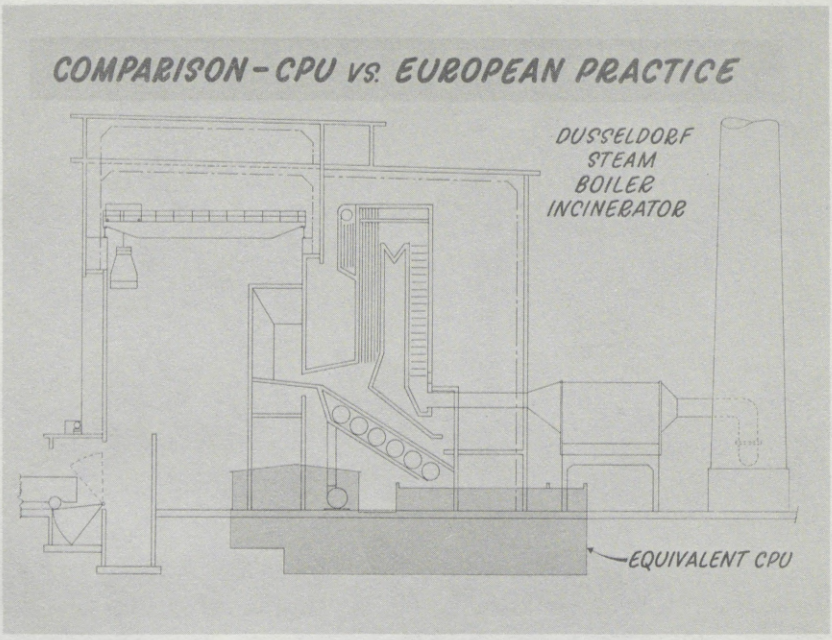
The most expensive single component of the CPU–400 is also, fortunately, the best developed one. Shown on the chart are a number of 15,000 KW gas turbines in regular service; hundreds of such units have been produced and are generating electric power all over the world.



Chart—Low cost operation

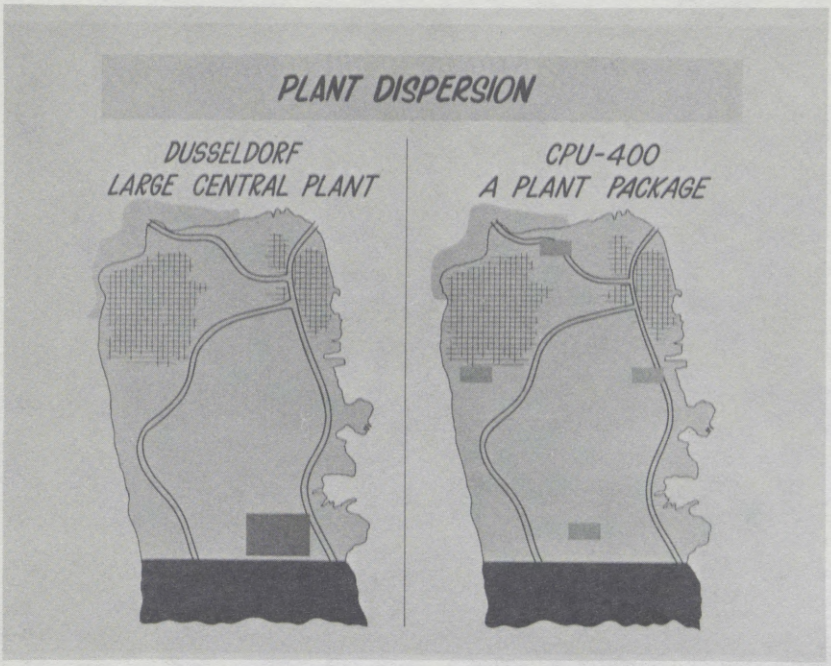
Shown here is a comparison between the cost of conventional sanitary landfill, incineration, and the projected operating costs for the CPU–400. The dramatic reduction in operating cost of the CPU–400 compared to the conventional approaches is made possible by the efficient generation of a product and its sale. In these calculations, no credit was assumed for sale of metals or minerals in the sterile ash.

The potential payoff from research and development in the field of solid waste is significant. Savings in only 5 years' operation in a city the size of San Francisco would repay the development costs.



Chart—Comparison: CPU versus European practice

Compared to the solid waste disposal technology used in the United States today, European practices are quite advanced. Some people in the field are of the opinion that we should copy the Europeans. Rather than copy them, we should leapfrog their technology and use the vast storehouse of knowledge from our space and defense work to put us squarely in the lead. This chart compares the size of a modern European incinerator with an equivalent CPU–400. The heat release rate in the combustors of the CPU–400 will be over 30 times that in the European incinerator.

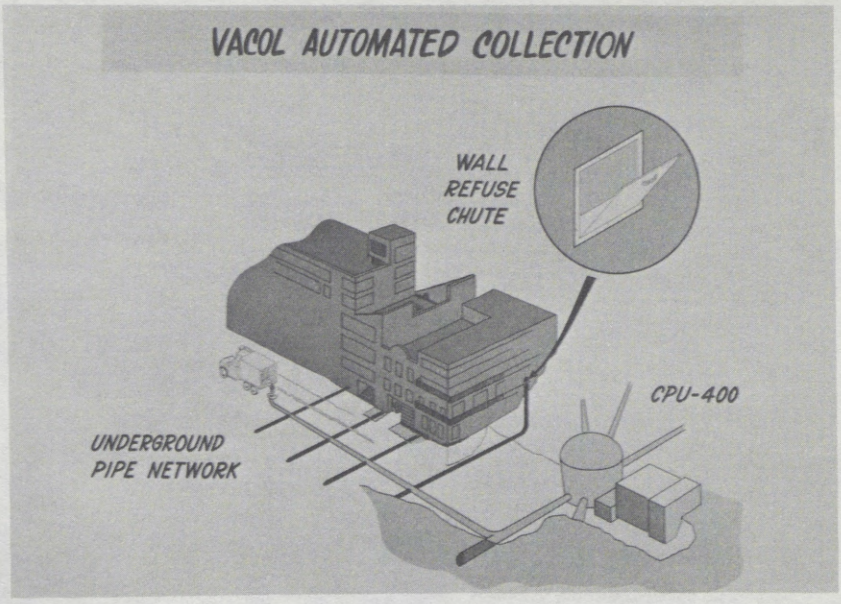


Chart—Plant dispersion

The cost of solid waste disposal is actually comprised of two parts, collection and the actual disposal itself. Collection costs are often 3 times higher than disposal costs; for example in Washington, D.C. collection costs averaged approximately $20 a ton a few years ago. Collection costs can be decreased by decreasing the distance from the pickup points to the disposal site.

On the left side of the chart is an outline of the San Francisco peninsula showing a potential location of a large European type incinerator, say 1500 tons per day. These types of incinerators become efficient only as the size increases, consequently larger central plant design is favored. On the right side of the chart potential locations for four CPU–400 plants are shown. Because it will be highly compact, the CPU–400 will fit on approximately one acre.

Comparing the left and ride side of the chart, the dispersed plant siting will reduce the haul distances significantly and consequently reduce collection costs.

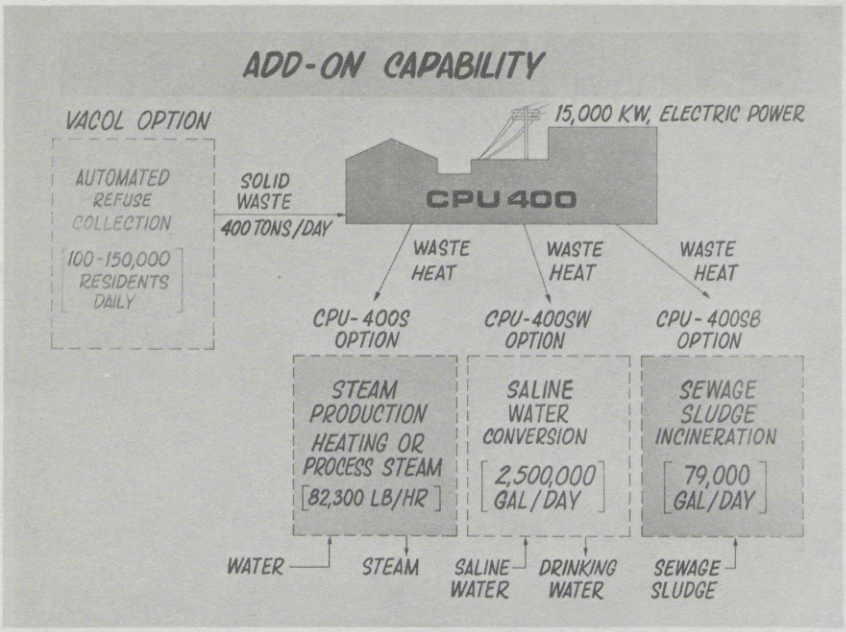


Chart—VaCol automated collection

One of the most promising advanced develpoments in the field of solid waste collection is pneumatic transport. Pneumatic transport of materials has been practiced in industrial plants for many years and the technology is now being applied to the collection of solid waste. As shown in the chart, pipes 18 to 24 inches in diameter are laid in the streets and connected to each apartment, office building, or dwelling. During the day solid waste is accumulated in each building but at night, when the demand for power is lowest, the compressor of the CPU–400 draws a vacuum on the lines and the valves in each building are sequentially opened along each trunk line to make the collection.

The compressor of the CPU–400 is powerful enough to collect 400 tons of solid waste from the surrounding urban environment in approximately 2 hours. The dispersion of small package plants throughout the city makes this possible by limiting the maximum line length.

The VaCol or vocuum collection system, when mated with the CPU–400 eliminates the need to provide for the going and coming of refuse trucks and consequently greatly reduces the area required for the plant. The plant can now be placed in the subbasement of a large downtown office building.



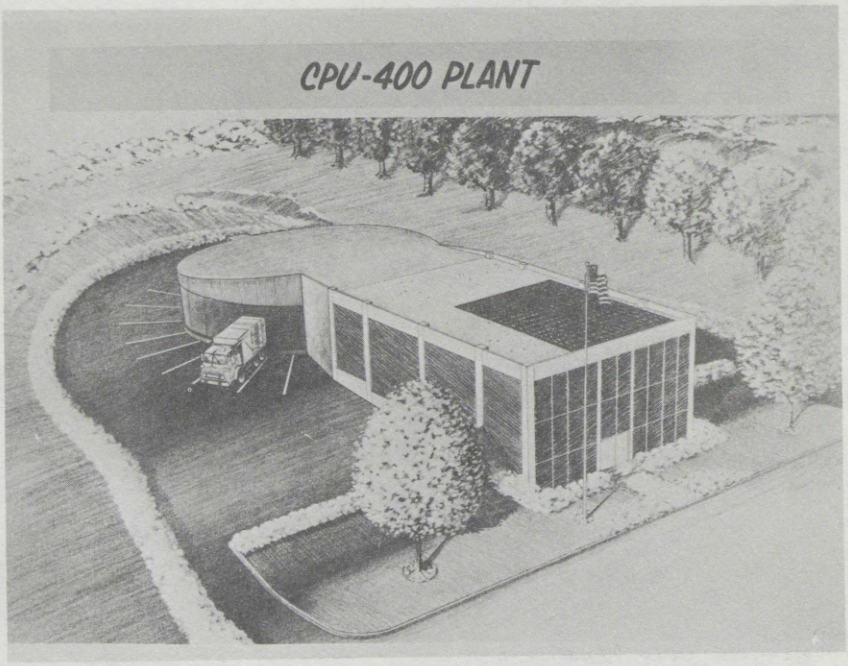
Chart—Add-on capability

In addition to the VaCol system, there are several other attractive add-on features which could benefit cities. These add-ons are uniquely available because of the use of the gas turbine in the CPU–400.

Waste heat can be used to generate steam for heating, or air conditioning. This is attractive when the plant can be located near a downtown area of a large city or in an industrial area.

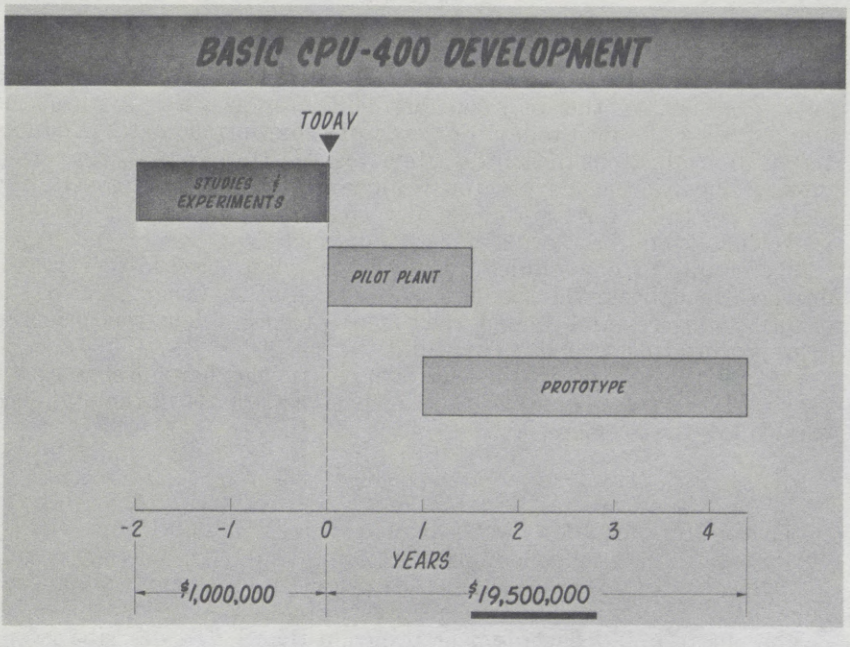
Desalting systems, developed by the Office of Saline Water, require heat to distill salt water into fresh water. When that heat is supplied by the waste heat from a CPU–400, the production of 2,500,000 gallons of fresh water is possible, about 10% of the consumption of those residents supplying solid waste to the CPU–400. The cost of water is estimated to be 28¢/1000 gallon.

Finally, the waste heat can be used to dry and incinerate sewage sludge from conventional sewage processing plants. The pollution free disposal of sewage sludge is a problem in many communities.



Chart—CPU–400 plant

Shown here is an artist's rendering of the CPU–400. Attractive, and because of its small size, it should fit in many urban locations.



Chart—Basic CPU–400 development

The status of the program is reported on this chart. Over two years of studies and subscale testing have been conducted, and approximately one million dollars of Federal funding has been expended to date. The next phase of the program, the pilot plant, is now underway. Over 19 million dollars of additional funding will be required to complete the development and build the first full scale prototype. As shown on the chart, the prototype is scheduled to be operating in 1974.

Lest anyone be dismayed at the time required to produce an operating prototype, especially in view of the onrush of pollution, production of CPU–400 package plants is estimated to require only 1 to 1½ years after development is complete. Consequently, once developed, a relatively rapid proliferation is possible. Production capacity within this country could meet our needs.

Dr. SMITH. The Combustion Power Co., by way of background, is an independent research and development company. We are approximately 3 years old, and our professional staff are all formerly from the space program; we left it about 3 years ago. We are now applying the systems engineering and advanced technology learned in that field to the problems of solid waste and other forms of pollution control.

The research and development to be discussed with you today has been fully sponsored by the Bureau of Solid Waste Management of the Department of Health, Education, and Welfare. We have received excellent support from Secretary Finch and his staff, Mr. C. C. Johnson and his staff, and Mr. Richard D. Vaughan and his staff, Mr. Vaughan being the Director of the Bureau of Solid Waste Management.

As a result of this Federal support, it has been possible to pursue goals that are more ambitious than would otherwise be possible. In conducting advanced research and development, close cooperation between the industry and the Government is essential; and, in that regard, the direction, guidance and cooperation received from Richard Vaughan and his staff has been excellent. It has been a distinct pleasure to work with them on this program.

PROBLEM

Getting into the technical part of the presentation, in terms of recycling or reuse of the resources of solid waste, we feel that this is only practical if the recycled product is marketable within the economy as we know it today. For example, the United States produces 190 million-plus tons of solid waste a year. If this were all converted into wallboard, the market for wallboard would be destroyed. We looked carefully for a product that could be produced from solid waste that would be useful on a national basis.

The results of our studies were that we chose electric power as a universally marketable product that was used in every city of the country. Our research and development program then was oriented to providing this product from solid waste.

I would like to go to the charts now. In the handouts we have prepared, there are copies of the charts so that those in the audience may follow the presentation.

CPU–400

Senator MONTOYA. May I ask you what this CPU–400 means?

Dr. SMITH. It means Combustion Power Unit–400. The 400 stands for the capacity of the plant in tons per day. This amount, 400 tons per day, is the solid waste output of approximately 160,000 people.

The research and development program that I will describe is one of the most advanced programs in being in the country today in terms of solid waste reuse and recycle.

Looking first at a flow diagram for a typical city, water comes in at about 150 gallons a day per person, food and hard goods come in, and electric power comes in at about 22 kilowatt-hours per day per person. Exiting from the city is waste water or sewage, as we know it, at about the same amount as enters and solid wastes.

The best type of reuse of wastes as we see it would be to make a direct conversion of the solid waste and perhaps the waste water into things that the city needs. The CPU–400 does this with solid waste, converting the material into electric power. If all of a city's solid wastes were converted to electric power, approximately 10 percent of the power needs of the city would be served by this source.

Today there is a growing shortage of electric power. Power requirements are increasing at approximately 10 percent per year, so that this is a useful commodity.

In addition, the CPU–400 produces some sterile ash. Senator Boggs, in a study requested from the Library of Congress, showed that the rare minerals we must conserve in an overall material policy would be in the ash. Wood and paper products, which constitute the part of solid waste that is burned for fuel, are in plentiful supply with an adequate supply for the future.

Looking at solid waste as fuel, on the left portion of the chart is a picture of some; and, as you can see, it is mostly paper and paper products. On the righthand side of the chart, the heating value is shown in red as compared to coal as shown in gray. Solid waste has approximately half of the heating value of high-grade coal. In addition, solid waste, when used as a fuel, has an added value because it is generated

right in the city where it is going to be used; it doesn't have to be shipped.

Senator MONTOYA. Let me ask you some simple questions about the heat value of solid waste. Now, are you talking about paper and other material that can be fired or are you also talking about garbage?

Dr. SMITH. Well, the term "solid waste" is an all-encompassing term that includes garbage, refuse, whatever is put out in the garbage cans, so to speak.

Senator MONTOYA. I understand that. Now, explain how garbage can be fuel.

Dr. SMITH. Solid wastes collected by municipal trucks is largely paper. What happens is that the food garbage in the cities these days mostly goes down the sink waste disposal so that the amount left in refuse, bones from the steak, and things such as this, are now small in relation to the amount of paper.

Garbage itself, which does not have a particularly high heating value because it is usually moist, makes up a relatively small part of the total amount of municipal refuse that goes to the dump, and that is why we get such a good heating value from solid waste in its totality.

WASTE PROCESSING

Senator MONTOYA. Now, in the solid waste you find a lot of aluminum and other metal such as cans, and what have you. How do you separate those from solid waste mass that you would put into this combustion process?

Dr. SMITH. All of the material is put into the CPU–400 as it comes. It is all shredded. This is shown in the next chart.

There is a component of the system that shreds the wastes into small parts. Limited separation is made later in the process by means of what is called an air classifier. In this unit a blast of air is directed upward through the shredded material. All but the heaviest materials, namely the metals and glass, are blown upward leaving the metals and glass to drop downward. A simple magnet can separate the steel from the glass and other metals.

SHREDDING

Senator MONTOYA. Now, about this shredding, what particular process do you go through in shredding and what kind of equipment would you use?

Dr. SMITH. Combustion Power Co. has made a survey, nationally and internationally, of shredders which are available for shredding refuse. We have selected, after looking at this, a shredder manufactured by the Eidel Co. of New Mexico, called the SW–750. This shredder works on a different principle than the others we investigated. It is unique in that regard. It was designed originally to shred car bodies, a tough job. But it has been developed to shred refuse. In refuse you can't help but to find an occasional car axle or other heavy metal objects once in a while, and a shredder that would not be able to cope with that would not be useful to shred refuse.

Senator MONTOYA. I have seen that shredder, and I understand it enjoys a good reputation for this type of work.

Dr. SMITH. Yes, sir, it does. Several cities are considering purchasing it to shred solid waste to put in landfills which results in uniform compaction, in more into the landfill, and in helping to destroy the attractiveness of the refuse for rodents and things such as that.

Senator MONTOYA. I was reading an article in the Chicago paper just a few days ago where the city of Chicago piled refuse, solid waste, and made quite a hill out of this pile, and then filled it and made a skiiing place out of it. It is used for recreation now in the winter.

Dr. SMITH. I understand it is the highest hill in the whole State.

Senator MONTOYA. Yes. It has the highest elevation of any place around Illinois.

Dr. SMITH. I have heard it called "Mount Trashmore."

COMBUSTION

Anyway, to go on very briefly with this schematic, the shredded solid waste is introduced into a high-pressure combustion chamber which uses a fluid bed principle. The fluid bed is a bed of sand through which air is being passed to cause it to act as a fluid. It serves to hold light materials such as tissue paper from blowing away before it burns, while allowing a bigger chunk to settle to the bottom and reside there until completely burned.

A gas turbine supplies the air for the fluid bed combustor. The hot gases resulting from the combustion of the solid waste pass through several particle collectors or antipollution devices. A major part of our research and development in the new areas for the CPU–400 are associated with ways of eliminating atmospheric pollution from the combustion of refuse.

The turbine turns a generator which produces electric power. This is a standard piece of equipment. The exhaust gas comes out here. There is a large quantity of heat available in the exhaust gas which is useful for other purposes. We will discuss these in a few minutes.

Because of the fact that the CPU–400 uses a gas turbine, or jet engine, if you will, we are able to get a lot of power out of a small package. This has other benefits in terms of the introduction of this package plant into a city.

Every component in this system has either been tested or is available and operating in full scale.

We will look at a few. On the first chart is a picture of a carrousel similar to the one we will use. This carrousel is used for storing and feeding wood chips for the paper industry, a problem not dissimilar from feeding shredded refuse. This particular one happens to be in California.

This is a picture of the Eidel shredder which is manufactured by Eidel International in Alburquerque. The refuse comes in from the upper left and is shredded between this cone and a rapidly rotating armature in the center. These are the two electric motors that drive it.

Fluid bed combustion is one of the two areas where the majority of the research and development work has been conducted. The picture on the left is of the Combustion Power Co. test apparatus. On the right, is a picture of a fluid bed in action; it is operating at ambient temperatures and pressures so it can be viewed. You can see the sand here with bursting bubbles of air and sand on the upper surface. The dark specks in it are pieces of refuse.

We have done testing in research and development on three completely different types of particle collectors to remove particulate from the hot gas. This is just one shown here for illustration. It is a mat filter. All of these have been tested at the operating temperatures and the operating pressures that they will see in the CPU–400.

Finally, the most expensive single component of the plant is the gas turbine. Shown here are three gas turbine generators. They are made by three manufacturers in this country, General Electric, Westinghouse and Pratt-Whitney, and they would be used as a stock part with very little modification.

DISPOSAL COSTS

This chart is a comparison of disposal costs between conventional methods and the CPU–400—just disposal and not collection. Landfills which are quite popular cost an average of $2 a ton, incineration ranges from $6 to $8 a ton with higher values when pollution control equipment is used, and the cost for the CPU–400 in comparison is $1 a ton.

This very low cost is possible because we are generating and selling electric power, a recycled or reusable product, to offset in large measure the cost of operation of the CPU–400.

Senator MONTOYA. At this point you are making a comparison between landfill incineration and the utilization of the CPU–400. Now, landfill on your chart, I assume, contemplates burying such solid waste as aluminum cans and other particles which would not be dissipated or burned by the CPU–400; is that right?

Dr. SMITH. No, sir. The landfilling that we are talking about here is the current process of just taking everything and putting it in the ground.

Senator MONTOYA. Would there be some remnants under the CPU–400 process which you would also have to landfill because you couldn't incinerate those?

Dr. SMITH. Yes, sir, and those costs are considered within the CPU–400 bar. The material has been made dense now; it has been reduced to 2 percent of its original volume. This resulting dense material is also sterile, which is quite a different problem than burying huge truckfuls of paper and garbage.

Senator MONTOYA. Well, what I am trying to develop is in your comparison that it takes into consideration that solid waste material such as cans and other metals will have to be separated after they go into the CPU–400 and disposed of by being buried or other disposal.

Dr. SMITH. The economics of the CPU–400 as shown here assume that the cost of residue disposal—that is the clean, sterile ash—includes no charge for landfilling it, nor any credit for selling it. For example, a part of this will be shredded steel scrap, which I now understand is selling in the order of $40 a ton and is a marketable product. Our economics assume that because this separation does occur a part of it will be salable, the income from that will offset the cost to bury the unsalable residue.

This chart shows the CPU–400 in comparison with what is called "a European practice" incinerator. Shown is the Dusseldorf steam boiler incinerator. Many people feel the Europeans are ahead of us

now, and I believe this is true. They have been using big steam boilers to generate electric power. With the CPU–400 and gas turbine technology, we are prepared to leapfrog them. We think that is the thing that should happen rather than to get full-scale production of something borrowed from over there which does not apply our more advanced technology.

Senator MONTOYA. Well, under the Dusseldorf steam boiler incinerator, do they have a separation process that separates, let us say, the metal and other things that are not burnable?

Dr. SMITH. I believe they do. I believe they make a separation from the ash after they burn. They just dump everything in.

Senator MONTOYA. But they convert the solid waste and they use it to create steam for generation?

Dr. SMITH. Yes.

Senator MONTOYA. Isn't it the same process that you are going into with the CPU–400?

Dr. SMITH. In the overall sense, yes; that is correct. But in the execution of it, in terms of the efficiency of the plant, the size, the great size reduction which gives us new economics, the CPU–400 is just a far more advanced and better way to do it than the Dusseldorf.

Senator MONTOYA. Give us the difference.

Dr. SMITH. For example, the rate of combustion of the solid waste in the CPU–400 is 30 times greater than that of the large steam boiler incinerators. It really all comes down to the cost of operation which is $1 per ton approximately for the CPU–400. The cost of operation of the steam boiler incinerators, in general, would be much higher.

Senator MONTOYA. Well, how much higher, more or less?

Dr. SMITH. It is hard to estimate because the European labor rates and other economic factors are different.

Senator MONTOYA. Is it substantially higher?

Dr. SMITH. We feel it is substantially higher, yes.

When considering solid waste, there are two parts to the economic picture: one is disposal, and the other is collection. The average cost of collection in this country runs between $25 and $30 a ton, greater than the disposal cost, although the disposal has received a lot of emphasis because people have not found places to put the material.

Shown here is an outline of the San Francisco Peninsula making a comparison of two different approaches of incinerators. One would be a large central Dusseldorf-type plant; these are made that way because they are more efficient in large sizes. The other would be the use of the CPU–400 in its package plant configuration. Here four of them would be adequate for the peninsula itself.

Senator MONTOYA. What particular place is required for the location of a CPU–400 plant?

Dr. SMITH. Less than an acre, sir.

Senator MONTOYA. And these would be located within the interior boundaries of the city?

Dr. SMITH. Yes, in the city itself, perhaps in the waterfront areas, various places, Hunters Point, and this one would perhaps be down south. The point is that in a central plant, all of the refuse has to come to that plant, and the collection costs—that is, the trucking costs, would be rather large. In the CPU–400 package plant, which is dispersed, the distance from the donor, as it were, to the plant is greatly reduced.

So that as a secondary advantage of this package plant concept, we have an inherent reduction in the collection costs.

Senator MONTOYA. Give me more about the economics of locating CPU–400 plants in different sections of a city, such as San Francisco. Start with the collection economy effectuated.

Dr. SMITH. Well, if a large central steam boiler were put in down near the south part of the city, which is probably where it would have to go, or out in Hunters Point, where it was considered, then the trucks would all have to go to the central plant; this may be some 15 miles, since the large part of the density is up in the northern part of the city. This would have to be a large industrial installation probably just down south of the San Francisco area.

Senator MONTOYA. How much space would that Dusseldorf plant require in San Francisco vis-a-vis the CPU–400 requirements for the four plants?

Dr. SMITH. I am guessing, but the Dusseldorf plant would have to be a large industrial complex probably 10 or 15 acres, at least. The four CPU–400's would require 4 acres; the dispersion would allow these much shorter routes to be taken.

Now, this can be extrapolated as we look forward to the new advancements in technology in collection, and one of the most promising of these is the pneumatic collection system, called Vacol automated collection, shown here.

Vacuum collection systems such as this are in use in Sweden, in some suburbs of Stockholm. One of them is being put in Disney World in Florida; Aerojet-General Corp. is installing it.

Because the CPU is distributed around the city, that is, a package plant, we can consider putting in a vacuum network that would feed it. In this way we can get rid of a lot of the space requirements for the CPU–400 needed for bringing trucks in and out with the refuse, and this is one of the objections.

Senator MONTOYA. How would that vacuum system work with heavy metal?

Dr. SMITH. Well, I can refer you to the experience they have had in Sweden. The system operates at a velocity of about 90 miles an hour of air in this pipe. They have collected generators from automobiles that have been dumped in the openings. Apparently the heavier material is constantly bombarded by the lighted material which has to go by it. They find it successful. Vacuum collection is a look into the future as we move forward in solid waste technology.

There are other add-on capabilities to the CPU–400 because it is a gas turbine. The waste heat from the gas turbine could be used to produce steam for heating or air conditioning in downtown cities. The heat could also be used with the latest technology in desalting water, to convert salt water to fresh water.

There are two ways of using the CPU–400 system to produce fresh water. One is, if electric power is generated; then, in addition to the power, some 2 million gallons of water could be converted a day using the waste heat. That would be about 10 percent of the water requirements of the population that giving the solid waste to the CPU–400.

Senator MONTOYA. How would you do that? Would you use saline water into the process rather than pure water?

Dr. SMITH. What we would do is add to the CPU–400 something

called a multistage flash evaporator which would use the heat from the gas turbine to make fresh water from brackish water, which is, of course, available throughout the Southwest. Salt water could also be used. The fresh water so produced would be an augmentation of the water supply of the people. Many water supplies are becoming marginal.

Another option is using the waste heat from the CPU–400 to incinerate sewage sludge. Many communities have a problem in getting rid of their sludge.

In one configuration of the CPU–400 it may be possible to produce chemicals as a byproduct which can be used to purify sewage. This is done by heating the refuse, which is largely paper, in the absence of air to make char as shown here. Char can be activated to make a chemical that adsorbs the dissolved organics and bad things from sewage water. Research and development on activated carbon treatment of sewage is being fostered by the Federal Water Pollution Control Administration.

This is a picture of some refuse that Combustion Power Co. turned into active carbon. The adjacent bar charts compare its ability to adsorb with the ability of conventional active carbon. As you can see, the active char made from refuse is equivalent to the commercially available material; it can be produced as a free byproduct of the CPU–400 process.

Finally, this is an artists rendition of what a CPU–400 plant might look like showing the attractiveness of it and how it could fit on an acre of land in a city.

Senator MONTOYA. That is a drawing of the proposed plant to house the CPU–400?

Dr. SMITH. Yes.

Senator MONTOYA. You haven't told us too much about how you contain the smoke.

Dr. SMITH. Well, there will be no smoke.

Senator MONTOYA. Well, tell us about it.

Dr. SMITH. The fluid bed combustion chamber, this bed of sand that we are burning refuse in, will operate at 100 pounds per square inch, and there will be approximately four times more air than is required to burn the solid waste. So we have a lot of oxygen at high pressure, which means we are going to have very thorough and complete combustion. When one has very thorough and complete combustion, one burns all of the hydrocarbons, but one can also run into the problem of nitrogen oxide if the combustion process is allowed to operate too hot. Our temperature is in the order of 1,700° F. in order to prevent formation of nitrogen oxide. Temperatures of 2,800° and 3,000° are undesirable because of the fact this propensity to generate this nitrogen oxide increases with temperature.

Senator MONTOYA. How sure are you that you will effectuate this kind of a result?

Dr. SMITH. Well, 3 months ago we took some shredded refuse from Albuquerque because it was ground in an Eidal shredder, and we put it in a fluid bed approximately 12 inches in diameter. We ran a series of experiments, burning it to completion. We measured the gases coming from the combustion chamber and observed no smoke. The projections I am giving you are essentially the results that we observed in our experiments with high-pressure fluid beds.

Senator MONTOYA. All right. Then you say that it will be smoke-free. What about fumes?

Dr. SMITH. A major source of fumes will be the hydrochloric acids emitted from the combustion of polyvinyl cluoride plastics. This is a problem with all incineration.

In that regard, the CPU–400 fluid bed combustor is going to have limestone in it. Tests conducted by the Air Pollution Control Administration in trying to reduce sulphuroxide pollution have indicated that the limestone in the fluid bed is one of the most effective ways of grabbing and holding these fumes; that is, turning them into solids before they even get out. This will catch fumes from hydrochloride acid and it will catch fumes from sulfur or sulfuric oxide.

Senator MONTOYA. At this point I want to acknowledge the presence of our esteemed chairman of the full Committee on Public Works, Senator Randolph of West Virginia, and we certainly welcome you here, Mr. Chairman.

Senator RANDOLPH. Thank you, Mr. Chairman.

Senator MONTOYA. I would also like to say, Senator Cooper, that you may ask any questions at any stage. I am just asking questions as we go along.

You may ask any question you wish, Mr. Chairman.

Senator RANDOLPH. I believe he has one more chart.

Dr. SMITH. I do.

Senator RANDOLPH. I think I will allow him to flip the pages, and then I may have some comments.

PILOT PLANT

Dr. SMITH. This last chart shows where are we in the program. Approximately 2 years of studies and experiments have been conducted in the CPU–400 program. We are now at the position that approximately $1 million has been spent. This is all money supported by the Department of Health, Education, and Welfare, the Bureau of Solid Wastes Management.

We are now at the stage of beginning a pilot plant which will be a one-tenth scale model of the CPU–400. The final objective of the program will be to develop and demonstrate a full scale prototype, which would require a little more than 4 years in accordance with our schedule. The financial requirements to continue the development through the full-scale operating prototype (in other words, proof of principal in full scale) is approximately $19,500,000.

Our point in testifying here before you is to bring out some of the improvements that are in the research and development process, the payoff from them in terms of reduced costs of disposal and recycle of products back into the system, and also to ask you to weigh these overall benefits in terms of increased research spending in this area in order to have the payoff available.

Thank you.

Senator MONTOYA. What would be the cost, assuming that after the prototype is made or built, that you would estimate to be the cost on the open market of this type of facility for any city?

Dr. SMITH. Approximately $4½ million to $5 million apiece for a plant that consumes 400 tons of solid waste a day.

Senator MONTOYA. And would you develop the amount of solid waste that would be available for these plants, what their need might be, in order to justify their existence and project with respect to observation in any given city?

Dr. SMITH. Yes. The CPU–400 package concept would serve approximately 160,000 population assuming an average rate of approximately 5 pounds of solid waste per person per day. Solid waste surveys show this increasing to the order of 10 pounds per day in the coming decade.

The CPU–400 used in large cities would, of course, be dispersed and be fed by groups of 160,000 people segments. It would be appropriate for use in small towns to approximately 100,000 population. It would be useful in smaller towns where a part of the fuel energy might be regular fuel for the generation of power than insufficient refuse would be available, and it would subsequently have growth as the town grew into a large size.

ECONOMICS

Senator MONTOYA. Are you prepared to give us the economics of the conventional type of collection of waste and disposal system, such as to landfill, and incineration and the economics that you developed for this type of plant?

Dr. SMITH. Yes. The current figures for sanitary landfill, where there is some effort to make a little beautification after the fill, is roughtly $2 a ton compared to the dollar for the CPU–400. Incineration today is cost of the order of $6 to $8 a ton compared to the dollar a ton for the CPU–400.

Senator MONTOYA. You mention in your prepared statement that the CPU–400 development is ahead of the European technology in this field. I guess it is generally conceded that in the past they have been ahead of us. Now, you indicate, however, that you are ready to take a big leapfrog forward, to use your terminology. Now, can you compare the CPU–400 technology that you are ready to launch and how it compares with the incinerator technology that we have been using in this country?

Dr. SMITH. The incinerators that have been used in this country, most of them have been around for a very long time. It is a field where, up to the present, advanced development has not been applied. Incinerators have been more or less built by ear and many of them are operating very unsatisfactorily.

As a matter of fact, in New York City the residue from the incinerators is such that you can read part of the newspapers that come out, and a lot of the garbage is simply warmed over rather than destroyed, making it more of a problem.

Senator MONTOYA. Do you think the development such as the CPU–400 would ever come to pass without Federal support and research?

Dr. SMITH. No, sir; we don't. This is a big step forward. It is not a little step; and, of course, it is an expensive research and development step.

In just the straight industrial sector, which is, of course, based entirely on competition, the idea is to get a product into the market as soon as you can get the payout back, and this results in a more cautious approach for research, and properly so.

We feel that the Federal support should be oriented toward the big step forward and that this support should also be oriented toward programs that are national in scope in terms of their applicability and from which the technology can be derived to be put into production later by manufacturing companies.

FEDERAL FUNDING

Senator MONTOYA. As you know, the authorized funds for this type of research and development under the present Solid Waste Act are extremely limited. Would you think that increased authorized research and development in the solid wastes field would pay off in further improvements in the technology?

Dr. SMITH. Yes, we feel so very strongly, and I guess that is our message in being here.

Senator MONTOYA. Would you explain just briefly how you got into this field and what your background is and capability of your company?

Dr. SMITH. We moved into this field a little over 3 years ago. Our professional staff are all from the space business. We contributed to the several major rocket programs that are now flying military and space missions.

We looked at some of the urban problems around us, and were really surprised at the level of technology that was available in some of these fields. We felt we could make a very major contribution by applying some of the lessons we learned.

We thus organized an independent company and submitted a proposal to the Department of Health, Education, and Welfare for what turned out to be the CPU–400. We were fortunate enough to be award the contract to begin the study of that some 3 years ago; it has now developed into the program as you see it today. It is our major program. We have other research and development activities associated with sewage, water pollution, and air pollution.

Senator MONTOYA. Now, you project the cost at $19.5 million over a period of 4 years. Does this take into account the possible increase or augmentation of costs as we go along, or is that based on today's prices?

Dr. SMITH. That is based largely on today's prices. We have a hard time guessing what is going to happen to the economy, sir.

Senator MONTOYA. Then, there is no telling what the cost might be?

Dr. SMITH. I think it is fair to say from what we have seen over the last year that we can expect some increase because of the cost of many materials. For example, stainless steel is going up rapidly, yes.

Senator COOPER. This is an impossible question, but have you been able to give some estimate of the cost of the CPU–400?

Dr. SMITH. Well, we estimate the cost in the order of $4.5 million to $5 million. One of our major components, the gas turbine is, of course, available from the manufacturers at an established price, which, of course, has been increased. It is in the order of $1.8 million.

Senator COOPER. Is there any reason to believe the proceeds of the sale of electrical energy produced from this facility or any other materials would aid amortizing the cost of one of these plants to a community or city?

Dr. SMITH. Yes, sir; we have a good feeling about that. The Bureau of Solid Waste Management asked that the Federal Power Commission make a study of what the income from electric power would be if the CPU–400 were depolyed in 12 of our major cities over the country. That study was completed, and the answer they came up with was that an overall average of 4½ mils per average kilowatt hour, which was the figure we used in our estimates.

Senator COOPER. From what you said, I assume we can't expect any large proceeds from the residue material.

Dr. SMITH. That is a portion of the program that we have yet to study in depth. Our major effort has been on the technology associated with combustion and gas cleanup. Of course, we know that the steel will be separated, and that it has a market. We feel inherently there is value in the ash from refuse, but as yet we have been unable to take the time from research to develop the figure of what that could be.

Senator COOPER. Do you consider that this plant will be able to deal with the pollutants, sulphur oxide, oxides of nitrogen, and such?

Dr. SMITH. Yes, sir. The sole reason why we developed the fluid bed combustor, essentially, was to deal with these materials that one could expect from the combustion of refuse.

ENVIRONMENTAL CONSIDERATIONS

Senator COOPER. At the beginning of your statement you gave estimates of the waste that would be fed into the plant. I assume that, in answer to my question on recovery it would depend upon the nature of the waste that is fed into the plant. Have you made any studies about residue that would be left after all elements have been recovered?

Dr. SMITH. You have made a good point, and that is that the figures we quote on refuse are necessarily based on an average. The plant is designed to accept various varieties of compositions, but I am sure even a truck full of magnesium ships may arrive some day at our doorstep which would be a problem.

But to answer your question about the study of the residue specifically, no, we have not made a detailed study of what they would be and how they would be influenced by composition, nor how one would use the minerals or take the minerals from them.

To the extent that this is an incineration process, we are using the heat energy, but the complete burnout of material results in a product no different here than it would in any other complete burnout. That is the same.

Senator COOPER. But the combustion products whether they were made up of elements that could be recovered, or residue which could not would necessitate some landfill and storage space.

Dr. SMITH. Probably so. However, in some cities where there has been a clean, sterile residue from an incineration process, general contractors building buildings have sought after this material because of its ability to pack down and provide good bases and foundations on which they could build. This is not true with just plain refuse.

Senator COOPER. Did I understand you to say, in response to Senator Montova's question, that there would be no odor from these plants?

Dr. SMITH. That is affirmative, there will be no odor.

HEAT

Senator COOPER. What about heat elimination and dispersal?

Dr. SMITH. The hot air coming out of these plants could be as hot as, roughtly, 700 to 900° F. We would propose to release this hot air over an area, as you saw in the CPU–400 schematic, and the heat will cause it to be buovant so as to get rapid dispersion at high altitudes.

Senator COOPER. Would the release of this heat in the immediate area cause any problems?

Dr. SMITH. I don't believe so because, in general, the release of heat into the atmosphere where it is easily dissipated is not upsetting to local ecology. It does not fall into the same general category of thermal pollution, such as the release of large amounts of heat into the large bodies of water.

Senator COOPER. Would this require large stacks?

Dr. SMITH. No.

Senator COOPER. If you have several of these plants in large cities, your statement says that each would require about an acre of land?

Dr. SMITH. Yes.

Senator COOPER. Would the heat from such plants in a built-up area have problems?

Dr. SMITH. We think not. Gas turbine electric generating units are now being introduced in large numbers to the utilities in this country. Now, that is a gas turbine not unlike the kind we are using here. It uses regular fuel, but its exhaust puts out just as much heat as the CPU–400 exhaust would. These are not considered problems at all. In some installations, houses are in the localities with these units.

Senator COOPER. What about noise. Will it be a problem area?

NOISE

Dr. SMITH. The noise will be effectively deadened by the construction of the inlet, that is, with sound absorbing material on its interior surfaces. The noise commonly associated with the jet engine at take off does not apply to the plant because that energy that creates the noise is essentially being removed by the turbine and going into electric power, so the gas coming out will not be going fast. It will be going quite slow, and we do not expect to hear any noise.

APPLICATIONS

Senator COOPER. You do contemplate, I assume, that municipalities would buy these units?

Dr. SMITH. There are three different ways that we see the introduction of the CPU–400. In one, the municipality would buy the unit and operate the unit and either supply the power to the city directly—for example, in Palo Alto where I live the power would be supplied by the municipality— or it could be sold to the local power company.

The second way is that the power company could own and operate the CPU–400 providing a service to the community; that is, accepting its refuse and putting the power into its line for normal distribution and sale.

In the third area there are now showing up a number of service companies who are interested in acting as middleman, not necessarily

with the CPU–400, but they have interests in taking the refuse from a city under contract, and disposing of it. They would purchase the means of disposal and operate it as just a straight service function to the cities. In either one of these three areas, the CPU–400 could fit.

Senator COOPER. In the first part of your statement you suggested that recycle some products might not be readily marketable; that the price would be competitive with an existing source of suppiy; and that the quantity could be large enough to flood the market. Do you see any problems with the sale of the energy from these plants in a city, for example, where power is now supplied by either a municipal plant or by a private utility?

Dr. SMITH. These days, power is a little short. There are brown-outs and the black-outs we are experiencing; and, of course, the rate of increasing consumption of power is roughly 10 percent per year. So I guess we would feel that the need for added power is there; and, because of that current and increasing need, the power would be marketable in the cities in the country.

Senator COOPER. Would you use it in such a way so that it could be used for peaking power?

Dr. SMITH. You could certainly use it during the peak periods, but because of the nature of the investment, it would be uneconomical to use it only for that period.

Senator COOPER. I notice that you made some estimates of the problem. Have you considered, for example, in our State we have some cities with 450,000 or 500,000 people, and others with 150,000 to 250,000. Then we have many smaller cities from 30,000 to 50,000. How will this technology apply to these areas?

Dr. SMITH. Well, in Louisville right now they are incinerating about 95 percent of their refuse in an incinerator which is about 15 years old, but it is working well. About five percent is landfill. In a city of, let us say, 450,000, approximately three CPU–400's would be installed to supply the power and take over the incineration function.

In the smaller cities, say 100,000, this sort of a thing, we think that a single CPU–400 could be quite useful. The power in the area is supplied by the Louisville Gas & Electric, which would, of course, have to be cooperating in the installations.

Senator COOPER. What about the waters around this plant? Would there be any polluted effects?

Dr. SMITH. No; there are no wet processes that are used here.

Senator COOPER. Dr. Smith you have given a very interesting and informative statement.

Dr. SMITH. Thank you.

Senator MONTOYA. Mr. Chairman?

Senator RANDOLPH. In the last 2 or 3 minutes, Dr. Smith, you have contrasted a type of heating which you think is satisfactory to another type of heating which would perhaps cause difficulty. Would you comment on the Florida Power Co. in reference to the heating of the waters from the Deer Key Point area south of Miami?

Dr. SMITH. No, sir; I am not familiar with that situation.

Senator RANDOLPH. Well, you mentioned such a situation. You didn't pinpoint it, but I wondered if you had commented on it. There is a very active and sometimes very violent controversy with the firm

saying that this is not doing damage to life within the ocean. Others say it is.

Dr. SMITH. Well, of course, I have read the pollution journals and try to keep up on all of these things. But in terms of the heating of waters, my own personal opinion on the matter is that where the ecology is considered, I tend to think in certain areas it can be beneficial because certain oyster growth or other types of fishes that literally require warmth could be seeded in the area and it could prosper.

Now, in certain cases where the water is heated and there are cold water fish, obviously it is destroying the ecology. But you could literally put a farm, if you will, of special types of organisms that would thrive in this sort of thing, and that might be an intelligent thing to take advantage of the heat.

Senator RANDOLPH. I am glad you gave your opinion, because we value the knowledge and comment of you and other gentlemen who sit before us. This is a matter of current controversy, and there have been conferences held here in the last few days on the matter. I believe Murray Stein was there and had a particular interest because our subcommittee has gone to Deer Key Point, to look into this problem.

It is difficult to know always just what to recommend and how to proceed in a matter of this kind.

Dr. Smith, you are from California, and you may not have had the opportunity to read last week in the Washington Post the articles by Jim Mann.

Dr. SMITH. No, sir; I did not.

Senator RANDOLPH. I think the series presented an excellent summary of the solid waste problem of the District of Columbia and the Greater Washington area.

According to Mr. Mann, we have the distinction in the District of Columbia—I might call it the dubious distinction—of being No. 4 in the Nation's cities in solid waste problems.

The problem, I think, is not greatly different from that being experienced in other cities and urban areas throughout the Nation.

The Post articles emphasize that we are producing 875,000 tons of solid waste per year, having experienced what I call a terrifying increase from 650,000 tons in 1965.

I read the HEW survey, and I am rather startled that the actual amount of solid waste collected in the country is over 5.3 pounds per person per day, more than 190 million tons a year. The survey predicts that this will increase to 8 pounds per person per day by 1980, and this does not, Dr. Smith, include industry waste which amounts to another 3 pounds per person per day.

Presently the Nation spends an estimated $4.5 billion a year to process and dispose of this material, from which, practically speaking, we recover no useful value. As a matter of fact, in almost every area the present methods of handling and disposing of solid waste are actually polluting our environment.

Your presentation has shown that through the application of new technology, solutions to this problem are in the offing. Your systems approach seems to bear out that we can recover valuable energy and other resources from solid waste material while enhancing the overall quality of our environment.

We know the importance of these hearings, as do you, because as

we consider this legislation, which we hope will expand properly the Federal Government's role in research and development, there will be a determination of ways to encourage deployment of advanced waste disposal systems.

So I join in thanking you, Doctor, for your stimulating presentation.

DEVELOPMENT COSTS

You show a need for some $20 million to produce and demonstrate the first full-scale CPU–400. How does this break down into fiscal requirements?

Dr. SMITH. This breaks down as follows, sir: In 1970, the requirement is for $1.4 million; fiscal 1971, a requirement for $3.1 million; fiscal 1972, a requirement for $8.9 million; fiscal 1973, a requirement for $4.4 million, and fiscal 1974, a requirement for $1.6 million.

Senator RANDOLPH. What does that total?

Dr. SMITH. That totals $19.5 million.

Senator RANDOLPH. I think you say, also, that we need $3.4 million in fiscal 1971.

Dr. SMITH. That is affirmative.

Senator RANDOLPH. Does the solid waste management budget have this kind of money in its fiscal 1971 budget?

Dr. SMITH. No.

Senator RANDOLPH. What could we do about it? Could the Congress do something overnight about it?

Dr. SMITH. I think we are here to make a plea for the kind of funding in the research and development category that will allow programs such as this to be conducted, literally.

FISCAL YEAR 1971 BUDGET

Senator RANDOLPH. The President's budget total in this area is $14.3 million for all purposes in fiscal 1971. Would you feel that this is adequate or inadequate?

Mr. DELL. I might try to answer that question. Of the solid waste budget for 1971, the $14.3 million, $10 million of that is categorized for grant programs. These are construction and demonstration type grants and not applicable to the type of work we are doing.

Their budget for actual research and development of this type must come out of their operating funds, which is about $2.5 million, and they have other programs that they must fund, as well as ours. So that $2.5 million which they can actually commit to research and development is quite limited.

Senator RANDOLPH. You are really saying, then, we have $2.5 million for this type of project?

Mr. DELL. Yes. And out of that $2.5 million they have to support their own in-house research and development work and pay their own salaries.

Senator MONTOYA. In other words, what you are telling us is this: For research and development under the Solid Waste Disposal Act, the Department is seeking a funding of $2.5 million?

Mr. DELL. Well, I am actually saying that all of the work that they are able to do in research and development must come out of that

category of funding, and when they have to meet their commitments that recur each year, there is actually only about $1 to $1.5 million that they can actually spend on research and development.

Senator MONTOYA. Of course, they have other plans for further research into other fields within the orbit of waste disposal.

Mr. DELL. Yes.

Senator MONTOYA. So, actually, with the present status and the prospect for funding for research and development, you would not be able to come within it?

Mr. DELL. That is right. Our program, the CPU–400, at the present looks a little bleak for fiscal year 1971. As Dr. Smith pointed out, we are now entering this pilot plant phase of the program in which we expect to build a one-tenth-scale pilot plant. We are very hopeful that the solid waste budget for fiscal 1971 can support the program through the pilot plant.

Senator MONTOYA. Well, do you know whether there is any request under the budget for this type of program?

Mr. DELL. The solid waste group did make a request to the Bureau of the Budget for funding in fiscal 1971 for this program, but that was denied. So there has been no money put in, specifically, for fiscal year 1971 for the CPU–400 program.

Senator MONTOYA. Thank you.

Senator RANDOLPH. Mr. Grundy is calling my attention to the National Academy of Engineering-National Academy of Science policies for solid waste management. I recall testimony last week by Mr. Fry, and he zeroed in on this problem of money. You are saying $2.5 million is available for systems, components, research, development, and demonstration; is that right?

Mr. DELL. Yes, sir, to support both in-house programs and outside contracts.

Senator RANDOLPH. It falls into the categories I have indicated.

Mr. DELL. Yes, sir.

Senator RANDOLPH. Mr. Fry said the need of these knowledgeable people indicates $19 million rather than the figure of $2.5 million we are discussing here. Perhaps Senator Montoya or Senator Cooper might have a suggestion.

Senator MONTOYA. Well, the requirement for funding for this type of project would be in the amounts stated for the different fiscal years, which is far below the $19 million.

Dr. SMITH. I would assume that the figure of the National Academy of Engineering-National Academy of Science came up with was for an overall research and development program, not only for the CPU–400 alone, but for other approaches that they would wish to follow.

Senator MONTOYA. But that this particular program, the funding that would be immediately necessary for the next fiscal year, I believe, you stated would be $3.1 million?

Dr. SMITH. Yes, sir.

Senator RANDOLPH. Can we agree, Dr. Smith and Mr. Dell, that the job can be done only if we have sufficient dollars to do the job, plus the know-how to effectively use the dollars; is that correct?

Dr. SMITH. Yes, sir. We see no way the job can get done without that.

Senator RANDOLPH. Sometimes you have the know-how and not the

dollars, and sometimes you have the dollars and really don't have the know-how. There has to be a combination. I know that is a simplification, but that is a fact.

Dr. SMITH. Yes, we think that the technology is ready to go.

Senator RANDOLPH. If the technology is ready to go, is it possible, Dr. Smith, that a full-scale unit could be built by using demonstration grant funds like a model cities program or something else in that category?

Dr. SMITH. That is a possibility, sir.

Senator RANDOLPH. Do you have any suggestion on that?

Mr. DELL. The funding of the program through the demonstration of the one-tenth-scale pilot plant is definitely in the category of research and development. It is possible that, let us say, through a HUD grant, for instance, the first prototype unit could be built in a city as a model city type of grant program.

Senator RANDOLPH. Mr. Chairman, one further question. We would like to know whether HUD or the Department of the Interior—I think they are perhaps affected, and are interested in the program you are discussing—are they aware of your CPU–400 development?

Dr. SMITH. Yes, sir, they are. There has been very close cooperation between the Bureau of Solid Waste Management and other agencies of the Government, and this has been fostered and directed by Mr. Richard Vaughan in his overall guidance and management of the program.

Senator RANDOLPH. That is all, Mr. Chairman. I thank you, Dr. Smith.

Senator MONTOYA. Would you supply for the record your qualifications, Dr. Smith?

Dr. SMITH. Yes, sir.

Senator MONTOYA. And also the capabilities of those who are in charge of your research program in your company?

Dr. SMITH. Yes, sir.

Senator MONTOYA. Thank you very much, gentlemen, for your splendid testimony.

(The information to be furnished had not been received up to time of publication of the hearing.)

Senator MONTOYA. Our next witness is Mr. Leon J. Coslov.

STATEMENT OF LEON J. COSLOV, PRESIDENT, INSTITUTE OF SCRAP IRON & STEEL, INC., WASHINGTON, D.C.; ACCOMPANIED BY DR. HERSCHEL CUTLER, TRANSPORTATION CONSULTANT, AND JAMES FOWLER, DIRECTOR, PUBLIC RELATIONS

Mr. COSLOV. Mr. Chairman and members of the committee, I am accompanied this morning by Mr. James Fowler on my left, the director of public relations for the Institute of Scrap Iron & Steel, and Dr. Herschel Cutler, the transportation consultant to the institute.

My name is Leon J. Coslov. I am president of the Tube City Iron & Metal Co., 130 Monongahela Avenue, Glassport, Pa. 15045. I have been in the ferrous scrap processing business for 35 years.

I appear here today as president of the Institute of Scrap Iron &

Steel, Inc., the national trade association representing the ferrous scrap processing and brokerage industry. The institute has some 1,300 member companies, the majority of whom are processors of iron and steel scrap, with the remainder consisting largely of brokers of ferrous scrap and manufacturers of equipment for the industry. We estimate that members of the institute broker, process, or otherwise handle about 95 percent of all scrap consumed or exported annually. In 1969, sales of ferrous scrap by our industry approximated $3 billion.

We are an industry which has been working for many years in the field of recycling metallic solid wastes and of conserving our metallic natural resources through the effect of such recycling. Our direct interest as an association lies with the iron and steel scrap portion of the metallics, although our members also handle nonferrous metals.

Were it not for the volume of material handled by the industry, today's metallic solid waste problem would be much more severe than it is, and would have been in the forefront of public concern and congressional interest long before now. However, despite our annual volume, the fact that metallic solid wastes are included in current discussions is indicative of the existence of a growing problem in this area.

As a benchmark, may I point out that from 1956 to 1968, our industry failed to set a single record for tonnage shipped to consumers such as domestic steel mills and foundries.

STEEL PRODUCTION

Nineteen hundred and sixty-nine was the first year since 1956 in which we established new domestic levels. During this period, steel mill production increased from 115.2 million net tons to 137.6 million net tons, an increase of 22.4 million net tons. Our solid metallic waste problem today, especially as it applies to consumer hard goods, reflects not only those years of reduced volume, but also the fact that despite the 1969 levels, the volume of metallic solid wastes produced annually is not being completely recycled.

It is for this reason that our association supports the basic goals for S. 2005, although we differ on some specific portions of the bill itself.

In the Detroit field hearings of the subcommittee, ably handled by Senator Eagleton, an official of one of our member companies, effectively covered the technical problems relating to the lag in recycling ferrous solid wastes. He is Dr. Richard Burlingame, director of research of Luria Bros. & Co. I would draw the subcommittee's attention to that testimony, rather than repeating it here.

As a summary of his comments, let me say simply that basic changes in steelmaking technology caused declines in scrap demand and prices during the period under discussion.

SCRAP SUPPLIES

The impact of this decline fell largely in the area of less desirable scrap grades, that is, consumer hard goods, of which the old automobile is a prime example. This led to a backlog of such material, the abandoned auto syndrome, the filling of dumps and sanitary landfills throughout the Nation, and the consequent problems facing the States, counties, and municipalities.

During this period, the collection structure of the scrap processing industry was severely shaken. Peddlers and collectors disappeared in large numbers because it was no longer possible to even eke out a living handling material which had been discarded on streets, in fields, or dumps and landfills.

In addition, the number of processing firms in the industry who were handling iron and steel scrap declined. In 1958, according to census figures, there were 2,781 firms with processing equipment. By 1963, date of the most recent census data, there were only 1,921 such firms.

The need for scrap processors is paramount if the basic goal of recycling all possible metallic is to be met. People can be persuaded to come back into the industry, either as collectors or processors, providing they can foresee economic opportunities available to them.

Private industry can effectively handle the material. However, if the most complete job of recycling is to be accomplished, incentives, as called for in general terms in S. 2005, are needed.

In indicated earlier that the burden of decline in demand and price fell primarily in the area of consumer hard goods. This type of material is what we call obsolescent scrap.

As it is used in the industry, this term covers a wider range than merely consumer hard goods. It includes the scrap from railroad cars, ships, buildings which have been demolished, and obsolete plant machinery.

However, reduced market levels for scrap have meant that our members could not pay as much for these types of raw materials. Consequently, during periods of reduced demand there develops a breakdown in the supply channels.

Industrial plants which produce iron and steel scrap as a part of their manufacturing operations have had no major problem in selling it.

This type of scrap is considered prime material, and will move even at low demand levels unless it is too badly contaminated to effectively segregate. There is one exception to this, namely, borings and turnings.

In recent years, it has become the practice to charge plants for their removal. Where plants have been unwilling to pay the fee, the material has been taken to landfills and dumps. Even here, new techniques have been developed which will tend to make this material more salable. I have with me an example of a product made with this new equipment. Again, I would refer the subcommittee to Dr. Burlingame's Detroit testimony.

Basically, it seems the problem lies with what are generally considered consumer hard goods, and it is here that there is the major need for incentives. Thus, we support the provision of S. 2005, calling for "appropriate incentive programs," including tax incentives, to assist in solving the problems of solid waste disposal.

Senator RANDOLPH. Mr. Chairman, I would like to interrupt at this point in Mr. Coslov's prepared statement.

Senator MONTOYA. Proceed.

Senator RANDOLPH. I would like to express my appreciation to Senator Cooper, who, with others on our committee and subcommittee, although the legislative incentive is not before us or within the jurisdiction of this committee, very often Senator Cooper has joined other

Senators and has spoken often in this committee and in other committees for incentives for industry to do the job you believe must be done, and I compliment you for joining his purposes here through your organization of the pending legislation.

INCENTIVES

I wanted to say that this has been an active matter. It has been considered by many persons, and I want to express my thanks to Senator Cooper, who, over and over again, has talked about the incentive matter and the features that are valuable to industry and perhaps even partially meeting the needs in this area.

Senator COOPER. I am glad you join in this effort with the other members of this committee. Although we don't have jurisdiction over tax incentives in committee we have carried our efforts forward in other incentive areas and I think some progress has been made.

Mr. COSLOV. Thank you, Senator Randolph, and you, Senator Cooper.

I would, however, suggest to the subcommittee that the words "and recycling" be added to that section, section 205(a)(2), so that it will read, in part, "* * * to assist in solving the problems of solid waste disposal and recycling."

TAX

With reference to tax incentives, it is our hope that the Congress would look with favor on rapid amortization provisions for equipment which is used in the processing of metallic solid waste of all types. Such a provision would effectively help our industry install more efficient equipment of advanced design to process iron and steel scrap as well as other scrap metals, and thereby help contribute to an effective long-term solution to the metallic solid waste portion of the overall problem.

While it is not made clear in the provisions of S. 2005, I hope that the phrase, "appropriate incentive programs," includes private industry. For, as testimony has indicated, unlike the areas of air and water pollution where private industry has not really existed except to produce control equipment, the solid waste area includes large segments of private industry with major equipment investments, particularly in metallic solid wastes, where plant investments range from between a half million dollars to $5 million or more.

It would be our hope that consideration be given to incentives to consumers of our products to buy and melt more obsolescent ferrous scrap. Additionally, other industries which might develop future uses for such metallics as a result of research should be included in this area.

Further, we suggest that the transportation industry be included as another area of study for possible application of incentives to move scrap at more reasonable rates, and to build additional freight cars for transporting scrap. In this connection, may I point out one small area of concern that is closely related to high transportation costs—the problem of old tin cans. There are markets in the copper industry for scrap tin cans, if they are shredded. The material is used in a process which produces copper from copper-bearing mine waters generally

found in the west. However, the major tonnage of tin cans is found in the populous east. The barrier to fuller utilization of this segment of tin cans is freight rates because of their low density, bulky nature.

There is one additional industry which should be carefully considered for incentives: The auto salvage or auto wrecking industry, or, as most people think of it—the auto junk dealer. A program is needed which will persuade those businessmen to reduce the volume of hulks they hold in inventory to the minimum necessary for their business operations. If this were successful, the spread of auto wrecking yards across the landscape would be substantially reduced. The goal should be to move the maximum number of vehicles through the scrap cycle—not simply put up a fence to hide them.

MARYLAND

In this regard, I cite the law in the state of Maryland, which imposes a $5 charge every 6 months on all old vehicles which are over 7 years of age, and which have been held 6 months or longer in the wrecker's yard.

Senator MONTOYA. May I ask a question at this point? What process would you suggest in order to affectuate the movement of these vehicles through the scrap cycle?

Mr. COSLOV. I am going to relate to that just a bit further on, if you will, sir.

In a similar vein, we suggest that consideration be given to a congressional resolution recognizing the role of higher freight rates in impeding solid waste collection of high bulk, low density materials.

The similarity of the solid waste crisis facing this nation as it relates to high freight rates, and the agricultural crisis of the 1920's, again makes relevant legislation such as the Hoch-Smith resolution, whereby "lowest possible lawful rates compatible with the maintenance of the adequate transportation service" are in the national interest.

HOCH-SMITH RESOLUTION

Moreover, the policy of the Hoch-Smith resolution is that the ICC in adjusting freight rates should consider "so far as it is legally possible to do so," the conditions prevailing in "our industries * * * to the end that commodities may freely move."

The purpose of the Hoch-Smith resolution was, in the eyes of many transportation authorities, to shift the cost burden from commodities which had difficulty moving under high rates to commodities which could absorb yet higher rates. We suggest consideration of this concept especially where a movement of obsolete consumer hard goods to processing facilities is deterred, and consequently, aggravates solid waste problems.

Does that, Mr. Chairman, answer your question?

Senator MONTOYA. Well, you mentioned the movement, but where would these automobiles be moved to, and what process would you indulge in to facilitate that movement?

Mr. COSLOV. The movement would be to processing plants, of which there is sufficient capacity in the country. The problem is the transportation because of the bulky nature of that particular material. The

transportation costs in many areas are prohibitive because of the distance involved.

CAN RECYCLING

Senator MONTOYA. We had some testimony here last week from Reynolds Aluminum where they are encouraging and starting projects of collection of aluminum cans in Los Angeles and other cities, and they indicated to this committee that this was an economically feasible and it was a profitable operation for them in engaging in this type of collection and going through recycling.

Do you think that the iron and steel industries could launch a similar operation and make it economically feasible after collection costs and transportation costs?

Mr. COSLOV. With some help in the area of transportation. Comparing this to aluminum, aluminum has a much higher economic value.

Senator MONTOYA. Do you use shredding or crushing of automobiles?

Mr. COSLOV. I think there are presently about 75 shredders operating in the country for shredding automobiles.

Senator MONTOYA. What has been your experience with shredders? Can you give me an evaluation of the different type of shredders?

Mr. COSLOV. Technically, I cannot. Generally speaking, the feedback we receive at our association office is that they are very effective. They are a high-cost operation in that the investment and maintenance is considerable. However, they do an effective job and produce a quality product for the consumers of iron and steel scrap.

Senator MONTOYA. You may proceed, sir.

INCENTIVES

Mr. COSLOV. Finally, it is our view that no additional scrap industry incentives should be necessary. Those mentioned above, when implemented, would help provide markets for the processed scrap which would then be handled more expeditiously through the scrap cycle.

The ferrous scrap industry operates in an area where price is determined solely by the law of supply and demand. What has occurred in recent years demonstrates this basic law.

In the past 2 months, there has been a sudden reversal in ferrous scrap prices. Steel mills, anticipating that scrap would be in plentiful supply this year, reduced their inventories. They expected their operations would be lower and their scrap demands less. They were concerned with the high cost of money. World demand for steel, and a rise in their export volume; that is, the producers of steel, however, serve to keep their production at a higher level than forecast, resulting in a marked growth in scrap demand.

However, the automotive industry, a prime source of industrial scrap, has reduced its operations, with a consequent decline in scrap output. Our export markets, also based on strong world steel demand, have maintained high levels. The conjunction of these events has caused domestic steel mills to seek out scrap, with a consequent rise in market levels. This, in turn, is bringing an outpouring of supply, which will increase as winter loosens its hold.

Typical of the impact of higher prices on the flow of scrap was a

comment made by one of our members from Portland, Oreg., who said he was not able to reach into Idaho and Montana to get junk automobiles which hitherto had been untouchable because of the cost of transportation. Items like borings and turnings, which I cited earlier as a problem, are now moving to consumers.

If higher price levels could be maintained, there would soon be no metallic solid waste problem to speak about. But we know they will not, and that the long-term factors which have led to the problem will soon reassert themselves with a consequent drop in price.

I believe it is important to point out that the artifically high scrap prices now found in the marketplace are not desired by the ferrous scrap processing industry. The present level, while reducing somewhat the current scrap backlog, portends even more serious congestion in the future. This will occur because the high current price will expedite the development of such intense competitive materials as high iron pellets which can displace ferrous scrap as a raw material in the future.

For example, once pellet mills are "on-line," pellets will generally be used regardless of the price of competing materials, such as ferrous scrap. The long-run absorption of obsolete scrap will be threatened by a continuation of artifically high scrap prices. Thus, the removal of obsolete materials is conditioned on competitive price levels of ferrous scrap as compared to the price of iron ore in its various forms.

We believe domestic mills and foundries can use more scrap, and on a more continuous basis. Such continuity would provide stability to the collection mechanism of metallic solid waste products.

It is also our considered opinion that those who produce metallic solid waste, the public, should be asked to directly bear the cost of insuring that this material is recycled whenever possible. The principal goal would be to provide funds, which could not only help meet the problem of transportation, but also meet the requirement of more costly and effective processing to insure that scrap produced is as uniform as possible in meeting the needs of the steel mills and foundries.

CONCLUSION

In conclusion, I would like to recommend to the subcommittee that section 207, "Grants for State, Interstate, and Local Planning," subsection (a)(2) be amended with the insertion of the words: "and/or recycling." Thus, grants would be made under that section when they "indicate the manner in which provision will be made to insure full consideration of all aspects of planning essential to areawide planning for proper and effective solid waste disposal and/or recycling consistent with the protection of the public health, et cetera."

Further, we oppose section 208, "Grants for Construction" in any respect. We see in this the possibility of Federal and State funds being used to construct scrap processing facilities, thereby bringing Government entities into competition with private industry. We believe that incentives to the private section to promote recycling will be much more effective and less costly.

We made this same point in testimony relating to the existing Solid Waste Act, and our position was accepted. We hope the same view will prevail with S. 2004.

At the same time, we support the Boggs amendment to S. 2005, and are particularly interested in section 204—Duties of the Commission, subsection (a) (7) feasibility and desirability of establishing computer inventories of national and international materials requirements, supplies, and alternatives. We believe ferrous scrap should be included.

To this end, we have met with the automotive and the steel industries, as well as a major research organization, with the goal of setting up a computer program which would serve to measure the long-range supply of iron and steel scrap. We hope to utilize this information to reinforce the confidence of those corporations who are considering additional installations of scrap melting facilities.

I appreciate the opportunity to appear before this subcommittee to present our thinking. Thank you.

AUTO EXCISE TAX

Senator MONTOYA. Now, Mr. Coslov, an article by Donald Carr in the New York Times magazine of May 4, 1969, indicates that steel scrap sales dropped from $3 billion in 1956 to $1.9 billion in 1963. Now, the value of a ton of scrap steel is worth about $16, and in some parts of the country has dropped as $10.

On the other hand, it costs about $12 to $14 a ton to compact cars and another $10 to haul them to the mill. Obviously, it is an easy way to lose money.

Now, in 1965, Senator Paul Douglas proposed a 2-percent excise tax on new cars sold to go into a burial and beautification fund. Senator Douglas also suggested that part of this money be spent on finding new uses for scrap steel.

Would you comment on this proposal?

Mr. COSLOV. You are referring directly to the Senator Douglas proposal?

Senator MONTOYA. Yes.

Mr. COSLOV. The one area, the latter part of your request, we feel is very important because of the large excessive accumulations that will come about in any specific or structured program for solid waste handling. Obviously, the incineration and other systems which have been described here this morning will not serve to dispose of the ferrous or nonferrous scrap metallic materials.

With this obvious continuous excessive volume, and looking down the road by way of comparison with the abandoned automobile, recent statistics in 1969, I think, relate about 6 million retirements per annum. The anticipation by 1980 will be 10 million per annum. Consequently, there will be a continuous growth in this area.

Senator MONTOYA. What is the recycling rate?

Mr. COSLOV. I can give that to you specifically, sir, 6.9 million cars.

Senator MONTOYA. So you are actually now recycling almost the rate of obsolescence?

Mr. COSLOV. Yes, that is correct. But this does not account for the backlog, nor the increase in sales per annum.

Senator MONTOYA. What do you suggest be done besides transportation incentives in order to move this to a point where we will be ahead of ourselves?

Mr. COSLOV. I would say a continuous market for the product by

way of incentives, which I have suggested for the consumers of the scrap, particularly those low-quality materials, that the taxpayers consume, such as the appliances referred to in my statement.

Senator MONTOYA. I am speaking to the realities of the situation, and I am assuming that Congress would never provide incentives for this type of a program. Could you tell me the economics of the problem more lucidly, and are you able to tell me whether or not we can develop economic feasibility without Government incentives?

MARYLAND

Mr. COSLOV. Perhaps the Maryland bill, which I quoted from this morning might be some help in that area. I might say that our staff is presently working on specifics and we would be glad, either verbally or in written form, to work with the staff of the subcommittee in the area of specifics or details.

Senator MONTOYA. Well, you mentioned the Maryland bill. The Maryland bill is only a tax on old vehicles which would prod their removal. Is that what you are talking about?

Mr. COSLOV. No. That is a tax on new registrations to supply a fund for the disposition at the $5 rate per vehicle.

Senator MONTOYA. That was the Douglas bill?

Mr. COSLOV. Yes; a similar theory.

Senator MONTOYA.The Maryland provision is a tax on old vehicles at the rate of $5 each month?

Mr. COSLOV. No. There is also in that bill a disposal figure. Now, I don't have all the specifics in front of me. Dr. Cutler has just pointed out proposed legislation by Senator Javits, "Bounty on Junked Cars," legislation providing a $25 to $50 incentive for reclamation of junked automobiles.

INCENTIVE

Senator MONTOYA. Well, the President in his message made the following comment, and I quote:

> I have asked the Council on Environmental Quality to take the lead in producing a recommendation for a bounty base or other system to promote the scrapping of all junked automobiles. He further stated: "The particular disposal problems presented by the automobile are unique. However, wherever appropriate, we should also seek to establish incentives and regulations to encourage the reuse, recycling or easier disposal of other commonly used goods.

Mr. COSLOV. Senator Javits' proposal here is a cost to the consumer or the buyer of the original automobile.

Senator MONTOYA. Well, that was the Douglas concept.

Mr. COSLOV. Yes; that is correct.

Senator COOPER. I also thought Senator Javits' bill included a charge against the landowner.

Mr. COSLOV. Yes. These bounties, regardless of the method pursued, would not be completely effective if we do not have a continuous market for the products, and that is why I stress the possible formula for some incentives for consumers to use this lower grade product.

Now, there are many prime grades in large tonnages that present no problem to market; that is, we have no problems marketing them in this industry. The prime grades produced by the automotive industry is an example.

Senator MONTOYA. Well, it is reported that the Proler Steel Co. in Houston, Tex., has a $2 million auto eater, to turn the light on in California, which reduces cars to pellets of steel. Now, Proler sells these pellets for up to $33 a ton to the Japanese steel mills on a 5-year contract. How can these prices be realized to foreign sources when domestic sources will pay only $14 to $15 a ton. Can we, as a nation, afford to lose this potential resource?

Mr. COSLOV. Depending on the area, here is a transportation problem to the plant. The price structure you are citing, Mr. Chairman, has moved up appreciably domestically in the last 60 days.

Senator MONTOYA. What is it now?

Mr. COSLOV. At the consuming area, including transportation, processing costs, et cetera, for this type of material, we are more in the area of $38 per ton, but this is delivered to the consuming point.

Senator MONTOYA. Is that domestically?

Mr. COSLOV. Domestically; yes, sir.

Senator MONTOYA. What do the Japanese pay?

Mr. COSLOV. They are competitive because of the fact they need the material. They must be competitive at the seaports.

DEPARTMENT OF COMMERCE

Senator MONTOYA. Now, the reports indicate the Department of Commerce has met with representatives of the automobile and steel industries to discuss the problem of used automobiles.

Now, what progress has been made as a result of these meetings, and to what extent has economic incentives been considered?

Mr. COSLOV. To the best of my knowledge, there are no specific programs as yet worked out. In considering them, our association is going to hold a conference on all old automobiles on March 31 to review these problems, particularly with governmental officials at all levels, State, counties, municipalities, and so forth.

Now, as to a program, I think there are some additional meetings which are scheduled with the automotive industries, as well as our industry, in order to evaluate the situation and arrive at some formula that we might suggest at that time.

INCENTIVES

Senator MONTOYA. I will read you a statement that was submitted to this subcommittee by Senator Eagleton, of Missouri. He said the problem is not only to establish new public polices, but to be sure that old public policies are consistent with our new environmental priorities. At present Federal Government offers a wide range of inducements, usually in the form of tax incentives such as depletion allowances which encourage the exploitation of raw materials. While these policies were surely consistent with the need of a young nation to grow and to take advantage of seemingly endless resources, they may now constitute an actual disincentive to the recapture and the reuse of the materials.

For example, at a time when we are concerned with recycling the steel in junked cars, the 15-percent mineral depletion allowance reduces the cost of fresh ore relative to the cost of scrap, encouraging the use of ore and thereby discouraging the use of scrap.

Since there is already a limited market for junked cars processed, they bring about $27 a ton at the steel mill. An increase in the price of ore resulting from eliminating of the depletion allowance might help clear out a lot of unsightly auto graveyards.

So what comments can you offer on this?

Mr. Coslov. Well, you have indicated several times this morning various prices for scrap. This definitely is an indication of the volatility of our market, the supply and demand factors which determine these factors.

Consequently, and as I stated in my testimony, a continuous demand to keep the scrap at an indicated trading level, a level at which material would flow through the scrap cycle is the most desirable, and that is what we are seeking. We are not seeking the artificially high prices, but a price at which material flow can accomplish that which we are all seeking to accomplish as far as this solid wasting problem is concerned in the environmental program.

Senator Montoya. Do you feel the Japanese who buy this scrap metal are actually creating a better market for you than if you were just relegated to the whims of the domestic market entirely?

Mr. Coslov. Yes; very definitely, sir. The tonnage they will buy on a competitive basis with the domestic market removes that particular portion from the available supply in order to sustain a reasonable price at certain times. As I indicated, our market is very volatile and the supply and demand factors are always working.

Senator Montoya. The fact that they are buying these scrap metals from you people certainly creates a sort of a pressure on the local market to compete equally or on an equal plateau?

Mr. Coslov. That is absolutely correct.

Senator Montoya. Senator Cooper?

Senator Cooper. Now, on page 4, you say:

SCRAP RECYCLING

The need for scrap processors is paramount if the basic goal of recycling all possible metallics is to be met.

In the preceding paragraph you noted in the period from 1958 to 1963 the number of firms with processing equipment has reduced from 2,781 to 1,921.

Do they produce the same volume as the larger number of firms?

Mr. Coslov. Yes, sir; basically the capacities are there. The larger firms have been able to take up the slack by adding additional processing facilities.

Senator Cooper. On page 5:

Industrial plants which produce iron and steel scrap as a part of their manufacturing operations, have had no major problem selling it.

Are those plants which utilize primary iron and steel using the scrap which they produce?

Mr. Coslov. No. Generally speaking, these are fabricators producing parts for the automotive industry or bodies, and they do not have melting facilities. They sell their scrap in the marketplace.

Senator Cooper. But you have no difficulty in selling it?

Mr. Coslov. That is correct, because of the prime quality involved. Such material has a uniform analysis and consequently is the most desirable grade for our consumers.

Senator COOPER. You then go on to say that varying types of solid wastes, such as railroad cars, ships, buildings, which have been demolished, and obsolete plant machinery are of good quality but that often such waste is not salvageable; is that correct?

Mr. COSLOV. At the time, sir; but today that happens to be changing. But this is an unusual condition, as I stated.

Senator COOPER. For example, old railroad cars and obsolete machinery and steel and iron machinery, is that of good quality for use by the secondary producers of iron and steel?

Mr. COSLOV. Yes. I would say it is a medium quality in that it does not have the uniformity of chemical analysis that the products the automotive industry produces in the production of automobiles.

However, that would fall into a secondary grouping, and depending on the demand by domestic consumers and/or foreign customers, these prices will fluctuate accordingly.

RAILROAD CARS

I might indicate at this point that our industry is presently organizing in the area of research in order to solve the pollution from the burning of wooden boxcars, and we have a project presently operating in Chicago in order to research the problem of diffusing the pollutants in this area.

Senator COOPER. What about the scrap metal from railroad cars? Is that desirable metal for the use in iron and steel plants?

Mr. COSLOV. Yes.

Senator COOPER. You characterize them hard to recover. Why don't railroad cars move very well to your plants?

Mr. COSLOV. Do you mean the resultant scrap from the dismantling thereof?

Senator COOPER. Yes, sir.

Mr. COSLOV. That does move here, again depending on the demand, the market price at the consuming point as related to the transportation costs and the cost of processing. These have all moved up appreciably in the last 10 to 15 days.

Senator COOPER. Have you an estimate of the volume in tonnage of railroad cars which are obsolete, as far as the railroad companies themselves are concerned?

Mr. COSLOV. We are just checking our yearbook here. We may not have those, but I will be glad to get them.

(Subsequent to the hearing the following information was provided:)

INSTITUTE OF SCRAP IRON AND STEEL, INC.,
Washington, D.C., March 17, 1970.

Hon. JOHN SHERMAN COOPER,
U.S. Senate, Washington, D.C.

DEAR SENATOR COOPER: During the hearings on S. 2005, Resource Recovery Act of 1969, you directed a question to the President of this Institute, Mr. Leon Coslov, regarding the number of railroad cars retired during the most recent calendar year.

I was today informed by the Car Service Division, Association of American Railroads, that during the twelve month period ended January 31, 1970, a total of 72,100 freight cars owned by Class I railroads were retired, slightly less than the 73,716 retired during the immediately preceding twelve month period.

I thank you for your interest in the ferrous scrap processing industry and its role in furthering the elimination of our solid waste problems. I trust this information will be useful.

Cordially,

WILLIAM S. STORY, CAE,
Executive Vice President.

Senator COOPER. Many people in my State of Kentucky complain of the shortage of railroad cars because they are sent to other parts of the country and there is a problem of getting them back.

But it seems to me that one source of scrap productivity as they move to your plants, why couldn't they carry certain supplies to the neighborhoods of these plants so it would not be economically unfeasible to recover them. Has that even been thought about?

Mr. COSLOV. You are referring to the use of these old cars to move scrap products?

Senator COOPER. Yes, sir.

Mr. COSLOV. I personnally feel, based on experience that we have had in many of our plants, they are utilizing the oldest possible ones as long as they meet certain minimum safety regulations. There is a specific shortage of gondola equipment, which is the type of equipment required to move bulk commodities.

Senator COOPER. It seems to me within the industry itself some coordination in the movement of these railroad cars which are obsolete could carry other obsolescent material from plants which are right on the railroad, and it might be economical. Has this been considered?

Mr. COSLOV. I would like to have Dr. Cutler answer this, if you don't mind.

Senator COOPER. You asked for incentives, and in this committee we have talked a good deal about incentives, but it occurred to me when you say railroad cars, obsolescent iron and steel from producing plants, those plants are right on the railroad chiefly. Why couldn't there be some coordination to make it economical?

Mr. CUTLER. If I may, Senator, there are a number of problems that come up as a result of that suggestion. First of all, you could clearly make one final move in the obsolete car. You could have only one last move.

Second, generally scrap can only move in what are called gondolas for operating purposes. We couldn't use a hopper car or boxcar. It would only be the gonds.

The third thing is obviously there will have to be a rate to be charged because the scrap moving in the car would not have to be for the account of the railroad. So you have a commercial problem that would be involved.

Then, the fourth one, and the one that we have just had an unfortunate experience with—and it goes back to Mr. Coslov's discussion about the Hoch-Smith provision—we proposed to the carriers that they put in a provision for putting in a mileage rate for the cars. At present there is a mileage rate, but it doesn't differ whether you have new cars or the old cars that are being dismantled. The effect is that in many instances old cars don't move. We were turned down at that point.

Senator MONTOYA. Will you yield at that point?

Senator COOPER. Yes.

Senator MONTOYA. Congress just gave the railroad the the fast depreciation schedule and made an exception for them. Perhaps Congress could place a condition on that fast depreciation so that when some of their cars become obsolete and when they are useless, they should take them to the elephant burial grounds.

Mr. CUTLER. There are some other problems, and that is the crossing of various railroad lines and that not all processors can dismantle railroad cars. So that once it leaves the railroad, there is the problem of the rate that they have to pay each other. That is what we were trying to overcome, and we were turned down on our last attempt.

If I might, Senator, you mentioned something before about getting new policies.

Senator MONTOYA. That was Senator Eagleton's testimony.

Mr. CUTLER. This is the essence of what Mr. Coslov said about Hoch-Smith's resolution. I would like to point out, sir, that the freight rates—and we have had a number of problems with this—and I have the Wall Street Journal here of yesterday. I am sure you gentlemen know of the new rail rate ex parte case which was supposed to be filled this afternoon on an across-the-board basis for all commodities creating a basic problem for scrap because the basic structure is discriminantly in relation to ore.

Every time there is a percentage application, we get further and further behind in the competitive input, and so in ex parte 262 we lost about $2.16 a ton on an average, and if the Wall Street Journal is correct, we will lose about 16 cents a ton as versus iron ore in its competitive deliveries.

Senator MONTOYA. Is there anything else?

Senator COOPER. Could the steel and iron industry use all of these automobiles scattered around the country?

Mr. COSLOV. Could the consumers use all of them? Yes. I think the capacity is there, the production of steel capacity, they could use it if it is properly processed and put into a form physically as well as chemically by proper sortation and processing equipment. It could be made into products that the entire tonnage could be usable, yes.

Senator MONTOYA. Thank you very much, gentlemen, for your splendid testimony.

Mr. COSLOV. Thank you, sir.

(The following letter was received from the Institute of Scrap Iron and Steel, Inc.:)

INSTITUTE OF SCRAP IRON AND STEEL, INC.,
Washington, D.C., March 30, 1970.

HON. JENNINGS RANDOLPH,
U.S. Senate,
Washington, D.C.

DEAR SENATOR RANDOLPH: We really don't need Federal subsidies!

The Institute of Scrap Iron & Steel, which represents the 1300 scrap processing companies on the frontline of the nation's solid waste effort, applauds the long overdue national interest in environmental problems.

We're delighted that the President pinpointed the need to improve the process of recycling obsolescent metals into new steel. At last people are listening to the story we have been trying to tell for many years.

But in looking for quick and easy answers to complex problems, we're concerned about hasty legislative solution.

For example:

Our industry has the equipment to handle its end of the job. We don't need a Federal bounty to help us do our job.

Restriction on scrap exports are unthinkable when two billion dollars worth of scrap is lying fallow on our streets and fields.

It is for this reason that I wish to call your attention to the services the Institute offers. When you are considering legislation on solid waste disposal, we would be pleased to open our files, provide facts and figures, and share with you our research and experiences since the Institute was founded in 1928.

We look forward to an opportunity to be of assistance on these matters.

Sincerely,

WILLIAM S. STORY, CAE,
Executive Vice President.

(Subsequent to the hearing the following questions were sent to Mr. Coslov by Chairman Muskie:)

APRIL 21, 1970.

Mr. LEON J. COSLOV,
President, Institute of Scrap Iron and Steel, Inc.,
Washington, D.C.

DEAR MR. COSLOV: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formulation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide answers to the following questions:

1. It is reported that the Proler Steel Company of Houston, Texas, has a $2 million auto-eater at Terminal Island, California, which reduces cars to pellets of steel. Proler sells these pellets at up to $33 a ton to Japanese steel mills on a five-year contract. How can these prices be realized from foreign sources when domestic sources will only pay $12 to $14 a ton?

2. A paper by Mr. J. S. Poliskin, the Supervisor of Raw Materials for Colt Industries comments that the "reuse of the steel in scrapped automobiles is hindered by the retention of copper in wire conductors and small motors which are costly to remove. Lower copper in the scrap can be achieved by using aluminum for the electrical conductor wiring and ceramic ferrite permanent magnets for the stators in small motors. During melting and refining of this scrap, the aluminum will oxidize and enter the slag, together with the ceramic oxides. The steel produced from this scrap will be low in copper."

Would this improve the technical and economic feasibility of recycling future junk automobiles?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution.

(The following letter was received in response to the preceding questions:)

INSTITUTE OF SCRAP IRON, AND STEEL, INC.,
Washington, D.C., May 1, 1970.

Hon. EDMUND MUSKIE,
U.S. Senator,
Old Senate Office Building,
Washington, D.C.

DEAR SENATOR MUSKIE: Our President, Leon I. Coslov, is out of the country at the present time enroute for the Annual Congress of the Bureau International de la Recuperation (BIR) in London, which starts next week. He asked me if I would be good enough to provide you with the information requested in your April 21 letter.

The BIR, incidentally, is a Federation of all associations in major countries having to do with the reclamation of solid waste—iron and steel, non-ferrous metals, paper, rubber, glass and textiles. Through the activity and interest of two American associations—our own Institute, and the National Association of Secondary Material Industries—BIR has been placed on a firmer financial and membership basis, so that it is better able to operate in the growing worldwide interest in environmental problems.

You asked about Proler Steel's operation at Terminal Island, Calif. This is actually the Proler-Neu Corporation, a joint venture between Proler Steel and Hugo Neu Corporation of New York. Proler-Neu also operates a shredder in

Boston, Mass. under the name Prolerized New England Corporation. Material from this plant also goes for export.

Regarding prices paid for shredded material for use domestically, it is generally the case that this type of product has carried the same price level as No. 1 heavy melting steel. There are efforts on the part of consumers here, as well as abroad, to bring the price down to the point where it is somewhere between No. 1 heavy melting and No. 2 heavy melting. (Using Boston as an example, No. 1 heavy melting is $31 f.o.b. shipping point, No. 2 heavy melting, $21–$23). Shredder operators, I am told, are resisting this effort, but as more systems come into operation and the material becomes more plentiful, there probably will be some downward movement, especially when demand for scrap eases.

I am not certain where the $12 to $14 per ton figures referred to in your letter came from, but it is not true that domestic sources will pay only this level for shredded scrap. This is more akin to the prices which shredders in some areas might be paying for old automobiles to shred. Actually, when Proler-Neu first opened operations in Los Angeles at Terminal Island, the price paid for old cars was only $1 less than the delivered price of No. 2 bundles (baled autos) to local consumers. I believe this pricing policy is still followed in Los Angeles by Proler-Neu as well as the two other firms now operating shredder systems in greater Los Angeles. In Los Angeles at the present time, No. 2 bundles are $31.

I hasten to point out that the ferrous scrap market has been much stronger this year than it was in the same period last year—indeed, stronger than it has been for many years. No. 1 heavy melting steel in Los Angeles is quoted at $44 delivered, at the present time, for example.

Strength in ferrous scrap is due first, to a continued high level of domestic demand, much of it caused by heavy exports of steel products, and a higher-than-usual level of export demand for scrap.

I hope this effectively answers your query about shredded scrap, and provides some additional insight into current scrap markets. If today's market levels had been in effect from 1957 to 1969, there would be no major solid metallic waste problem in the country today, in my opinion.

Your second question referred to Mr. Poliskin's paper on the substitution of aluminum wire for copper wire in automobiles, and also the use of ceramic ferrite permanent magnets for starters in small motors. I have read Mr. Poliskin's paper, and agree with him. Actually, I have on several occasions asked major aluminum producers to step up their work in aluminum wire substitutability in the automotive field. In the most recent responses, there appears to have been some increase in their momentum in this area. I am also told that a division of Texas Instruments now has what reportedly is a copper-flashed aluminum wire which can be substituted.

Mr. Roger Schoerner, Southern Wire Company, Carrolton, Ga. called me and said he is working with Ford and General Motors to replace all the copper wiring in automobiles. He also mentioned that this should greatly improve the value of the scrap.

There is no question but that presence of copper in automotive scrap of all grades has been an inhibiting factor on greater use of this material. Copper goes into solution in the steel bath and cannot be economically removed by any known process. Aluminum has a tendency to deoxidize, and while this would present some problems to consumers, they are not as great as those presented by copper.

It would be of real assistance to steelmakers as well as to our industry if, through research, it were possible to come up with a technique which would serve to cure the copper problem while steel was in the molten stage in the furnace. Absent this, our industry's response has been to develop the shredder with its improved ability to remove coppers, and to provide a product which is more uniform with respect to this and all other residual metals.

I hope this satisfactorily answers your query, but if we can provide further information, please feel free to call on us.

Cordially yours,

WILLIAM S. STORY, CAE,
Executive Vice President.

Senator MONTOYA. I have a letter and news release from the National Barrel & Drum Association which I would like to enter in the

record at this point. This letter and accompanying release concern the manufacture of single use 55-gallon steel containers. Without passing judgment on this practice, I would like to comment that this approach discourages reuse at a time when there is a need for more rather than less of a use and discard approach to all types of containers.

(The letter referred to follows:)

NATIONAL BARREL & DRUM ASSOCIATION, INC.,
Washington, D.C., February 13, 1970.

Hon. JENNINGS RANDOLPH,
Chairman, Senate Committee on Public Works,
Senate Office Building, Washington, D.C.

DEAR SENATOR RANDOLPH: Knowing of your deep interest in environmental quality control, and in view of the urgency of the problems outlined in President Nixon's message to Congress this week, we hope that you will find a moment to read the enclosed release and suggestions from our Association.

Our recommendation, to end the manufacture of 55-gallon containers made of steel lighter than 18-gauge, and therefore not reusable at least a dozen times, is in keeping with the theory of recycling materials wherever possible. It could be implemented at no cost to either Government or industry. It should in no way be construed as an attempt to obtain funds for any program and would not add to the taxpayers' burden.

During World War II and the Korean War, regulations were promulgated by the War Production Board and the National Production Authority, respectively, with the objective of conserving steel. One of these regulations prohibited the purchase of new drums, unless shippers arranged for the use and reuse of such drums, until their useful life had been exhausted. Then, and only then, were they permitted to buy new ones.

That regulation was necessary during wartime to conserve steel; it is necessary today, in our opinion, to help reduce solid waste pollution in this country. It is a different kind of emergency, but an emergency, nevertheless.

Our suggestion is aimed at reducing the Nation's solid waste disposal problem, conserving steel and the natural resources therein, and as a means of implementing—insofar as the steel container industry—some of the proposals in the President's environmental message, as well as the statements quoted in our release from *Business Week*, *Technology* and *Iron Age*, which conclude that the only solution lies in the " . . . *reuse and recycling of everything.*"

We hope that you can make use of the information enclosed. If our Association and our industry can be of any service to you and your Committee, we would be pleased to have you call on us.

Very truly yours,

MORRIS HERSHSON, *President.*

[News release from the National Barrel & Drum Association]

DRUM RECONDITIONING INDUSTRY REDUCES NATION'S SOLID WASTE DISPOSAL PROBLEM BY RECYCLING ONE MILLION TONS OF STEEL ANNUALLY

"We need to . . . create self-sustaining environments, in which people can live for long periods of time by re-processing re-cycling and re-using the same materials.

"I have ordered a re-direction of research under the Solid Waste Disposal Act to place greater emphasis on techniques for re-cycling materials. . . ." (From President Nixon's environment message to Congress, Feb. 10, 1970.)

The President's message is clear: the time has come for industry to adopt measures which will aid in solving this segment of the Nation's environmental pollution problems. His references to solid waste disposal have been singled out here to illustrate the steel drum reconditioning industry's contribution, over the past 40 years, to finding solutions for this problem through the reuse of materials, and to emphasize the steps which must be taken by the steel industry to avert future disposal problems.

"If the U.S. is not to wallow in its own metallic trash, government officials at all levels must give greater consideration to recycling metals—especially iron and steel scrap." (*Iron Age*, Jan. 15, 1970.)

Ever since its inception, brought on by the acute steel shortage of World

War II, the National Barrel & Drum Association, (NABADA), which represents the steel drum reconditioning industry, has been advancing the theory of recycling steel by reconditioning steel drums, in order to, (a) conserve steel and the natural resources inherent therein, and (b), to keep steel containers circulating commercially as long as possible, rather than piling up in industrial and rural areas of the country. Recycling, in effect, has been the "raison d'être" of the industry.

The process of reconditioning is a complicated and technical one today, far removed from the original concept of simply washing out impurities and repainting the container. Because of the thousands of different products now shipped in drums, and especially because of the enormous variety of dangerous chemicals on the market—many of them still active and hazardous in a seemingly empty container—reconditioners can no longer afford to be concerned only with making a used drum look and perform like a new one. They have had to study and research such technical fields as chemical biodegradation, controlled burning, metallurgy, pesticide longevity, air, water and land pollution. Today's drum reconditioning plant is an expensive operation, requiring millions of dollars worth of machinery and equipment. Before a drum is ready for reuse, it must go through what sounds like a medieval torture chamber: it is burned, blasted, deheaded, dedented, chained, each process carefully timed according to its previous contents and proposed future use. Each time it comes off the assembly line, it is ready to serve again as a container for anything from beeswax to the most sophisticated chemicals.

Modern, effective reconditioning has enabled the industry to extend the life of a metal container to 10 and 15 trips. This has a double advantage: it brings the cost-per-trip way down for industries on the returnable drum system, and it keeps serviceable containers on the market, not littering population centers. The petroleum, paint, varnish, adhesives, printing ink, vegetable oil and many other industries long ago recognized the economy inherent in the use and reuse of 18-gauge, 55-gallon steel drums. The petroleum industry has learned through experience that a good 18-gauge drum will outlast and outperform any lighter gauge container by about 8 to 12 trips, so that the initial savings incurred in the lower purchase price of, for instance, a 24-gauge drum, is far overshadowed by the long-range economy of an 18-gauge. It is no accident that a substantial portion of the profits of the petroleum refining industry is attributable to the use of 18-gauge, reconditionable drums; the stronger steel in an 18-gauge drum makes possible continued reconditioning and reuse, and is responsible for savings of millions of dollars a year in their packaging costs.

Even some of the most important members of the chemicals industry, long the largest user of new drums in the U.S., have begun to recognize, (1) the economies of reusable drums, and (2) their anti-pollution aspects, after many years of listening to the siren song of single-trip containers.

More important to the problem of solid waste disposal, by recycling these containers, the reconditioning industry actually conserves approximately *one-fifth of all reusable materials in the U.S.* This is not a broad, general statement; it is based on the factual statistics of packaging experts, who claim that 54 million tons of materials are used annually in packaging in this country.[1]

Of this 54 million tons, they add, *only 10%*, or approximately *5 million tons* is reusable; the rest is added to the Nation's growing pile of waste. Based upon Department of Commerce statistics of approximately 20 million new drums manufactured in 1968,[2] and NABADA's conservative industry estimate of 45 million 55-gallon steel drums reused annually through reconditioning,[3] (each 55-gallon steel drum weighing approximately 44 lbs. empty), *the amount of steel being conserved and recycled by the reconditioning industry amounts to approximately one million tons annually, or one-fifth of all reusable materials in the U.S.*

If reconditioned drums were not part of our economy, at the present conservative estimated rate of 45 million drums recycled annually, there would be 450 million empty, non-reusable drums to dispose of at the end of a 10 year period.

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[1] *"The Role of Packaging in Solid Waste Management 1966 to 1976"*—pub. SW–5c, written for the Bureau of Solid Waste Management of U.S. Dept. of Health, Education & Welfare by A. Darnay and W. E. Franklin, Midwest Research Institute, Mo. 1969.

[2] Bureau of the Census, "Current Industrial Reports—Summary of Producer's Shipments of Steel Shipping Barrels & Pails 1967–1969".

[3] National Barrel & Drum Association estimated annual production 1968.

It is a frightening thought to picture another million tons of scrap added each year to the present-day mountain of it already overflowing onto highways, beaches and resorts; one begins to perceive that the drum reconditioning industry is making a sizeable contribution to keeping our landscapes from disappearing under millions of rusty, crumbling, smelly and chemically hazardous drums.

"The more we study the problem, the more we become convinced that recycling . . . is inescapable as the long run solution." (*Technology*, Nov. 8, 1969.)

But the reconditioning industry is, after all, a *service* industry; it does not *manufacture* new drums, it has no voice in the policy-making of those who do. It exists only to receive the used drum and prepare it for reuse.

It cannot recondition a drum with paper-thin walls, one which was designed in the first place to be used once and thrown away. Yet this is exactly what the steel industry is encouraging today—a *throwaway drum*. Our affluent society has led steel manufacturers to believe they can convince industry that a single-trip, light-gauge, throwaway container is a better buy, at approximately $6.00, than an 18-gauge, strong, safe, *reusable* drum, which may cost $7.00 or $8.00 at purchase, but whose initial cost is amortized over its 10 to 15 trips (including the average $2.50 to $3.00 reconditioning charge between trips), down to approximately $5.00 per drum.[4]

NABADA has, for years, been trying to educate the industrial drum buyers to the fallacy of this arithmetic, but it has been a David and Goliath proposition. With less than 200 members and limited funds, it cannot reach the public with the impact of a sales campaign sponsored by U.S. Steel, Inland Steel, Republic Steel, Jones and Laughlin, to name only a few of the members of the Steel Shipping Container Institute, which represents the new drum manufacturers.

Yet these are facts: in order to sell more steel to an economy which is only beginning to realize the magnitude of its solid waste problem, the steel industry is deliberately accelerating the trend towards light-gauge, throwaway containers by reducing the production of reusable 18-gauge drums. In so doing, it is knowingly creating a disposal problem and shrugging it off onto the shoulders of the public—because that is exactly where the problem lands. Once the drums are emptied, the consumer finds no one will take them off his hands.

Instead of receiving $1.50 to $3.00 per empty drum, which reconditioners pay for good used 18-gauge steel containers, he finds that the reconditioners will refuse to buy light-gauge drums at any price.

Why should the reconditioner take these useless drums? He can neither recondition nor resell them. They would simply rust, crumble and accumulate in *his* yard. The consumer is finally forced to pay a junk dealer to pick them up and dispose of them (if he can find one, since many junk dealers also refuse light-gauge containers, on the grounds that their steel scrap value is lower than the cost of carting them away); or if he is not interested in "keeping America beautiful", he drives out of town and dumps them when no one is looking. There they remain until eaten through with rust, littering the countryside and polluting the ground and nearby waters with the residue of their contents.

Under these circumstances, it seems an eminently fair solution to go back to the source of this difficult-to-dispose-of solid waste: *the drum manufacturer*. Since he is responsible for the creation of this future scrap, why not charge him at the outset for its eventual disposal cost? President Nixon proposes: "An extra fee of less than $50 would be added to the price of a new car, with the money going into a fund for hauling the car away when it is ready for the junkyard." We propose: "*An extra fee of up to $1.00 for every 55-gallon drum manufactured of lighter than 18-gauge steel, with the money going into a fund for hauling the drum away when it is ready for the junkyard.*" Perhaps then a manufacturer would think twice before producing a non-reusable container, instead of ignoring the natural resources he is wasting, the disposal problem he is creating and the disservice he is doing the national economy. It seems fair that the burden should rest on him, rather than on the consumer who succumbs to a well organized campaign, designed to convince him he is "saving" money by buying single-trip, throwaway containers.

It is an added irony to learn the steel industry is raising its prices while simultaneously advising the industrial economy to forego container savings, buy throwaway drums and continue contributing to solid waste pollution. In so doing, they are not only increasing private costs, but substantially adding to the social cost of their products.

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[4] Prices are approximate and vary depending upon region, quantity, and quality.

"There is only one solution: the reuse and recycling of everything." (*Business Week*, Jan. 15, 1970.)

The obvious alternative, of course, is to *end the manufacture of any container which is not reusable for at least a dozen trips, that is, any 55-gallon steel drum of a gauge lighter than 18.* Manufacturers would then be making a vital contribution to the battle against solid waste pollution, by providing the consumer not only with a better container, but also one that can safely be reconditioned and reused over and over again. Although even an 18-gauge drum must wear out eventually, in its useful lifetime it will have reduced the solid waste pollution factor by at least 15 (trips). This would give ecological experts time to find new ways of disposing of the existing masses of light-gauge steel waste accumulated over the past years, without having the problem multiply while they are studying it.

Our natural resources are too valuable, our country's environmental pollution problems too urgent for an industry as fundamental and important as the steel industry to ignore its obligations; if "reuse and recycling of everything" is the only solution, then steel container manufacturers should join all other industries, including the drum reconditioning industry, in attempting to reduce the problem by eliminating the manufacture of light-gauge and throwaway containers.

Senator MONTOYA. Our next witness is Mr. M. J. Mighdoll, executive vice president of the National Association of Secondary Material Industries, Inc.

STATEMENT OF M. J. MIGHDOLL, EXECUTIVE VICE PRESIDENT, NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, INC., NEW YORK CITY, ACCOMPANIED BY EDWARD L. MERRIGAN

Senator MONTOYA. Mr. Mighdoll, would you identify your fellow witness?

Mr. MIGHDOLL. He is Edward L. Merrigan, a member of the firm of Smathers, Merrigan & O'Keefe, 1700 Pennsylvania Avenue NW., Washington, D.C.

Senator MONTOYA. You may proceed.

Mr. MIGHDOLL. I am executive vice president of the National Association of Secondary Material Industries, Inc., with headquarters at 330 Madison Avenue in New York City.

The National Association of Secondary Material Industries, Inc., represents approximately 700 of the leading firms in the Nation concerned with the reclaiming and recycling of secondary raw materials. These firms collect, process, and prepare the overwhelming proportion of such economically vital secondary materials as aluminum, copper, lead, zinc, nickel alloys, precious metals, paper stock, and textiles.

Our association vigorously supports the basic objectives of S. 2005, particularly that phase of the bill which relates to the improvement of research in the field of solid waste reutilization, although we do take some exception to some terminology in another part of the bill. We will discuss this latter point later on. There is no doubt, however, that S. 2005 is a most constructive step in the direction of helping to solve a most important national problem.

The industry we represent has, for more than half a century, devoted its efforts to recovering and recycling secondary materials in such commodity fields as nonferrous scrap metals, paper stock, and secondary textiles. It annually reclaims millions of tons of such raw materials, much of which might have represented nothing more than waste if it had not been for the initiative and resourcefulness of scrap

processors and scrap consumers who established major industry in this country.

CURRENT RECLAMATION EFFORTS

President Johnson's Science and Advisory Committee estimated that the collection and processing of secondary materials was a $7 billion per year business. It reflects the scope and importance of the many firms in the United States whose reclamation efforts have a tremendous impact on our economy.

Here are some key factors to point up this economic importance.

Over 3 million tons of nonferrous metal scrap are annually processed by dealers and consumed by smelters and refiners in the United States.

About 10 million tons of paper stock are recovered and processed by our industry for the Nation's paper, paperboard and building material mills.

Approximately 40 percent of the supply of copper is recovered from scrap.

The quantity of lead recovered from scrap has risen from insignificance in 1900 to over 1 million tons in recent years, surpassing by a wide margin the lead supplied from domestic ores.

The value of sales of textile waste dealers and processors has recently been estimated at approximately $300 million.

There are many more statistical facts that could be cited to dramatize the resourcefulness of our industry. We append our study, "Perspectives of the Secondary Materials Industry," which contains useful data in this field. Also, we submit for the record, a statistical sheet showing the significant proportion of secondary metals to available mine production and to the total raw materials supply.

The secondary materials industry has developed a vast collection system, through which it reaches out over the industrial, community and government generators of waste material and brings into the marketplace every pound of scrap material that has an economic value. At the local community level there are small "retail" scrap collectors whose function it is to buy secondary materials from small business establishments, farms and the general public. This scrap is segregated in a very basic manner and then sold to "wholesale" dealers, whose technical knowledge and more sophisticated equipment permits them to process it into the kind of product which can be consumed by mills.

In this processing operation, the wholesale dealers remove contaminants which might otherwise make this material unsalable, and often change the form and size of the scrap to fit consumer requirements. Wholesale dealers also purchase larger quantities of secondary materials from industrial plants, government installations, manufacturing operations, printing firms—in short, all sources of waste become generators of a new resource—secondary materials.

Our industry also includes a wide range of firms which consume secondary materials in its processed scrap form and through smelting, refining and related processes transform this recycled material into a raw material suitable for its ultimate consumption by the Nation's manufacturers, mills, fabricators, foundries, et cetera. Here we see the end of the cycle: from manufactured waste to processed secondary materials to specification raw material to new end product. We call

it "recycling resources," and without it, our economy could not long survive.

It becomes obvious that an industry which has developed such a widespread collection system, which has the technological know-how to process this material, and which has the ability to meet critical specification demands and is able to market it economically, already is recycling a very large percentage of solid wastes which the industry has made marketable. It is, in our opinion, the only industry which is economically oriented and technologically prepared to cope with the vast accumulations of solid waste that will arise in the future and to transform this into recoverable and utilizable material.

The job our industry has done and is doing in this reclamation and recycling process of secondary materials has been attested to by Government and business leaders over the years.

In its "Defense Scrap Yard Handbook," the Department of Defense states:

> Conservation and reclamation of scrap are of the utmost importance in order to provide the necessary raw materials for the manufacture of essential military and civilian items. Secondary raw materials recovered from scrap provide a vast reservoir of hard-to-obtain materias.

The historic Paley Report stated:

> Recovery of scrap in the secondary metal market is essential for the operation of the metal industry.

The late President John F. Kennedy, in a message to our association's 50th anniversary, declared:

> In your inventory there is nothing that is useless. Scrap metal, textiles, rubber, waste paper—these are your raw materials for new useful production. In wartime you taught us how to make do. In peacetime, you give the lie to those who say we are wasteful. If any word were to describe your industry, that word might well be resourefulness.

Senator Cooper. May I ask a question? I have gone through your statement, and I understand what you are talking about. The testimony of the national association is a very important factor in the problems we are discussing. Up to now we have been having testimony all during these hearings today that there is a failure in the recovery of steel and other elements from scrapped cars.

Now, I note on this page secondary materials present some statistical problems. This table shows a problem in the secondary recovery as to maintain the needs of production. Has there been a failure in your work of steel, scrap steel? You don't list scrap steel there.

Mr. Mighdoll. No, sir. The group that appeared before us represented the scrap steel segment, and we represent the other elements. So rather than having you hear it twice, we thought we would not present any material on scrap iron and steel.

Senator Cooper. It might not be a very profitable one then. Do you concur with these other witnesses about the problems of scrap steel and iron?

Mr. Mighdoll. Basically, the conditions in the iron and steel materials are not the same as in our industrial segments. The sources of supply and consuming points differ and, therefore, there are different elements to be considered.

Senator Cooper. Thank you. I am sorry that I have to leave.

Senator MONTOYA. We certainly enjoyed having you hear, Senator Cooper.

Proceed.

Mr. MIGHDOLL. Mr. Chairman, the recognition that the secondary material industry is the logical place to promote expanded solid waste reclamation is, we are glad to note, beginning to be felt in Government circles.

In a recent article, Richard D. Vaughan, Director of the Bureau of Solid Waste Management, Department of Health, Education, and Welfare, stated:

> Private scrap dealers and processors now play a very significant role in helping to cope with the Nation's solid waste problem. The importance of their service to society, as well as the busines opportunities for the scrap industry, may be expected to grow even larger in the future.

The shift in Government thinking from the "disposal" of solid waste to its "recovery and recycling" has at least focused on the established operations of the secondary material industry which, both in times of war and peace, has been the principal source of raw material reclamation in this country.

Our industry several years ago saw the direct and pragmatic relationship between the recovery of secondary materials and the challenging problem of solid waste accumulation. As a result, we have engaged in our own studies in solid waste utilization; we have established a national solid waste utilization committee to spearhead activities in this field; we have conducted meetings and conferences on this subject.

Of most recent significance is the proposal we have advanced to HEW for an intensive economic and technological study designed to provide opportunities for greater solid waste utilization. We eagerly await HEW acceptance of this plan, which we believe will be the first coordinated Government industry program to knock on the door of new opportunities for solid waste recycling. This proposed study would appropriately put our industry in the forefront of the problem and develop the type of interrelationship with HEW's Solid Waste Bureau that will be essential to the ultimate solution of the question of greater solid waste utilization.

EMPHASIS ON RECOVERY

The change in emphasis by the Government from "disposal" to "recovery" of solid waste has been a swift and dramatic one. At last the Government became concerned with how to reuse secondary materials instead of how to get rid of "junk." It is obvious that recycling procedures are useful not only in eliminating the need to find dwindling dump areas, minimize air pollution and alleviate the rising cost of disposal for municipalities and States—but in recovering material of an economic value and thus adding to the gross product of the United States.

In its thoughtful "Policies for Solid Waste Management," the Ad Hoc Committee on Solid Waste Management points out that:

> The 200 million tons of solid waste material per year represent a national resource and will in time be a major one. Return of fractions of solid waste to economical reuse must in the long run become common practice and must be a national objective. Some mineral fractions of the total solid waste stream are re-

cycled today—notably steel and copper. But lesser fractions in the aggregated waste streams must eventually be recycled.

The ad hoc committee then went on to state as one of the objectives of solid waste management:

To economically recover and adequately process for recycle increasing portions of the solid waste streams.

Mr. Chairman, our testimony is designed to emphasize the fact that the secondary raw material industry has for more than 50 years "economically recovered" material which otherwise would have been lost to the economy and magnified the solid waste problem. It has converted waste into useful raw material and has each year put into the mainstream of the U.S. production channels millions of tons of material with an economic value running into the billions of dollars.

Obviously, not all solid waste material is economically recoverable. The term "fractional reclamation" used by the ad hoc committee refers to the percentages of material that can be recovered economically. The secondary material industry has, over the past few decades, actually been expanding that "fractional reclamation" to the point where it is successfully recovering and reclaiming ever larger tonnages of material which were once thought to be unreclaimable. This work has been accomplished as a result of the industry's own developmental efforts, its own ingenuity, its own dollars.

PAPER

Through intensive research in the field of deinking processes, our paper stock industry has been able to reclaim and reuse huge tonages of paper which otherwise would have been burned or buried. In order to comprehend the importance of this particular successful process, it is only necessary to look at a recent study by the Glass Container Manufacturers Institute (in the report "Controlling Wastes for a Quality Environment" by John H. Abrahams, Jr.). This report shows that paper accounted for 67 percent of the total litter.

There is no statistical study available to indicate the substantial tonnages of paper stock that have been taken out of that 67 percent because our industry developed a deinking process which permits the economic recovery of wastepaper. But this is one example of the resourcefulness and ability of the secondary material industry to reduce the staggering size of the solid waste challenge—and at the same time to help conserve the Nation's forests.

INSULATED WIRE

Here is another: When the problem of air pollution became evident to Government and industry and open burning of insulated wire was abolished by most of the municipalities, cities, and States in the United States, our industry through its own initiative and through private research developed a process for the removal of the insulated wire from copper and aluminum by means of new chopping and mechanical separating operations which avoid pollution of the air and at the same time economically recover the metals.

In that respect, firms in our industry have spent substantial funds to develop special air pollution control equipment in order to be able

to continue to process increasing quantities of secondary materials without polluting the air. By doing this, it has been able to speed the flow of scrap for recycling. And this type of research on air pollution control equipment is continuing.

FRACTIONAL RECLAMATION

The expansion of "fractional reclamation" can be seen in every area of the secondary materials industry. Twenty-five years ago, much of the nickel alloy and exotic metal scrap (molybdenum, titanium, tantalum, et cetera) was simply bypassed because the industry did not have the technological ability to handle such metals. Vast economic "mines above ground" were being lost because the knowledge, equipment, and industry resources had not reached the point whereby this material could be recovered economically. Today, this material not only represents an economic gain but also represents strategic metals and expresses a vital conservation factor. But it needed research and equipment on the part of private industry to do the job.

In the past 10 years a similar situation existed in precious metal scrap. Little attention had been paid to the recovery and reuse of silver scrap, for example. Here again, private initiative within our industry has made precious metal scrap an important economic factor today.

METAL CANS

You were mentioning the next example, Mr. Chairman, I would like to cite, which is the problem of the number of metal cans being thrown out.

One of the vast problems facing America today is the staggering production of metal cans which are being thrown out each day. A recent study states that these metal cans represent 16 percent of total litter. What can be done with the millions of cans that are being discarded daily and whose bulk will grow and multiply in the next decade? This is the kind of challenging problem which our industry is already studying with a view toward expanding the potential of "fractional reclamation."

Yet the economics of the problem cannot be ignored. The collection of individual cans is extremely uneconomical. The feeling exists within our industry that somehow these cans will have to be collected, reprocessed and recycled. Our association has been in contact with Reynolds Metals Co. which recently began a pilot project in this field, and we are now searching for possible reclamation techniques by means of which these aluminum cans (and at the moment we are only studying the aluminum can situation) can be put back into the recycling process.

Our industry is constantly on the alert for new economic methods by which to expand the use of recoverable solid wastes. By developing foreign markets for surplus metals, for paper stock and textile wastes, for example, we have been able successfully to reduce the aggregate size of the solid waste accumulation in this country. Millions of pounds of potential solid waste have been shipped abroad to foreign consumers. This type of international trade can be expanded to reduce our total solid waste accumulation even further if we can make U.S. surplus scrap competitive in the world marketplace and reduce current restrictions on its overseas flow.

ALUMINUM CANS

Senator MONTOYA. May I interrupt you here? The Reynolds Aluminum witnesses who were here last week indicated that the reclamation of aluminum cans and recycling was economically feasible, and that they had established this pilot collection in Los Angeles. And as a result of that experience, they were establishing other centers of collection in other parts of the country, and they are convinced that it is a feasible process.

What is the industry doing in this respect to try to bring about more wise use of regional collection?

Mr. MIGHDOLL. We are now consulting with Reynolds Metals. There is one pilot operation in Los Angeles and one in Miami, and one in Atlanta. The key here is obviously transporting the cans on an individual unit basis, if you please, to a marketing center, and the Reynolds Metals appreciates the role that the scrap processor, the collector and processor of scrap in the community, is going to play in this recycling process.

It is still experimental. It is too early, I believe, to determine whether the present method of collection and recycling, such as Reynolds has indicated, will prove economical. We hope so, but we are studying with them possible other ways in which this can be broadened on a national basis.

Senator MONTOYA. I was in Spain a few years ago, and on the island of Palma Mallorca they had some glass-blowing factories. They were using old beer bottles. They were remelting these bottles, and they were manufacturing vases and all kinds of glasswares. I don't think we have reached that kind of technology here yet in the United States—we just run over the bottles on the highways.

Proceed, sir.

COTTON BLENDS

Mr. MIGHDOLL. Unfortunately, our industry has had to face numerous restrictions on its operations which have hampered the expansion of the potential recycling of raw materials. When such restrictions occur, the result has been an accumulation of solid waste for disposal, rather than for reuse. One such instance is the secondary textile industry which has suffered from restrictive legislation to a point of economic deterioration. As a consequence, 300 to 400 million pounds of contaminated cotton-synthetic blends alone are now accumulating as solid waste.

Legislative restrictions are also evident in the nonferrous scrap metal industry, as evidenced in our study, "The Secondary Material Industries and Environmental Problems," which we would like to append to the record. Zoning clauses which force scrap firms to move; municipal ordinances which require scrap businesses to meet inordinately expensive requirements in order to be permitted to operate; special administrative requirements for scrap companies; discriminatory Government quotas for export shipment—these are some of the difficulties that have resulted in a contraction of the collection process and a dislocation of the channels for reprocessing of secondary raw materials. This has been a major cause for the disruption of the important collection system our industry has built up over the years.

(See p. 2143 for study referred to.)

There are also economic restraints to be considered and corrected. Such subjects as transportation costs, adequate and trained manpower, consumer discrimination and prejudices, technological assistance, are but some of the areas deserving of constructive attention. It is only by strengthening—not weakening the reclamation system developed by our industry—that the Government can help in reducing the accumulated 200 million tons of solid waste per annum. We must remove the restraints which inhibit the recycling of recoverable solid waste.

This brings me to that portion of S. 2005 which has aroused serious apprehension within our industry. Section 208(a) of the bill states:

> The Secretary of Health, Education, and Welfare is authorized to make grants pursuant to this section to any State, municipality, or interstate, or inter-municipal agency for the *construction of solid waste disposal and resource recovery facilities*, including completion and improvement of existing facilities.

The phrase "construction of * * * resource recovery facilities," we feel, opens the door to possible local Government competition with our industry and is, therefore, fraught with danger. It could result in further dislocation of the very private industry which has already proven essential to expanding solid waste utilization.

Similarly, section 208(b) contains language which could potentially misdirect funds from the purpose intended, mainly research.

When I testified on S. 306 in 1965, before the Subcommittee on Public Health and Welfare, Interstate, and Foreign Commerce Committee of the House of Representatives, I stated:

> There could be chaotic consequences within our highly competitive industry if the very funds intended for the solution of the solid waste problems were actually utilized in a competitive manner, harmful to the industry responsible for recovering reusable secondary materials.

As a result, the report by the House committee on the Clean Air and Solid Waste Disposal Acts, of the 80th Congress, dated August 31, 1965, carried this significant paragraph:

> The committee takes note of the role being played by the secondary materials industry in reclaiming materials that would otherwise add to the solid waste problem. The committee therefore expects that the funds authorized under this Act will be used to demonstrate new and improved methods in solid waste disposal and not for facilities that would duplicate those operated by the secondary materials industry.

We fervently hope that the Senate committee will take cognizance of the phraseology of the statement noted above and that it will place similar safeguards in S. 2005 to protect the secondary material industry and the Nation from harmful competitive and duplicative practices that would be inimical to the total effort to solve the Nation's solid waste program.

The Department of the Interior earlier submitted to this committee a "Summary of Investigations and Research on the Extraction of Mineral and Energy Values From Solid Wastes." In this report, it was pointed out that "the total scrap and energy value that could be derived annually from these wastes (household and commercial refuse collected annually) approaches $1 billion."

The report went on to say that the Bureau of Mines is studying techniques "to separate the conglomeration of nonferrous metals contained in the refuse and incinerator residues. Research on methods to separate and recover the aluminum, copper, zinc, lead, and tin values

from the nonferrous fractions are continuing. Refinement of the separate nonferrous values to marketable products is the ultimate objective."

This, of course, is also the aim of our industry. As I noted previously, we have devoted the research and operational efforts of our industry to widen the recovery of all economically reclaimable secondary materials. One of the significant aspects of this program has been the development of new types of materials handling and production equipment to speed the recycling of scrap. At our last annual convention, our association spotlighted the role that new technology can play in recovery and recycling through an intensive program which featured the exhibits of a number of equipment firms in many fields, including air pollution control and solid waste utilization.

With the aid of the Government—through grants for studies and research efforts—our industry can move effectively to expand the recovery of those solid wastes which today seem economically or technologically unrecoverable. We can uncover new markets and broaden existing ones through physical research and through realistic analysis of the restrictive elements and prejudices which adversely affect the recycling of these secondary raw material resources.

Our industry has already embarked on research into broadening the reclamation of certain of our secondary commodities, but with the aid of the Government, through funds provided by S. 2005, we can move into untapped areas of reclamation and begin to utilize millions of additional pounds of raw material with an economic potential which today are only adding to the solid waste burden.

Mr. Chairman, scrap is an American product. It is generated and produced in the United States. It does not require special transportation facilities to bring it into this country's economic supply lines. It can be reused over and over again. No foreign country can suddenly cut off this vital, and sometimes strategic, raw material. It is here in our own backyard and it remains for us to utilize it without self-imposed restrictions.

NATIONAL MATERIALS POLICY

In this connection, we applaud the inclusion of the secondary raw materials in the development of the national materials policy section of S. 2005. Can there by any doubt that the secondary segment is a vital, essential and integral element of the total raw material supply line? This portion of the bill would coordinate a national materials policy directly with the opportunities for achieving greater solid waste recovery and utilization of our resources. We strongly support these legislative proposals and extend the competence of our industry to the proposed Commission in the development of its recommendations.

During World War II and during the Korean war, when the need for secondary materials was critical, and when the Government called upon the citizens of this country to save its waste paper and its scrap metals, our industry accomplished a gigantic task. Now, we are ready to declare war on solid waste. We are prepared to use all our energies and efforts to reduce the magnitude of the problem of solid waste facing every city, every municipality, every section of our country. We believe that our industry is the only logical instrument for accomplishing the conversion of the additional quantities of solid waste into

an economically useful product. We have the experience, the facilities, and the know-how. We ask that Congress appropriate the necessary funds for research and development so that they are directed productively for expanding solid waste utilization in harmony with our industry and not competitively with it.

Our industry—the Nation's solid waste utilizers—with all its resources, stands ready to make a maximum contribution to the Nation's solid waste program.

Thank you, Mr. Chairman.

Senator MONTOYA. Thank you for a very fine statement.

You mention here your apprehension about the animosity manifested by certain civic groups and other individuals in different areas of the United States. Don't you think that this is mostly a public relations problem which is generated by the fact that many of the collectors usually expose to the view of the public unsightly accumulations?

Mr. MIGHDOLL. I think that is, in essence, true.

Senator MONTOYA. That is probably the main contribution to that animosity.

Now, what is your industry doing about trying to hide these unsightly accumulations? Are you doing anything to cover them from the view of the public?

Mr. MIGHDOLL. Very definitely. The industry has even gone beyond that which was legally imposed upon it by the beautification requirements. The industry has been very conscious of its community role by the fact that it had a responsibility to perform, an economic function, but at the same time to perform a community function in beautifying its physical location. It does seem incongruous that the very critics of the scrap processors are the same people who want the countryside beautified and the scrap removed.

We think there must be a greater realization on the part of the American consumer, just as there is in the business community, that the scrap industry performs a vital function, and it is tied directly, not only to the economics of the situation, but the ecology of the situation as well.

Senator MONTOYA. I am afraid you people are in the same category as the taxi driver—just because one taxi driver doesn't let you get into his lane, that taxi driver is going to give all of the taxi drivers a bad name. The same thing with the trucker on the highway. One discourteous truck driver can give a bad image to the entire industry and to all of the truck drivers. That is what is happening in this country.

Americans are strange people, so to speak, in that they categorize, and I think the same thing is happening with the junk dealers or scrap collectors; that one unsightly location puts all of them in the category of not giving a darn about the appearance of the countryside.

Senator RANDOLPH. Mr. Chairman, I have been with the witness and his colleagues, perhaps a dozen in number, in conference prior to their appearing on behalf of their organization. We had, I think, a helpful discussion of their problems. I am certain that the contribution of their group to the knowledge of this subcommittee will help us to work realistically and effectively in this area of recycling and the problem of countryside beautification.

Mr. MIGHDOLL. Thank you.

Senator MONTOYA. Thank you, Mr. Chairman. And I certainly want

to thank you for the very fine statement. I am sorry that the hour is late. I would like to ask you a few more questions, but your statement has been very concise, and it will be most helpful to us. And, of course, any additional materials, pertinent to your testimony that you can to submit, will be included in the record at this point.

Mr. MIGHDOLL. Thank you very much, Mr. Chairman.

(Additional materials, subsequently furnished, follow:)

SECONDARY METAL'S SIGNIFICANT STATISTICAL POSITION IN 1968 IN THE UNITED STATES

[In short tons]

	Domestic production	Secondary recovery	Total supply	Percentage of secondary recovery to total
Copper	1,204,600	1,218,000	2,655,000	45
Aluminum	3,255,000	1,070,000	4,983,000	20
Lead	477,000	550,000	1,366,000	40
Zinc	526,000	254,000	1,384,000	18
Nickel	16,700	[1] 22,000	[2] 160,000	15-20

[1] Estimated.
[2] Consumption.

Sources: Figures based on statistics in Bureau of Mines reports; American Bureau of Metal Statistics; Metal Statistics 1969; Aluminum Statistical Review; BDSA Copper Quarterly Report; Study of Secondary Lead in the United States.

(From the National Association of Secondary Material Industries, Inc., New York, N.Y.)

PERSPECTIVE OF THE SECONDARY MATERIALS INDUSTRY

Until recently—with the exception of wartime periods—the secondary materials industry has enjoyed scant public attention. An understanding of the scope and functions of the industry has been limited to industry members, scientific researchers, and a few economists.

Those who have studied the industry immediately recognized that secondary materials are not only an important economic factor in national and international economics but, surprisingly enough, also function to conserve vital and strategic raw materials.

Recently, however, with a greater public awareness of the problems of ecology, environmental pollution, and conservation, the secondary materials industry has come increasingly into the limelight. There is now a far more realistic appreciation of this industry and its impact. Public officials, conservationists and community groups, in searching for solutions to these problems, have become increasingly aware of the concept of *recycling resources* through the secondary materials industry.

In his recent message to Congress (February 10, 1970), proposing action against pollution, *President Nixon* said:

"As we look toward the long-range future—to 1980, 2000 and beyond—recycling of materials will become increasingly necessary not only for waste disposal but also to conserve resources. . . . A great deal of our space research has been directed toward creating self-sustaining environments, in which people can live for long periods of time by reprocessing, recycling and re-using the same materials. We need to apply this kind of thinking more consciously and more broadly to our patterns of use and disposal of materials here on earth."

The secondary materials industry represents this kind of thinking *in action.* Functioning in its normal pattern—collecting, identifying, processing, packing, and distributing secondary raw materials—the industry acts as an important conservation and economic factor. It has been often referred to as a "mine above ground." *The Department of Defense's "Defense Scrap Yard Handbook"* states:

"Conservation and reclamation of scrap are of the utmost importance in order to provide the necessary raw materials for the manufacture of essential military and civilian items. Secondary raw materials recovered from scrap provide a vast reservoir of hard-to-obtain materials."

The historic Paley Report stated: "The recovery of scrap in the secondary metal market is essential for the operation of the metal industry." This statement, which could equally apply to the paper stock and textile segments of the industry, illustrates that secondary materials are an integral and vital part of the *entire* raw materials supply.

ECONOMIC IMPORTANCE

Statistics for the year 1968 (the last complete year available) give a cursory view of this nation's deepening dependence upon secondary materials and imports:

In the United States, secondary recovery of Nickel represents 31.7% *more than* the total domestic mine production for that metal; for Lead and Copper it is 15.3% and 1.1% more than domestic mine production, respectively. Secondary recovery of Zinc and Aluminum represent almost ½ and ⅓ the total domestic mine production, respectively.

Secondary paper stock annually provides 25% of the total raw material supplied to producing mills. The reclamation and use of each ton of paper stock spares 17 full grown trees. Every ton of paper stock frees 3⅔ acres of forest land for some other productive use for one year. As one top industry official put it, "Any material that has gone through a portion of the normal life cycle from its source, refining, fabricating, has consumed a constantly increasing amount of labor, processing and transportation expense. The scrap industry is based upon the conservation of this value."

SOLID WASTE UTILIZATION

Correlative with the conservation aspect of the secondary materials industry is the effect of industry operations upon the crucial environmental problem of solid waste accumulation. For without the continuous and healthy operation of this industry, tens of millions of tons of textile, paper and metallic materials now being recycled and reused would accumulate as waste. This waste problem would be of such magnitude as to stagger the imagination. It would effectively suffocate our nation's streets and streams, making our everyday business and pleasure activities impossible.

To understand the true importance of solid waste utilization, all one need do is realize that of this nation's gross national product—now approaching the trillion dollar mark—8.4% is concerned with the production of items to *replace* industrial machinery, equipment, and consumer goods now in use. Much of this obsolete equipment becomes scrap. And this does not include the enormous quantities of material that become available in the manufacturing process itself.

However, the secondary materials industry is constantly on the job of *recycling resources*—secondary materials. In fact, it is at both doors of the manufacturing cycle—providing increasing quantities of raw materials to be used in the growing manufacture of consumer products, and by purchasing the by-products of industry for processing and eventual reuse.

INDUSTRY PROFILE

With the growth of the industry and the increased demand for secondary raw materials, extensive expansion is taking place in the plant, equipment and laboratory facilities of industry firms. To keep pace with the handling of larger volumes of materials, to be able to properly process and package, to cope with the increased complexities of industrial by-products, and to guard against the contamination of these valuable materials—the industry has turned to the introduction of new and modernized equipment and technical systems.

Approximately 41% of Association firms have multi-plant operations. (The average is over 2.5)

The "average" Association member employs—13.4 executive and supervisory employees and 77.5 plant workers. The "average" firm payroll is over $500,000.

More than half of the Association's firms have an annual gross sales in excess of $3,000,000 and the membership average approximates $10,000,000.

More than half of the Association's members value their capital investment in plant and equipment in excess of $500,000 and the average is $1,300,000. The total valuation placed on plant and equipment of just the Association's member firms is over $700,000,000.

Secondary materials move in international business. The flow of scrap metals, paper stock, textiles, rubber, plastics and other commodities plays a vital role in the economic growth and stability of underdeveloped countries. Without these raw materials, many of these underdeveloped countries—lacking primary materials or the ability to pay for them—would suffer serious industrial handicaps. The larger nations of Europe and the Far East also are buyers of U.S.-generated scrap. As a result of this international trade, the U.S. also gains in balance of payments.

As the industry has grown and matured, so has its Association—NASMI. Now in its 58th consecutive year, NASMI not only continues with its many basic trade association activities, but also is concerned with such modern problems as solid waste utilization, air pollution control, and technological research.

Perhaps the late President John F. Kennedy said it best: " . . . If any one word describes your industry it is 'resourcefulness' . . ." (Message to NASMI on its 50th Anniversary in 1963.)

STATISTICAL ABSTRACT

The secondary materials industry is more than a collection of companies with an annual gross volume in excess of $7 billion. It is a vital, well-organized economic force which provides an essential source of raw materials feeding practically all key industries comprising the nation's economy. It figures economically in the operations of practically all industrial concerns—both large and small. Here are just a few statistical highlights which dramatize the story:

Over 3,000,000 tons of nonferrous scrap metals are annually processed by dealers and consumed by smelters, refiners, and ingot makers in the U.S. This includes copper and brass scrap (1,500,000 tons); lead scrap (700,000 tons); aluminum scrap (100,000 tons); zinc scrap (225,000 tons); nickel base scrap (25,000 tons). In addition, scrap dealers and brokers handle substantial scrap metal which enters international trade; in 1964 about 225,000 tons, valued at over $100,000,000 were exported.

Scrap is a substantial percentage of the total raw material supply. Approximately 45% of the total available copper is recovered from scrap by the secondary material industry, as is 20% of all aluminum and 18% of all zinc. More than 50% of the total domestic lead supply is recovered from scrap.

About 10,000,000 tons of paper stock is recovered and procesesd by the industry for the nation's paper, paperboard and building material mills. Paper stock represents almost one-fourth of the raw material supply of the paperboard industry.

Textile secondary materials are an equally important factor to both domestic and international consumers. Annual sales of these commodities approximate $400,000,000.

NASMI's own business survey puts the plant and equipment investment by the Association's members at $675,575,000. The average investment is in excess of $1,000.000.

NASMI PUBLICATIONS

For additional information about the publications listed below, please contact: NASMI Publications, 330 Madison Avenue, New York, N.Y. 10017.

CURRENTLY AVAILABLE

The Nonferrous Scrap Metal Industry. A comprehensive study of nonferrous operations, procedures and techniques. The only book of its kind. (A few copies still available.)

NASMI Metal Seminar Digest—Management and Ownership Trends in the Secondary Materials Industry. Factors in mergers and acquisitions as they relate to the privately-owned company, the public corporation and the conglomerate.

Industrial Profile and Cost Factors in Nonferrous Scrap Processing. The latest publication dealing with important industry cost elements.

Proper Materials Handling Techniques for Nonferrous Scrap. A concise summary of various materials handling techniques for the nonferrous scrap industry.

The Secondary Materials Industry and Environmental Problems. A detailed look into the environmental problems affecting the industry as well as the impact of zoning, licensing, urban renewal, etc. Contains an economic evaluation of the secondary materials industry.

NASMI Specifications—NF–66, PS–70, WS–63, CS–65. The internationally accepted standards and practices for trading in secondary metals, textiles and paper stock.

NASMI . . . Ahead in the Seventies. A look into NASMI—the Association's makeup, its regional and commodity divisions, its membership services, programs and activities.

Serving a Vital Industry—The Paper Stock Institute of America. A pamphlet describing the paper stock industry and its importance to the economy of the nation.

NASMI PERIODICAL PUBLICATIONS

NASMI Metals Report. A weekly market report on all phases of metals. This authoritative and often quoted newsletter is available only to members of NASMI.

NASMI Technical Service Bulletin. A new concept giving the latest technological information in such areas as solid waste recycling, air pollution control and materials handling.

NASMI Tax Advisor. A monthly publication analyzing the latest developments in the tax field of interest to businessmen. Available to NASMI members only.

NASMI Commodity Outlook—1970. NASMI commodity and division heads look at the industry for 1970.

Letter from Headquarters. A periodic publication giving information on current developments and association activities in all spheres of industry interest. Available to NASMI members only.

NASMI Bulletins and Special Commodity Reports. Issued on the instant, these publications keep member up-to-date on the latest industry news, techniques and studies.

OUT OF PRINT.—AVAILABLE FOR REFERENCE AT NASMI HEADQUARTERS LIBRARY

A Study of the Secondary Lead Industry in the United States
Nonferrous Scrap Metal Guidebook
The Secondary Materials Industry in a Changing Society
Air Pollution Control in the Secondary Metal Industry
Cost Studies in the Nonferrous Scrap Metal Industry

Some Background Information About NASMI

NASMI stands for the National Association of Secondary Material Industries, Inc. Its headquarters are at 330 Madison Avenue, New York, N.Y. (Telephone: 212–867–7330)

NASMI was founded in 1913 and is now in its 58th year as a trade association.

NASMI represents leading firms in the secondary material industries in such fields as nonferrous metals, paper stock, textiles, rubber and plastics, and foreign trade. A recent survey indicated that the Association's membership had an estimated gross sales of $7.0 billion and an annual payroll approximating $375,000,000.

NASMI's membership is national in scope and consists of small, medium-size and large firms in nearly every state of the Union. NASMI members may also be found in countries through the world; as far away as Japan and Australia. As a result, the Association has an unusually complete industrial framework. Not only are there the diverse commodity interests, but NASMI also has extensive membership representation on the various levels of industrial operations: scrap generator, dealer/broker/exporter, scrap consumer and manufacturer.

NASMI has five commodity divisions: Metal Dealers Division, Secondary Metal Institute, Paper Stock Institute of America, Textile Division and Foreign Trade Division. Each division has its own officers and develops its own program of activity.

NASMI has four regional divisions: Eastern, Midwestern, Southern and Western. Each regional divsion has its own officers and executive members and plans and arranges regional meetings and conferences throughout the year.

NASMI specifications in the fields of nonferrous scrap metals, paper stock and textiles are internationally accepted and business is done all over the world on the basis of these specifications.

NASMI runs extensive information and education programs for its members. It issues newsletters, bulletins, pamphlets, books, etc. It has—through its Metals Seminar of Regents—conducted seminars for junior and senior executives at Michigan State University, University of Wisconsin and the University of Chi-

cago. Its Textile Division has conducted Fibre Identification Seminars at the Philadelphia College of Textiles and Science. The Metal Dealers Division has held a number of supervisory educational programs throughout the country. The Paper Stock Institute has supported research aimed at the increased usage of paper stock by the paper and board mills and has also sponsored educational courses.

NASMI's Educational and Research Foundation recently published an in-depth transportation study of great importance to the entire secondary material industry. The goal of the Foundation is to support and further research relevant to the secondary material industry.

NAMSI has its own Arbitration Service available for members. It also maintains credit files, providing a confidential business service for Association members.

NASMI sponsors far-flung insurance programs for its members in the fields of life insurance, major-medical plans, accidental death/dismemberment, a unique national workmen's compensation program and umbrella-liability coverage.

NASMI has concentrated many of its committee activities in areas of industry concern such as: air pollution control, solid waste utilization, urban renewal and related problems, transportation, costs, plant management, labor, Government sales, etc.

NASMI holds an Annual Convention and conducts regional meetings, conferences, workshops and seminars throughout the country. It sponsors trade shows in conjunction with its Convention.

NASMI through its Washington representatives, maintains a continuing liaison with Government officials, legislators, and important agencies in the nation's capital.

STUDIES OF DISLOCATION FACTORS: No. II

The Secondary Material Industries and Environmental Problems

A SPECIAL STUDY BY

NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, INC.

•

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NO PART OF THIS STUDY MAY BE REPRODUCED WITHOUT THE EXPRESS PERMISSION OF NASMI

JUNE, 1968

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FOREWORD

• All America desires clean air to breathe and the vision of a beautiful countryside. But unreasonable and unrealistic regulations and controls can only result in severe economic restrictions on the very industry that is the instrument for reclaiming the by-products of our land.

Where would the factories of the cities or the citizens of the residential communities market their industrial and household by-products were there no scrap collector and processor of secondary raw materials in their areas? What would happen to the waste paper, the old refrigerator, the discarded automobile, the worn out tires generated by the private citizenry? What would the industrial plant do with the cuttings, clippings, turnings, and numerous other forms of factory by-products generated by the tens of thousands of pounds?

Far from thinking in terms of eliminating, relocating, or hiding the secondary materials firm, the nation and the local community should promote its existence as a progressive step toward the maximum utilization of the ever-growing recoverable solid waste of the country. There also are the important considerations of assuring an adequate raw material supply for our expanding national economy and helping to provide lower cost end-products for the American consumer.

Perhaps the legislator and the city planner would do well to review the late President Kennedy's comments to the secondary materials industry:

> *"The fifty years of achievement by the members of the National Association of Secondary Material Industries are a bright chapter in our country's economy. In your inventory, there is nothing that is useless. Scrap metal, textiles, rubber, waste paper — these are your raw materials for new useful production. In wartime, you taught us how to make do. In peacetime, you give the lie to those who say we are wasteful. If any one word were to describe your industry, that word might well be 'resourcefulness'."*

The secondary materials industry has the continuing challenge of expanding its reclamation system, improving its processing facilities, and conquering the technological problems of the times. The nation—and that means private citizens and governmental bodies alike, on a local, state and federal level—have the obligation to provide a community and industrial atmosphere conducive to the growth of this vital industry. With this as our goal, the Association has undertaken the study that follows.

M. J. MIGHDOLL
Executive Vice President, NASMI

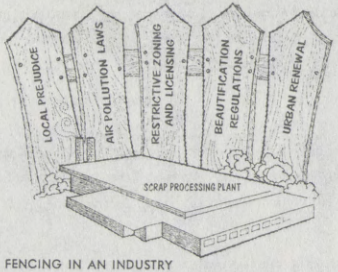
I

Emergence of New Major Factors of Dislocation

The walls around scrap yards are getting thicker, the fences are growing higher, municipal laws are tougher, and the costs of maintaining a secondary material business as a result of new restrictive zoning, licensing, beautification, and air pollution regulations are becoming impossibly high—this is the conclusion of a detailed study made by NASMI's Urban Renewal and Related Problems Committee.

From Rochester, N.Y. in the East to Portland, Oregon in the West, local administrations are cracking down on scrap plants, paper stock companies, secondary textile firms with stricter regulations, higher licensing fees, special taxes, and onerous ordinances that are buffeting and bludgeoning the industry. Companies are being zoned out of central business districts in urban areas and pushed further and further away from their normal sources of supply and from their consuming outlets. This type of dislocation is making it more difficult for some of the smaller firms to survive.

Several years ago, urban renewal loomed as the No. 1 challenge facing the industry. Dislocations of secondary material firms were common due to the vast urban renewal projects scattered across the country. Possibly, the brunt of displacement in the industry as a result of urban renewal has already been felt, although some industry officials believe that this problem will haunt us for many years to come. But it has been supplanted by zoning, licensing, beautification and air pollution which have become the principal factors in the dislocation process. Even where the end-result is not actual dislocation, it is a major factor in posing difficulties for companies in the secondary material field.



FENCING IN AN INDUSTRY

A study of the complex area of zoning and licensing indicates that this particular problem is "local" rather than national. By that we mean that cities and regions throughout the United States have established their own municipal codes which pertain specifically to their own prescribed areas in which business firms can operate. It is therefore no accident that these regulations and ordinances have to be challenged on local grounds.

NASMI, as a national trade association, has sought to gather information which it could then dispense to local member groups who are directing the fight against injurious laws and regulatory controls. The ordinances are different in different parts of the country; they apply different measuring standards; they establish different zoning rules and different licensing fees. In other words, while there are certain similarities in a general and fundamental sense of the zoning and licensing codes—the specifics are different and must be met locally in different ways.

It is for this reason that a certain part of the challenge has been met either by local groups who have banded together for the express purpose of securing more intelligent and reasonable zoning and licensing laws, or by existing local associations more conversant with the immediate local situation. NASMI has been able to give direction through its Urban Renewal and Special Problems Committee, publish studies such as its widely-disseminated "The Secondary Material Industries in a Changing Urban Society" which has been hailed by urban planners, city administrators, universities, etc., and gather general information about the industry which would be of value to any local group working in this field of endeavor.

In making its study, NASMI has come across the following trends which are apparent in the industry across the country:

1. The tendency among municipal administrations is to develop stricter regulations regarding the zoning of scrap yards, paper stock plants, and other industry firms.

2. Licensing of new firms in the secondary material industry is accompanied by closer surveillance, higher fees, insistence on conditions that make for hardship within the industry.

3. Beautification in some areas has become the means of harassing smaller scrap firms.

4. Urban renewal continues to displace firms, although it is not as vital a factor today as are other dislocation forces.

5. Highway construction still remains a displacement factor. Widening of highways, ex-

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tension of turnpikes, creation of new roads have caused the closing down of a number of scrap yards.

6. Air pollution controls are becoming more and more the chief problem of many firms in the industry. While statistically, only about 40% of the secondary firms have been somewhat affected, interviews with member firms indicate that they anticipate a much larger percentage figure by 1970.

7. The entire problem seems to be inextricably tied in with the "image" of the industry and the ineffective public relations generated by the industry in the past decades. There is a general agreement that a better public relations program is needed.

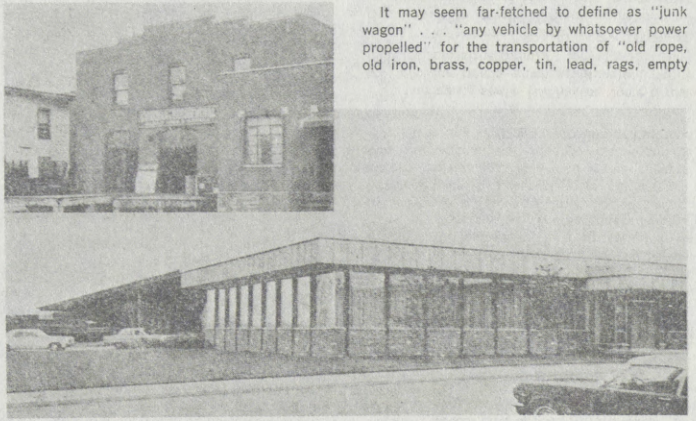
8. It is believed, on the basis of investigation, that some city planning commissions and municipal administrators are becoming more aware of the existence of the secondary material industry as an industry of economic importance. In some areas of the country, attempts are being made by local administrations to blunt the impact of ordinances on the scrap industry. However, these instances are still few and far between.

It is apparent that the problem for the secondary material industries—as they enter the decade of the 1970's—will be to find an economic and industrial environment which will not restrict their operations. The purpose of this study is to highlight some of the factors that currently make such an environment untenable. By analyzing the material, it will be possible to chart the direction in which the industry can move to attain the kind of environment which will make possible the secondary material industry's role as an economic asset to the community.

II

Antiquated and Outmoded Definitions

A study of municipal codes dealing with the establishment of scrap yards and plants reveals one common denominator: the use of the word "junk" to refer to operations within the industry.



The metal plant as it looked yesterday (top) and as it appears today (bottom) with modern design and layout, characterizing the dramatic evolution of the development of the scrap industry.

The phraseology that constantly recurs in these codes may be summed up as follows:

"JUNK, PAPER AND RAGS"

"JUNK SHOPS"

"JUNK WAGONS"

"JUNK LICENSES"

"JUNK YARDS"

With rare exceptions, this terminology is used as it was fifty years ago. City administrators who pride themselves on the fact that their cities have made remarkable advances into the 20th century, are still using the outworn vocabulary of the 19th century when it pertains to the secondary material industry.

It may seem far-fetched to define as "junk wagon" . . . "any vehicle by whatsoever power propelled" for the transportation of "old rope, old iron, brass, copper, tin, lead, rags, empty

bottles, paper, bagging, scrap metals of all kinds, and other worn out or discarded material." But this antiquated definition is written into the codes of a number of cities.

Sociologists would perhaps explain this as a matter of psychological pressure. The retention of phrases such as "junk wagons"—once applied actually to horse and wagon vehicles, serves to paint a picture of second-class citizenship and to place the secondary material industry outside the pale of normal industrial activity.

It might be pointed out that modern technology and scientific materials handling techniques have transformed the secondary materials industry from the category these administrators classify as "junk" into an industrial complex that is highly sophisticated and that operates on the same level as other large industries such as petroleum, chemical, iron and steel, etc. The utilization of equipment costing hundreds of thousands of dollars in some instances, the installation of cost-saving machines—all this tends to be negated by the "junk" label.

Even smaller and medium-sized yards and plants are using the more sophisticated techniques for segregating, testing, and processing secondary material. The old, outmoded methods of hand operation long ago gave way to machines. But the old, antiquated phraseology in city codes regulating the scrap industry remains unchanged.

WHAT IS "JUNK"?

In the nomenclature of the secondary materials industry, the word "junk" has long gone by the board. It is not merely a matter of semantics, or of trying to cover certain industrial operations under a new sweet-smelling description. But from "junk" to "secondary materials" represents an industrial development as different in its concept as from the "silent screen" to "talkies" to the present wide-screen Cinerama. The industry has changed so materially and so substantially that the appellation "junk" today simply seems to be used to satirize or denigrate the industry and it is therefore objected to and rejected.

A few years ago, "Industrial & Engineering Chemistry," writing about the recovery of rare metals from scrap by reprocessors, declared: "The reprocessor is assuming an ever increasingly important part in the economics of metal processing. The modern day scrap dealer is highly insulted when aligned with the classic concept of the 'junk' dealer."

The financial magazine, Barron's, in an article entitled "Sophisticated Scrap," indicated by its subtitle "The Metal Reclaiming Business Has Come a Long Way from the Junkyard" the thesis of an advancing and progressive industry. Said Barron's:

"While the industry performs a wide variety of functions in collecting, processing and marketing ferrous and nonferrous metal scrap and boasts of a yearly volume of $4.4 billion, it is one of the least known businesses in the United States. With its extensive network of yards, plants, and warehouses, the scrap industry gobbles up annually not only millions of junked cars and trucks, but also dismantled refineries, oil tanks, railroads, copper wire communication lines and storage batteries and converts them into raw materials for making shiny new cars, refrigerators and other metal products."

In the publicity attending the recent beautification program, the word "junkyard" seemed originally applied to what we call automobile graveyards—collection points for wrecked and abandoned vehicles—and then by extension to auto wrecking yards. Finally, because of the looseness of the terminology, the legislation introduced in Congress designated "junkyards" to cover ". . . any place which is used, maintained or operated for the purpose of storing, keeping, buying, selling, or disposing of garbage, trash, scrap metal, rope, rags, batteries, paper, rubber, or junked, dismantled, or wrecked automobiles or parts thereof."

During Congressional debate, the question was asked: "Scrap metal processors by definition here are different from junkyards and auto graveyards?" In answer, one Congressman stated: "The junkyard includes the junk processor. Your metal processor is included. They would be restricted as junkyards that accumulate the junk. They would be equally covered."

This was predicted by M. J. Mighdoll, NASMI executive vice president earlier when he noted in a letter to all NASMI members: "Such an all-inclusive definition of 'junkyards' would bring the operations of our industry fully within the scope of this legislative proposal, in spite of the contentions voiced in some quarters that "they don't really mean us!"

DEALERS AS "PROCESSORS"

From a strict legislative point of view there have been a number of Court decisions which have defined the scrap dealer as a "processor" or "manufacturer," thus differentiating him from the accumulator of scrap (such as the auto graveyard, for example). It would seem obvious, from the report in this study, that the scrap dealer or processor, handles an economically valuable raw material in the very same manner that a metalman, for example, handles primary raw material. The objection to "junk" as a title to a bill, or as a catchword to denote a $5 billion industry is therefore understandable. The secondary material industry operates at a high level of technical efficiency, abides by standards and specifications, conducts vast educational programs, including Seminars for its younger members at leading universities, has ties with producers and consumers, and moves its products

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across a wide national and international boundary. It asks for the same status and position as any other self-respecting industry group in the United States. Its opposition to the "junk" tag therefore is deeprooted and uncompromising.

There are indications that some municipalities are beginning to take a more enlightened approach to this subject. Not too many, it must be admitted; but even these few help set a pattern for the future. Thus a recent revision of the Atlanta Code of Ordinance, reads as follows:

"An ordinance to amend Chapter 17 of the Code of Ordinances City of Atlanta, Georgia, relating to licensing and business regulations by deleting Article XI relating to junk and junk dealers in its entirety and inserting in lieu thereof a new Article XI relating to scrap, scrap processors, scrap yard operations and scrap dealers."

The old Article XI, with its reference to the shopworn "junk" terminology was deleted by the Board of Aldermen in September 1966 which approved the new wording.

It is certainly an improvement in raising the image of the industry to meet the following definition in the Atlanta code:

"The words 'scrap processor' shall mean any person who buys, sells, or in any ways deals in scrap and who owns, leases, operates or otherwise maintains a scrap processing facility within the city of Atlanta."

It is not a matter of semantics to distinguish so specifically between the definition of a "junk" dealer and those of a "scrap processing facility" —it is an acknowledgment of an advance in industry technology and it sets the industry into a different frame of reference.

We are using the Atlanta ordinance as a sample of the kind of change in vocabulary that is needed to eliminate the prejudices of the old "junk" classification with its horse and buggy connotations. The industry long ago left the world of the 1900's and is firmly entrenched in the technical civilization of the upcoming 1970's.

III

Restrictive Covenants in Zoning and Licensing

There is every indication that special restrictions are being established for scrap yards in many parts of the country. Many of these restrictive ordinances are based on the "beautification" concept which requires walls, fences, enclosures to surround the raw material and keep it out of sight. Others are based on tighter zoning measures emanating from political pressures in various localities. Some restrictions lap over into the area of closer inspection through keeping of special records. Whatever the case, it all falls under the general heading of discrimination against one particular sector of the business and industrial community.

We append here some news items which illustrate this trend toward restrictive covenants affecting the scrap metal industry:

"TOWN CONSIDERS STRICT YARD CONTROL"

"ROCHESTER, N.Y. — An ordinance calling for stricter controls over junk yards, plus a licensing measure, will be introduced before the City Council meeting . . . The proposed measure would give the city the authority to inspect existing junk yards, a right not granted by the present ordinance. Corporation Counsel Robert A Feldman said: 'The annual licensing provision would give the city a measure of control'."

These new ordinances were later adopted, although several community leaders felt that "they were not strict enough." Scrap yard dealers are expected to take the new city ordinance to the courts.

"CITY GOVERNMENTS STUDYING WAYS TO TIGHTEN SCRAP YARD CONTROL"

"Los Angeles — Strict controls which would beautify automobile wrecking yards, junk yards and other eyesores in industrial areas have been recommended by the City Planning Commission . . . they would require wrecking and junk yards and secondhand box or barrel yards to be completely enclosed or surrounded by high masonry walls . . ."

Local dealer groups in the Los Angeles area have been opposing some of the restrictive measures intended to control the operations of scrap processors in that area of the country.

"TOWN BOARD QUESTIONS YARD OPERATORS"

"Syracuse, N.Y. — Five Cicero scrap yard operators were quizzed by the town board on their progress toward beautifying their property and were given until November 6 to comply with the village junk ordinance or pay $50 a day fine."

It was pointed out in the article that one scrap yard operator, whose yard is on Route 11 reported that the state and federal governments are building a $30,000 redwood fence around his scrap yard. He added: "That's where the taxpayer's money is going." Another scrap yard operator who did not fall within the assistance act of the federal government, will have to pay the total cost of erecting an eight foot fence or shrubbery screen.

A study of some of the regulations in different parts of the country indicates that space for new scrap yards or plants is becoming more unavailable in central business districts. New ordinances also place heavier burdens on newcomers in the industry.

Here are some illustrations of regulations in several areas of the country:

In New Orleans, scrap dealers who were operating prior to the effect of the new zoning ordinance may continue to operate in a **fenced** area. However, new scrap establishments must be within **enclosed buildings.** Scrap plants in New Orleans are confined to areas prescribed as "light industrial" or "heavy industrial."

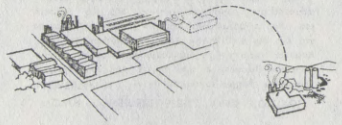
In Chicago, scrap yards are classed as "special uses" under the Chicago Zoning Ordinance and are permitted in M2 and M3 Heavy Manufacturing Districts and only after a public hearing before the Board of Appeal. Smelting plants are permitted use in M3 Heavy Manufacturing District. No license is required for the operation of smelting plants. (It is reported that a special committee in Chicago is currently reviewing the present zoning ordinance.)

In Nashville, Tenn., all scrap yards and plants are classified as Industrial B. Dealers in Nashville contend that there is very little Industrial B Property near the business district of Nashville. It is intimated that for scrap yards and plants to relocate would present a problem in securing Industrial B property.

The Cleveland ordinance lumps together the storage of "secondhand lumber, or other used building material, junk, paper, rags, unrepaired or uncleaned containers, or other salvaged articles . . ." and goes on to say: ". . . less than 125 feet from any public thoroughfare, public land, or Residence District, are enclosed within a ten-foot high, solid masonry wall, not closer to the street line than the set-back building line and not closer than 50 feet to any Residence District. Such wall may have one opening, not more than 20 feet in width for street access and may have two such openings if the wall along the street is more than 200 feet in length."

The city of Newark, N.J. ordinance states: ". . . any junk yard must be within a solid enclosure not less than 6 feet high."

The Los Angeles ordinance declares that: ". . . automobile wrecking yards, junk yards and the secondhand uses enumerated in (1) be permitted in the future in M3 Zone only if conducted within enclosed buildings or in an area completely enclosed with a solid masonry wall not less than eight feet in height, and provided that no material or equipment be stored to a height greater than that of the wall. . . ."



THE SCRAP PLANT BELONGS HERE . . .

AND THEY PUT IT THERE!

It is obvious that (1) Restrictive covenants aimed at the scrap industry exist; (2) That established firms are finding it more difficult to operate within the restrictive ordinances; (3) That if such firms for reasons of urban renewal or highway construction have to relocate, it is most difficult to secure new locations within the industrial district; (4) That newcomers in the industry are being discouraged because of the excessively tightened regulations.

Local dealer groups have been waging their own campaign for more reasonable ordinances. Such local campaigns have been waged in New York and Los Angeles for definitions to permit scrap yards to operate under a code that would distinguish between "scrap processing facilities" and auto wrecking yards or salvage plants, for example. That is not to say that all such campaigns have proved fruitless. Los Angeles dealers have been successful in staving off added tax burdens and New York dealers have made some inroads in impressing on the local administration the importance of the scrap industry. In Atlanta, as has been mentioned earlier, a new ordinance uses language much more acceptable to the scrap industry.

The conclusion to be reached on zoning and licensing is this: Our study shows that most city governments are reacting to public pressure for more restrictive ordinances. It is to be anticipated that for practical purposes the attempt will be made to crack down more stringently on existing scrap establishments and to discourage the setting up of new plants in business areas. Tighter regulations through licensing will also harass the industry in years to come.

The procedure to counteract this may be listed as follows:

1. Since these are local problems, they must be met on the local level. Cooperation of all scrap dealer groups in a given area must be secured and effective action waged both through political and legal channels.

2. One of the principal steps to be taken must be to secure a revision of definitions, so that a "scrap processing facility" can be distinguished from a "junk yard," "auto wrecking plant," or "salvage plant."

3. Material should be accumulated (such as the Atlanta Ordinance, for example) as an illustration of the kind of ordinance which would be fair and reasonable.

4. A local public relations campaign must be mounted to make both the city administration and the public aware of the economic importance of the scrap industry. In this connection, local groups can secure the cooperation of NASMI's National Public Relations Committee which has established a Speakers' Bureau for just such purposes.

5. Help can be secured from NASMI on a broad and general basis. The Association has effective material—such as this pamphlet for example, or other publications which show the vital importance of the secondary material industry.

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IV

Experiences of the Industry

A survey undertaken by NASMI indicates that many of its members have had frustrating experiences in zoning, licensing, urban renewal, highway construction, air pollution, etc. However, in any number of instances, when the case was pressed or when groups of dealers banded together locally to fight what they considered restrictive ordinances or unjust taxation (as in Los Angeles) a fairly successful conclusion was reached.

Here are some typical cases in which NASMI member concerns listed their experiences:

Missouri: "When we applied for our license, the local newspaper ran a front page article that a junk yard was to be opened in that area which resulted in a mass meeting of 100 people at City Hall protesting it. The City Fathers turned down our request for a license."

Connecticut: "We met antiquated thinking on the part of the members of the Zoning Committee. Their ideas of the type of business we do dates back about fifty years."

Ohio: "The city is going to take over one of our warehouses. . . . We understand they will pay a certain amount for the moving cost but are not yet sure how much. We need this space very badly, especially now since many items are not salable and have to be held for better times."

Wisconsin: "We met prejudice and discrimination in trying to move from downtown to an industrial zone; finally the move was allowed but with Junk Dealers restrictions such as concrete block buildings, etc."

Virginia: "The property in which we had been located for over 30 years was claimed by our local redevelopment authority. We received about 90-100% of its fair market value—this was equal to about 1/3 of its replacement cost and we were fairly well satisfied with this. However, we are farther away from good labor supply, being in the country, and are exposed to inferior fire and police protection. After three years, our figures show a loss of as high as 25% of volume in the same prime grades with no increases that can be attributed to the new location."

Maryland: "We experienced some pilferage through our six foot chain fence and complaints of trash thrown over the fence into our field. In order to beautify the area and discourage pilferage, we decided to replace the six foot fence with a twelve foot fence and then grade and seed and plant shrubs along the fence on our side. We unexpectedly ran into difficulties from our neighbors who claimed we were putting up a "Berlin Wall" and retained an attorney to discourage us. However, we completed the job and installed a mercury vapor area lighting along the new fencing. Subsequently, we have received a number of compliments from the residents in the neighborhood. . . ."

Connecticut: "About four years ago we were told that we would be included in redevelopment. We contacted local officials in an effort to remain in the city. Zoning was a problem because during this period Redevelopment and Zoning worked hand in hand. In order to keep the acquisition costs low, Redevelopment would tell the Zoning Board not to approve our plans for installing a new machine or process, the reason being that we were not zoned for that particular process. The upshot was that we finally approached another town where we bought a large parcel of land and we were welcomed with open arms."

Tennessee: "Our experience with urban renewal was in conjunction with the taking of some of our property and also their cutting through our property with storm sewers and gas lines which affected our use of those areas. Despite our efforts, the rulings were adverse to us and Urban Renewal was able to proceed with the project. They compensated us for the actual work we did to clear the area but we lost the future use of the property for its originally intended purpose."

Ohio: "Our approach has been that the city in designing any ordinance should direct its legislation towards the condition they want to correct and not any particular industry. We have not been too successful with this approach although the zoning commission has asked our advice on new legislation."

Pennsylvania: "Zoning was the problem. The local dealers met with local authorities and everyone was satisfied at conclusion. The main hitch was classification, i.e., light or medium or heavy industry. But it was all worked out."

California: "Problem was initiated by voluntary need to develop property for future expansion. Encountered resistance to development by county planners and Board of Supervisors. The property, in the county, was eventually annexed to the city. We approached the city authorities with well developed plans prepared by civil engineer showing fences, landscaping, and well designed buildings. City gave us appropriate zoning, requiring that all future construction plans be submitted for their planning department approval."

It is obvious from the comments noted in these responses to our survey—and they represent a typical segment—that the restrictive measures mentioned in our previous chapter are all too real for the average secondary material concern. However, it is apparent, too, that many of the firms took action to fight the unfair restrictions either through legal means or by banding together locally, and that these efforts in some cases bore fruit. But obviously, there's still a long road ahead.

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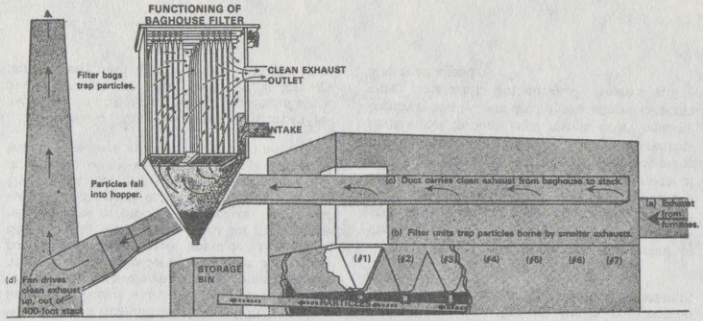
V

The Challenge of Air Pollution

Air pollution looms today as a major problem, not only in the secondary material industry but in industry everywhere. However, because of the specific nature of metal plants and because of their vulnerability in the community, this problem has assumed critical proportions, particularly for some of the smaller and medium-sized firms in the industry. Larger companies have the financial resources to cope with the outlays required both for research in this field and for the actual manufacture of devices to control air pollution. But the smaller and medium-sized firms, faced with heavy monetary requirements for equipment still of an experimental nature, are finding it increasingly difficult to satisfy local and State air pollution officials.

One of the hard core factors is the fact that the entire air pollution problem is still in a state of flux so that there are no pat answers to the questions that arise. Bethlehem Steel Corporation's president recently noted that pollution control must be approached with "knowledge and reason and in proper balance with society's other problems." He pointed out that "agencies involved in the problem have multiplied like rabbits . . . many of their approaches and activities tend to be unrealistic and impractical."

A survey among NASMI members has indicated quite clearly that two of the major problems facing the metals industry revolve around



New Air Pollution Control System at a copper refining plant. To meet stringent air pollution regulations involves large financial outlay on the part of the industry.

the areas of zinc chloride emissions and the incineration of insulated copper wire scrap. Firms in the secondary metal industry have been doing their own work in these fields; sizable sums have already been committed, for example, in an attempt to control emission of zinc chlorides in secondary zinc operations but with little visible success. A number of concerns have indicated to NASMI that despite the recruitment of engineering and technical consultants and the purchase of equipment which ran into thousands of dollars, they have been denied approval by local and State air pollution officials.

Experimentation in the field of recovery of insulated copper wire scrap is also going on. Some companies have completely abandoned the incineration technique and have been using other methods and devices to recover copper wire. A number of firms have installed specially constructed incineration equipment to burn insulated wire and have succeeded to securing approval from local air pollution officials. It is evident, however, that this problem is still one that has to be licked on an industry-wide basis.

Most companies admit that a good deal more research will have to be done in these areas before "solutions" are found that will satisfy the stringent air pollution regulations. NASMI, through its Air Pollution Committee, has been engaged in conferences with the Cincinnati technical center of the Department of Health, Education and Welfare in an effort to initiate a joint research project in the secondary zinc field, particularly looking toward the control of zinc chloride emission. It is hoped that such a pilot plant study can be begun soon.

Other NASMI efforts have included a workshop on air pollution control in Pittsburgh in 1967 at which three leading engineering authorities in the metal field discussed such factors as: the use of

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scrubbers and precipitators; the design and operation of baghouses; and the handling of insulated copper wire scrap. The Air Pollution Committee has also developed a bibliography of air pollution material available at the NASMI office in New York. Association representatives have held conferences with top officials of HEW in Washington and the NASMI executive vice president has testified at hearings on the Clean Air Act before Congressional subcommittees.

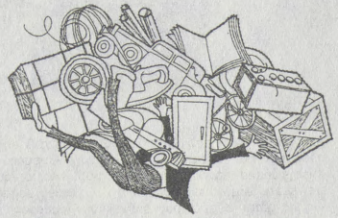
The economics of air pollution represents a major porblem. Until such time as equipment can be manufactured at a reasonable cost, the financial burden on the industrial community will be a heavy one. This is another factor that results in secondary material industry dislocation. While industry members believe that it is vital to achieve pollution-less air—they do not want all smaller firms forced out of business. The goal is to develop proper machinery and equipment at moderate cost so that effective air pollution control can be achieved without placing an onerous financial burden on the industry. In order to do this, of course, Government may have to implement its program with tax credits, research funds, and incentives of various kinds.

Overcoming air pollution may take time, and local and regional officials should be cautioned that when industry gives clear evidence that it is seriously attempting to meet and solve this problem—consideration should be given to that fact. Patience, research, education, cooperation—all these are necessary to make air pollution control a reality without imposing hardship and burdens that will lead to greater industry dislocations.

VI

The Disposal of Solid Wastes

A recent study by President Johnson's Science Advisory Committee, entitled "Restoring the Quality of the Environment," notes that a large fraction of consumer goods ends up as urban solid waste, though significant amounts are recycled back into industry. The report declares that industries engaged in the reprocessing of secondary materials operate at the level of $5 to $7 billion annually.



Without An Effective Scrap Industry, The American Citizen Will Be Swamped in Solid Waste

Some sociologists and students of the urban society foresee a growing trend to accumulate annually larger and larger amounts of solid waste without the means of removing or disposing of it. We know the critical problem of abandoned automobiles and the burden this imposes on cities and counties. In recent years, many municipalities have been faced with landfill space problems and vanishing areas for dumps. With air pollution controls restricting the incineration of some types of solid wastes, the challenge is growing even more acute.

It is therefore vitally important to assess the role that the secondary material industry plays in recovering and reprocessing huge tonnages of material which normally might end up as solid urban waste. Testimony by NASMI executive vice president M. J. Mighdoll before a Subcommittee on Public Health and Welfare disclosed that the secondary material industry enables many thousands of by-products of factory, farm and home to retain an economic value and replenish the country's raw material supply. He added: "Just as industry is dependent upon our members for much of its raw material supply, so is the general public from the standpoint that this recovery of secondary materials minimizes the waste left unusable throughout the country." The question might be asked what our cities and countryside would be like had not the secondary material industry pioneered and developed means of collecting, processing and utilizing secondary materials. Because the consumption of secondary materials is expanding with the growth of the economy itself, the techniques used in recovery make the industry more important than ever as an industrial reclaimer, a direct adversary of "waste."

A study recently prepared by the New York Regional Plan Association, entitled "Waste Management," warned that the amount of waste was growing in the metropolitan area and that within the next 25 to 30 years, the amount of waste generated per person would rise from 5 to 10 pounds a day. The report stated that more emphasis should be put on recycling into productive use the waste that is now dumped. It added, however, that "society has few incentives at present to recycle its wastes."

The problem of solid waste disposal will become more acute in the years to come, according to authorities on this subject. The chief counter-

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action lies in the expanding utilization of secondary materials, for in this operation by the industry, uneconomical material can be transformed into a potentially valuable raw material. It is for this reason that the industry must be strengthened and that some of the dislocations that are engendered by onerous regulations be eliminated.

One might also consider the economic aspect of the problem of solid waste recovery. A recent report by Penn State University, as reported in the American Metal Market, declared: "Ashes in this city's (University Park, Pa.) municipal incinerators have been found to contain metals worth as much as $12 per ton of ashes thus making the ashes richer than many of the metal ores. In spite of this, such ash is still being buried as land fill with total losses of the metal. . . . It is apparent, the Penn State scientists note, that many new metals recovery projects will be directly related to various industrial and liquid waste disposal problems. A major goal, therefore, is to devise new methods for recovering as many industrial wastes as possible, in useful, valuable forms."

The displacement of the secondary industry because of urban renewal and highway construction, for example, means that small dealers have been put out of business. Collection of so-called solid wastes rests at this industry level; when small collectors are out of business, potentially utilizable raw material lies abandoned and uncollected. A continuation of this kind of dislocation will only lead to a growing accumulation of solid wastes within large urban areas posing huge problems for municipal planners.

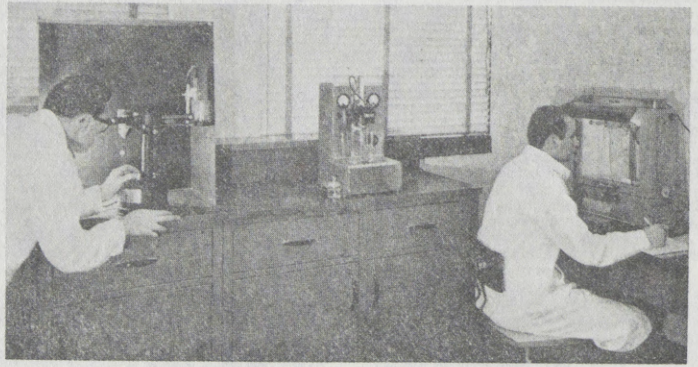
The secondary material industry is the most effective agent for the disposal of certain types of solid wastes—and this disposal is of an economically constructive kind, through reutilization and recycling back into industry channels. It is part of the overall "conservation" process which the secondary industry has been practicing for more than half a century.

VII

Changing Aspects in Technology and Industry Structure

Secondary materials today is a multi-billion dollar industry. It encompasses the areas of nonferrous scrap metals, scrap iron, paper stock, secondary textiles, scrap rubber and plastics. The growth of the industry has been paralleled by the vast changes in its technology, structure, and economics. The industry today has changed radically since World War II—to such an extent that it has been characterized by competent analysts as "sophisticated." What this definition means is that the industry has achieved stability and maturity.

Technologically, the industry today bears only superficial resemblance to the 19th century industry local legislators are talking about. The high-powered equipment in use today in yards and plants is the latest in a series of scientific developments that have revolutionized the processing of secondary materials and have turned it from a hand-operated business into a modern, automatically-operated industry. It is now well on the road toward computerization in many areas. Exactness of specification determined in com-



Research laboratory at modern metal plant — today research is an integral part of the scrap industry's operations.

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pany laboratories, efficiency achieved by yard and plant layouts, use of labor-saving devices—all these have provided the industry with a "new look."

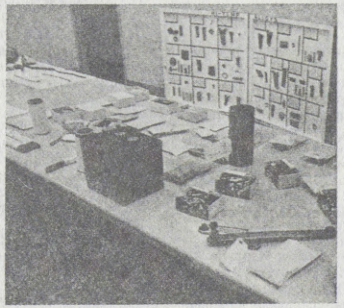
The machinery and equipment being used costs millions of dollars annually. Companies seeking to keep up with new and advanced methods have to invest large financial outlays in equipment. There is constant study going on of machinery used for processing, baling, packaging.

A study by NASMI indicated that its members' capital investment in terms of plant and equipment valuation in a recent year was estimated at over $675,000,000. An American Metal Market report had anticipated a spending program by NASMI members for equipment during a five-year period "as high as $20 to $40 million."

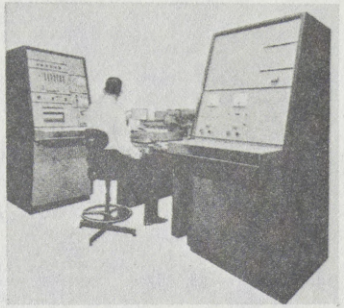
One must take into account the fact that new types of equipment, such as air pollution control equipment or incinerators for the burning of insulated copper wire scrap are now part of the plant operational scene and that these add to the vast financial outlay. One must also consider the additional burden of "beautification" investment for fencing and screening by many dealers who do not fall into the classification in which they receive compensation by the Government.

Because of the sharp change in technology and the mounting cost of operating secondary material plants, there have been obvious changes in industry structure. Smaller and medium-sized firms are having a more difficult job to subsist and compete; as a result, it has become evident in the past decade that mergers are increasing. There have been many articles written about the disappearance of the wholesale metal dealer, for example, whose activities were a major part of the scrap scene in the 1930's and 1940's. Many of these companies have been swallowed up by larger concerns, others have become victims of the trend toward specialization in the scrap industry since 1945.

There are signs that this trend toward merger is not over. The family-dominated business—once considered the pride of the industry and which, to some extent still survives in greater numbers than in many other American businesses —is slowly giving way to the corporate entity. As has been pointed out in a number of reports, more and more secondary material firms are now on the various stock exchanges and others are expected to join this growing list. There is no doubt that this change in industry structure is having wide repercussions within the industry.



Growth of alloys and hi-temperature metals indicates the ever-expanding markets of the secondary material industry.



Spectroscope tests metals for identification—one of the new tools of the modern scrap industry.

Concomitant with the changes in technology and industry structure is a growing need to reassess the economics of the industry. The problem of costs has become of major importance. Cost analysis is today a constant company activity. It is realized that haphazard operations are intolerable; that there must be a distinct awareness of costs in every company department. Recent Association activity has directed these efforts into channels of Cost Study Committees and Plant Management and Operational analyses.

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VIII

Conclusion: The Road Ahead

No industry can grow and develop to its maximum potential if the environment in which it operates is hostile to its efforts. Attempts by local and State governments to restrict and limit secondary material industry operations through zoning and licensing regulations, air pollution ordinances, urban renewal limitations, highway construction blocks, beautification requirements, etc., tend to frustrate and constrict the natural growth of the industry.

One of the basic requirements in the effort to bridge the gap between the secondary material industry and the local community in which it operates is **communication.** If the community understands and realizes the nature of the industry, its importance to the economy, its conservation value, its vital activity in helping to recover valuable raw material, its efforts to dispose of solid wastes—if the community understands this, it will move toward constructive rapprochment with the yards and plants within its boundaries.

NASMI's Community Guidance Program—under the direction of its National Public Relations Committee—has taken concrete steps to achieve this kind of communication. It has established a Speakers' Bureau, with available speakers in many small and large communities in the United States. It hopes to bring the message of the industry's role in the economic life of the nation into these communities. By doing so, it may avert difficulties arising out of the very problems that have been discussed in this brochure which lead to frictions and misunderstandings.

Individual firms, too, have been developing their own community improvement projects based upon information supplied through NASMI's Community Guidance Program. Visits to company plants by school children in the area, the supplying of literature about the secondary material industry to local libraries, participation of industry members in community activities—all these efforts will help cement relations.

The secondary material industry is an integral part of the American business community. It must be treated as such and not discriminated against because its raw materials are materials that have already been "used." The existing restrictions in zoning, licensing, urban renewal, beautification, air pollution must be evaluated in terms of both the needs of the community and the needs of the industry to exist and do a worthwhile and vitally important job. Reasonable attitudes must supplant suspicion and distrust.

The future of the secondary material industry in the United States is an expanding one. As more goods are produced, there will be a greater need to recover and recycle them back into industry channels. Without this vast effort on the part of the secondary industry, the urban centers and even the countryside will be choked with accumulating material. Only the secondary industry can help in the reutilization of these mounting tonnages and in converting them into valuable raw materials for the future growth of the nation's economy. The victor will be the American public—whose consumer needs depend on the secondary raw materials that industry produces and whose environment depends on the ability and ingenuity of industry to collect and utilize such secondary raw materials.

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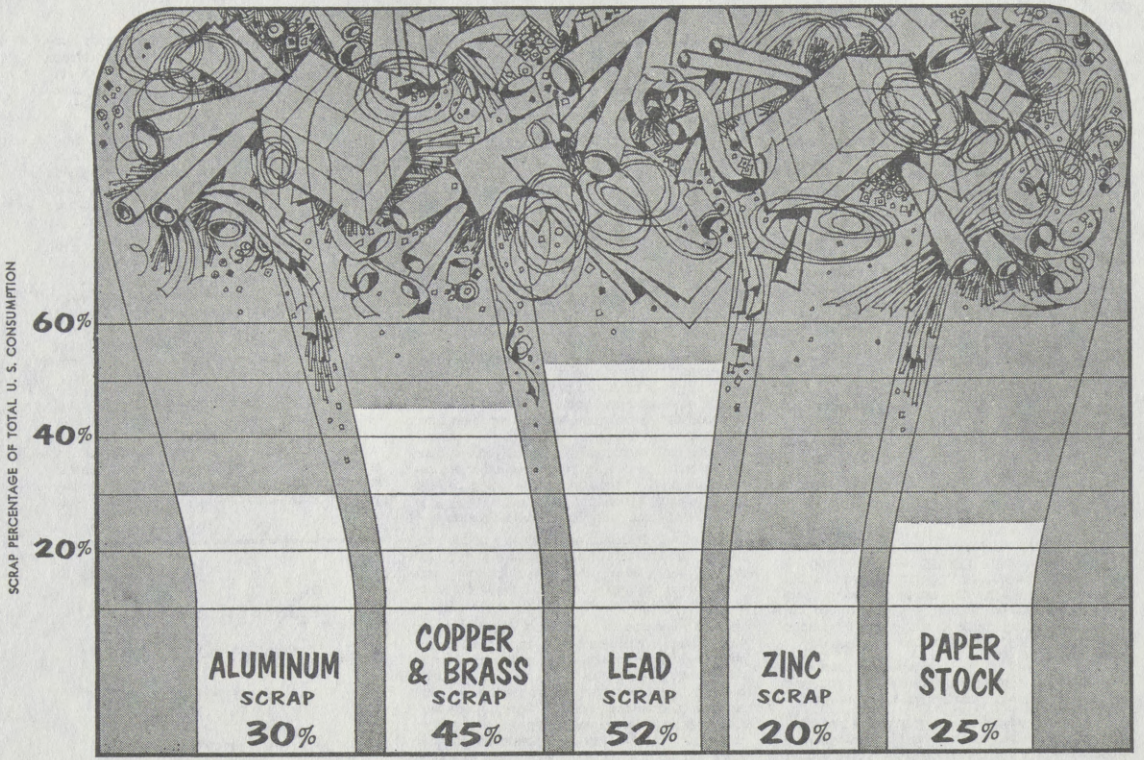
Secondary Production Accounts for a Major Portion of Raw Material Supply



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APPENDIX I

The Economic Importance of the Secondary Material Industries

A handbook of the Department of Defense defines the reclamation of scrap and secondary materials as "of the utmost importance in order to provide the necessary raw materials for the manufacture of essential military and civilian items. Secondary materials recovered from scrap provide a vast reservoir of hard-to-get materials."

This succinct statement graphically describes the multi-billion dollar secondary materials industry which has been recycling and reclaiming raw materials for more than half a century with growing efficiency and greater technological know-how. President Johnson's Science Advisory Committee has noted that industries engaged in the reprocessing of secondary materials operated at a level of $5 to $7 billion annually.

The industry consists of firms in the fields of scrap iron, scrap metals, paper stock, secondary textiles, rubber and plastic scrap. NASMI concerns itself with all these raw materials except scrap iron. A survey among our member firms taken a few years ago indicated that gross sales for this group alone totaled over $4 billion. Valuation of plant and equipment amounted to over $675,000,000 and total membership payroll exceeded $240,000,000. These figures, of course, are for NASMI members only—the figures for the entire industry would be much larger.

We are dealing then with the economics of an industry which can be classified on the same level as such industries as chemicals, petroleum, steel, and textiles. Like these, the secondary material industry employs thousands of workers, has developed highly technical skills, has expanding markets in this country and abroad, has built harmonious relations with its suppliers and consumers—but, in addition, the secondary material industry engages in conservation policies.

By reclaiming material already in use and sending it back into the industrial mainstream, the secondary industry "saves" the use of millions of tons of natural resources and lessens our nation's dependence on foreign countries.

For example: During the copper strike of 1967-68, when all the domestic mines in the United States were shut down, a preponderance of the supplies utilized by domestic consumers consisted of scrap. The rest came from imported material which had to be brought into the U. S. and thus distorted our balance of payments. If there had been no scrap available—the United States would have had to import all of its metal and the balance of payments deficit would have been staggering.

It is for that reason that secondary materials are called "a mine above ground." Every pound of scrap used saves a pound of ore from domestic mines which face depletion. For every ton of waste paper used, trees are saved which would have to be used in the production of wood pulp. The tremendous savings in natural resources as a result of the efficiency of the secondary material industry, is what makes our country a "have" nation as against other "have not" nations.

The vital link of the secondary material industry in the economic complex can be seen in the fact that it has direct relationship both with producers of manufactured goods and consumers of raw materials. From the back door of the manufacturer flows a vast accumulation of by-products to the secondary industry which is accumulated, sorted, segregated, and processed. The material then is shipped to consuming outlets via the front door where it is again transformed into a usable product. This is a never-ending cycle and it is upon this cycle that a large part of the U. S. economy depends.

Here are some highlights of the economic importance of the various segments of the secondary materials industry:

The nonferrous scrap metal industry processes about 2,000,000 tons of scrap annually, valued at close to $2 billion. In a typical year, based on U. S. Bureau of Mines figures, the scrap metal industry processed: 850,000 tons of copper and copper-base scrap; 350,000 tons of aluminum scrap; 450,000 tons of lead scrap; and 210,000 tons of zinc scrap.

In 1966, a more normal year than 1967, U. S. mine production of copper was 1,415,000 tons and U. S. copper recovered from scrap was 1,300,000 tons—nearly a 50-50 ratio. That same year, Free World Supply of copper was about 60% mined and 40% recovered from scrap. It is statistics of this kind that led one of the leading world authorities on copper, Jean Vuillequez, of Roan Selection Trust, to write in an article: "The magnitude of scrap is seldom appreciated even by experts in the industry."

That same year, some 850,000 tons of aluminum were recovered from scrap. This represented approximately 25% of the total supply. The volume of recovered scrap in the aluminum industry is rising year by year and its value to the supply total growing progressively. Kaiser Aluminum vice president Fred Drewes has remarked that: "Any material that has gone through a portion of the normal life cycle from its source, refining and fabricating, has consumed a constantly increasing amount in labor, processing and transportation expense. The scrap industry is based upon the conservation of this value."

Lead recovered from scrap totaled about 512,000 tons—and this compares with 448,000 tons produced at primary plants. It bears out the analysis made by H. H. Callaway, of the Bureau of Mines, who declared that: "Lead recovered

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from scrap of over 500,000 tons annually, surpasses by a wide margin lead supplied from domestic ores." About 165,000 tons of zinc were recovered from scrap, representing about 20% of the total supply.

In addition, it should be noted that in the two decades since World War II, the rise of nickel alloy and stainless steel scrap use has been phenomenal and has added large tonnages to the available scrap supply. Today, the field is expanding in exotic and rare metals such as molybdenum, titanium, tantalum, columbium, etc. A recent study indicates that the technology of secondary production in these fields is changing to permit much cleaner and quicker recovery of the individual metals from scrap. Precious metals, too, are now being recovered in much larger quantities. Some of these metals—such as silver—formerly used mainly in coinage, have now become vitally needed by the industry.

In the field of paper stock, some 10,000,000 tons of waste paper are used annually. Use of this tonnage is responsible for a vast conservation of America's timber resources and has prompted a Commerce Department official at a recent Paper Stock Institute of America meeting to say that: "One recent study showed that 46% of the municipal waste in an Eastern city consisted of paper and paperboard. Studies under way may show the need for the greater emphasis on the salvaging of paper stock." In one given year, some 40,000,000 tons of fibrous material were used to produce 39.2 million tons of paper and paper board.

As far as secondary textiles are concerned, these consist of cotton, woolen and synthetics and come from fabric mills, dye houses, finishing plants, apparel manufacturers and independent dealers who collect textile by-products. These materials are channeled back into hundreds of industries here and abroad, to emerge as new and useful products which play an important part in the world's economy. Textile wastes find their way into fine writing paper, paper mills, flooring plants, fibre mills, shoe manufacturers, laundries, and wiping cloth industries and woolen mills.

The dollar volume of sales of secondary textiles runs over $377,000,000 and exports approximate 5,000,000 lbs., valued at $54,000,000.

It is obvious that this is a complex and modern industry, technologically alert, equipment-conscious, totally sophisticated and in some cases even computerized. It is an industry composed of a vast network of companies with the latest in materials handling machinery, with highly technical analytical laboratories, and with skilled and college-trained personnel to run large plant operations.

Secondary material firms also employ a large force of non-skilled labor. Their ability to employ and train this type of labor has effectively helped absorb into the employment stream many of the so-called "unemployables" and has proven that these workers, once given the opportunity, can rise to positions where certain specialized skills are required. The industry thus does a service to the country as a whole by offering opportunities to the unskilled workers. Through such educational devices as NASMI's "Blue Collar Workshops," many workers in the industry are given special training.

A recent NASMI questionnaire indicated that Association members have a labor force of over 41,000 plant workers and over 7,000 supervisory employes in the scrap phase of their operations and that the total membership annual payroll exceeds $236,000,000. And behind these firms are hundreds of smaller companies comprising the industry's vast collection and reclamation system.

It is unfortunate that the public is not more aware of the giant strides that have been made by the secondary material industry. It still thinks of it too often in terms of "horse and buggy" even though companies in these fields are using computers in their offices, spectrographs for modern and up-to-date materials handling techniques.

NASMI through its seminars, workshops, and metal identification, the most complex and sensitive devices in their laboratories, and the most meetings constantly offers programs of education to the industry. Few are the industries and trade organizations in the United States that enable so many of their junior executives to go to week-long seminars at universities; their technical men to workshops; their foremen and superintendents to special training sessions—as this industry has in the past two decades. The percentage of college-trained executives in the industry is clearly on a par with other large industries in the United States.

The secondary material industry does the unique job of transforming what would otherwise be "waste" into valuable raw materials worth billions of dollars to our economy. Through its vast conservation effort it saves this nation's domestic natural resources. It is an international industry, exporting thousands of tons of all types of materials annually. The industry's growth in the next few decades is assured, according to studies of leading economists and with this expansion will come greater capabilities of serving the American economy and the community.

PHOTO CREDITS

METAL PLANT YESTERDAY AND TODAY (page 2).
Courtesy, Sulsman & Blumenthal, Inc.

AIR POLLUTION CONTROL SYSTEM (page 7),
Courtesy, U.S. Metals Refining Co.,
American Metal Climax, Inc.

RESEARCH LABORATORY (page 9),
Courtesy, Frankel Co., Inc.

SPECTROSCOPE TESTS METALS (page 10).
Courtesy, H. Kiaff & Co., Inc.

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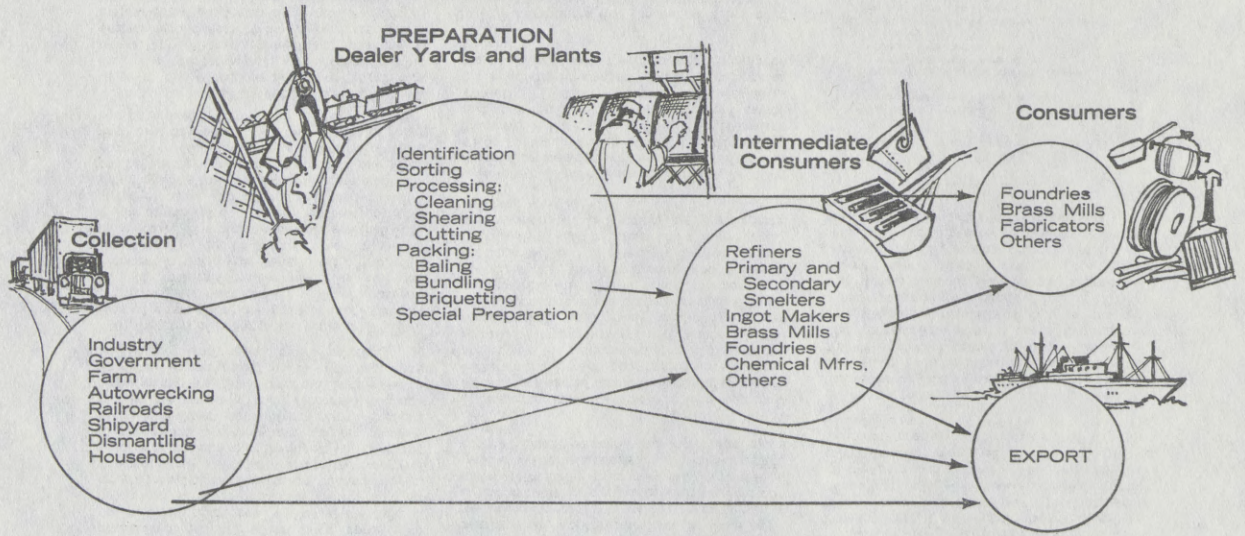
FLOW CHART OF NONFERROUS SCRAP METALS



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HOW NASMI CAN HELP CITY PLANNERS AND LOCAL GOVERNMENT OFFICIALS LEARN MORE ABOUT THE SECONDARY MATERIAL INDUSTRIES

Through facilities available at our Headquarters office in New York, NASMI can help you—City or State planners, local public officials, Government administrators—secure more information about the secondary material industries.

LITERATURE: "The Nonferrous Scrap Metal Industry."
"Air Pollution in the Secondary Metal Industry."
"Proper Material Handling Methods for Nonferrous Scrap."
"NF-66," "PS-66," "CS-65" Specifications for the industry.
"NASMI in the Sixties."

SPEAKERS BUREAU: Write for our pamphlet on the availability of speakers for local meetings, as sponsored by our National Public Relations Committee. Ask for our pamphlet "Toward a Better Understanding of the Secondary Materials Industry."

AIR POLLUTION: For more detailed information about the work of the secondary material industries in the field of air pollution, write to our National Air Pollution Committee.

URBAN RENEWAL: Copies of our booklet "The Secondary Material Industries in a Changing Urban Society" are available for inspection at our Headquarters office (booklet is out of print). For any specific information on zoning, licensing, beautifications, etc., write to Urban Renewal and Related Problems Committee of NASMI.

SOLID WASTES: For information regarding solid waste and the problems engendered by this technological challenge, write to NASMI.

All information can be secured through the above committees, by writing to:
NASMI, 330 Madison Avenue, New York, N. Y. 10017

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(Subsequent to his appearance Chairman Muskie sent the following letter to Mr. Mighdoll:)

APRIL 21, 1970.

Mr. M. J. MIGHDOLL,
Executive Vice President, National Association of Secondary Materials Industries, Inc., New York, N.Y.

DEAR MR. MIGHDOLL: I wish to express my appreciation to you for your testimony before the Subcommittee on Air and Water Pollution during recent hearings on pending solid waste legislation. Your statement will be useful to the Subcommittee in the formulation of legislation to deal with this critical environmental problem.

In addition to the information you have provided the Subcommittee, it would be helpful if you could provide an answer to the following questions:

A paper by Mr. J. S. Poliskin, the Supervisor of Raw Materials for Colt Industries comments that the "reuse of the steel in scrapped automobiles is hindered by the retention of copper in wire conductors and small motors which are costly to remove. Lower copper in the scrap can be achieved by using aluminum for the electrical conductor wiring and ceramic ferrite permanent magnets for the stators in small motors. During melting and refining of this scrap, the aluminum will oxidize and enter the slag, together with the ceramic oxides. The steel produced from this scrap will be low in copper."

Would this improve the technical and economic feasibility of recycling future junk automobiles?

Your early response to this request will be greatly appreciated.

Sincerely,

EDMUND S. MUSKIE,
Chairman, Subcommittee on Air and Water Pollution.

(Mr. Mighdoll's response follows:)

NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, INC.,
New York, N.Y., May 6, 1970.

Hon. EDMUND S. MUSKIE,
U.S. Senator, Chairman, Subcommittee on Air and Water Pollution, United States Senate, Washington, D.C.

DEAR SENATOR MUSKIE: Thank you for your letter of April 21 relative to our presentation before your Subcommittee on the pending solid waste legislation.

This will also serve to answer the question posed in your letter relative to the possible advantages of using aluminum instead of copper in wire conductors and small motors in automobiles to help assure a more efficient reclamation and recycling of steel scrap.

Needless to say, both copper and aluminum have specific metallic and technical characteristics that govern their use in the manufacture of conductors and motors and their successful adaptability to the automobile. It is probably oversimplifying the problem—and the ultimate solution—to think in terms of the eventual reclamation factor controlling the original raw material content or manufacturing technique of the product in question. The situation that has been cited in your letter is only one of a number of examples that could be used to illustrate the use of commodities in the manufacturing process—either for reasons of technology, economics or fashion—with little or no regard for the eventual recovery and utilization of these materials at the end of their use cycle.

In fact, there is a great need for research in this field so as to develop some coordination between product design and scrap (or solid waste) reclamation. There are many economic, technological and perhaps even psychological questions involved and we in this industry believe the time has arrived for encouraging consideration of recycling factors as a part of engineering and design technology.

Therefore, at this time, it is not possible to give a categorical response to the question raised in your letter. However, the separation technology in the scrap industry has vastly improved in recent years and, current economics generally enable an effective segregation of aluminum and copper items so as to preclude any meaningful contamination of a basic steel item. But the question of substituting one metallic for another in a particular manufactured product must receive much more study before any definite conclusions can be made.

Please be assured of our continued interest and desire to cooperate in any phases of solid waste utilization and recycling in which we can be helpful. I am enclosing a copy of the "Recycling Resources" kit which we recently produced to emphasize the role of solid waste utilization for effectively coping with environmental pollution.

Sincerely yours,

M. J. MIGHDOLL,
Executive Vice President.

ENVIRONMENTAL MANAGEMENT THROUGH SECONDARY MATERIALS UTILIZATION

NATIONAL ASSOCIATION OF SECONDARY MATERIAL INDUSTRIES, INC. / 330 MADISON AVENUE / NEW YORK, N.Y. 10017

RECYCLING RESOURCES FOR ENVIRONMENTAL MANAGEMENT

Recycling of materials can effectively control and conserve our environmental resources.

When one considers the prospect of mounting piles of solid wastes choking our cities, destroying the countryside, deteriorating the quality of life—it becomes apparent that only through maximum recycling of materials can we avert a major crisis in our environment.

Thousands of people in the secondary materials industry are already engaged in the reclamation and reutilization of materials which ordinarily would be discarded and added to the solid waste burden. Through economic expansion, research and technology, the industry has been able to achieve the recycling of more than 3,000,000 tons of nonferrous scrap metals annually back into the mainstream of production. It has been reclaiming over 11,000,000 tons of waste paper for productive industrial use. And it has been reusing substantial tonnages of textile wastes for the manufacture of new marketable items.

"Recycling Resources" is the industry's guideline. Through its vast efforts, the country is beautified, natural resources are conserved, virgin materials are left in the ground for future generations, and economically attractive raw materials made available to the economy.

It is dramatic to point out that for each ton of waste paper used, 17 trees do not have to be cut down. On the basis of the current consumption of paper stock, this means that we avert the destruction of 200,000,000 trees a year!

It is vital to note that five billion all-aluminum beverage cans are being manufactured annually. If they are simply discarded, we will have mountains of cans—as solid waste—to dispose of somewhere, but no one knows where. If an effort is made to reclaim and recycle the aluminum in these cans, we can effectively mitigate the problem.

Valuable resources are inherent in other consumer items—such as the large amounts of photographic and X-ray film which have been used and which may be thrown out for disposal. Recovery of important quantities of silver from such photographic film helps conserve silver as a natural resource.

More lead is produced from scrap than from mined ores, and nearly half of the copper products in the United States are manufactured from copper scrap. If these tonnages of scrap were not utilized—we would already have depleted our vast mineral resources in this country.

These are just a few sample illustrations of how recycling plays a vital role in conserving our resources. In its positive aspect, it emphasizes what kind of a world we might have, if efforts were intensified to achieve **maximum** recycling. A report recently prepared by the Senate Public Works Committee has put the entire problem succinctly:

> **"It is now evident that the industrial economy of the United States must undergo a shift from a use-and-discard approach to a closed cycle of use and salvage, reprocess and reuse... or else faces the alternative of a congested planet that has turned into a polluted trash heap, devoid of plant and animal life, depleted of minerals, with a climate intolerable to man."**

It is vividly apparent that current recycling efforts can be heightened and expanded immeasurably. Present recycling of aluminum is approximately 30%—this could be pushed much

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higher. Current reuse of lead and zinc scrap, of gold and silver scrap, of copper and nickel scrap—all can be widened considerably. And there are areas which haven't yet been touched: the Bureau of Mines, in its report on the utilization and stabilization of solid wastes, talks about the potential of extracting zinc from foundry dusts, recovering copper from dump leach solutions, and recovering additional values from copper and uranium mill wastes.

A major effort must be made in paper stock and in textile wastes to expand current recovery figures. The potential here is tremendous and the results could be unprecedented from a conservation factor. Imagine instead of constituting a 20% raw material factor, secondary paper were used in equal quantities with virgin pulp. The result: a "secondary forestland" of 500,000,000 trees—an area equivalent to all the New England states, New York, New Jersey, Pennsylvania, and Maryland.

But—and one of the big "buts" in the entire recycling program—is the fact that the very industry which has been reusing and reclaiming materials has been the victim of restrictions which have hampered its effective operations. These restrictions consist of municipal ordinances and regulations which have zoned out scrap plants (because they don't have "status" in the community) so that these plants have had difficulty in relocating. Other regulations have placed onerous administrative burdens or special taxation on scrap plants. The displacement of the industry has also been speeded by crash programs in urban planning and highway construction.

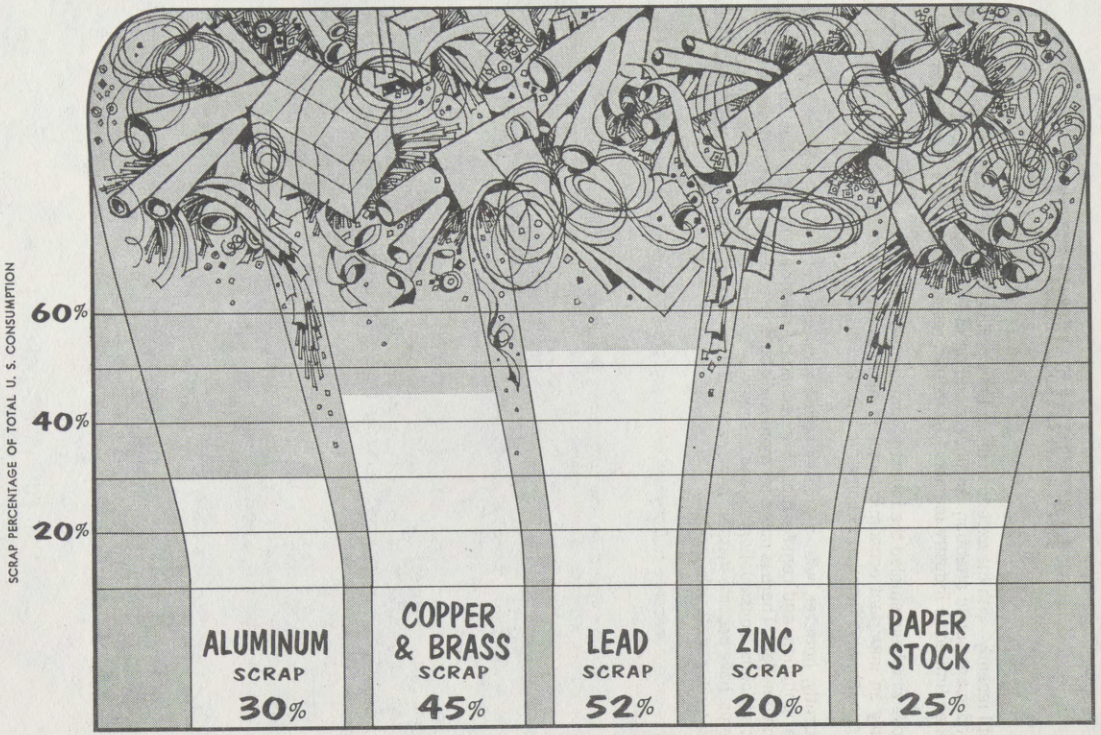
The United States is fortunate in having an organized secondary materials industry already deeply engaged in the process of recycling materials. The industry itself has already spent multi-millions of dollars on technological research—in the area of equipment to eliminate air pollution, in the area of reclaiming previously unsalvageable materials, in the area of finding new and effective ways to utilize the larger quantities of scrap our expanded economy is producing.

The secondary materials industry is the most effective instrument for the recycling of such materials back into industrial channels. But if it is restricted in its operations and not given government, industrial, and public encouragement it will lose the base of its manpower: the vast army of reclaimers who in every town collect the solid waste and recycle it to the consumers of this new resource—secondary materials. Government incentives, not impediments, are now called for.

"Recycling Resources" is more than a mere slogan. In today's world, in which the quality of the environment has become a major concern of our society, the recycling of resources——utilization—represents the most effective answer to the problem of waste disposal. The secondary materials industry, which for over five decades has been effectively reclaiming and utilizing materials, stands ready to meet the challenge of today—to achieve maximum recycling for the sake of our economy, our natural resources, our environment.

Solid waste utilization is the master key to environmental management.

Secondary Production Accounts for a Major Portion of Raw Material Supply



NASMI "RECYCLING RESOURCES"

PERSPECTIVE OF THE SECONDARY MATERIALS INDUSTRY

Until recently—with the exception of wartime periods—the secondary materials industry has enjoyed scant public attention. An understanding of the scope and functions of the industry has been limited to industry members, scientific researchers, and a few economists.

Those who have studied the industry immediately recognized that secondary materials are not only an important economic factor in national and international economics but, surprisingly enough, also function to conserve vital and strategic raw materials.

Recently, however, with a greater public awareness of the problems of ecology, environmental pollution, and conservation, the secondary materials industry has come increasingly into the limelight. There is now a far more realistic appreciation of this industry and its impact. Public officials, conservationists and community groups, in searching for solutions to these problems, have become increasingly aware of the concept of **RECYCLING RESOURCES** through the secondary materials industry.

In his recent message to Congress (February 10, 1970), proposing action against pollution, President Nixon said:

> **"As we look toward the long-range future—to 1980, 2000 and beyond—recycling of materials will become increasingly necessary not only for waste disposal but also to conserve resources... A great deal of our space research has been directed toward creating self-sustaining environments, in which people can live for long periods of time by reprocessing, recycling and re-using the same materials. We need to apply this kind of thinking more consciously and more broadly to our patterns of use and disposal of materials here on earth."**

The secondary materials industry represents this kind of thinking **in action.** Functioning in its normal pattern—collecting, identifying, processing, packing, and distributing secondary raw materials—the industry acts as an important conservation and economic factor. It has been often referred to as a "mine above ground." The Department of Defense's "Defense Scrap Yard Handbook" states:

> **"Conservation and reclamation of scrap are of the utmost importance in order to provide the necessary raw materials for the manufacture of essential military and civilian items. Secondary raw materials recovered from scrap provide a vast reservoir of hard-to-obtain materials."**

The historic Paley Report stated:

> **"The recovery of scrap in the secondary metal market is essential for the operation of the metal industry." This statement, which could equally apply to the paper stock and textile segments of the industry, illustrates that secondary materials are an integral and vital part of the entire raw materials supply.**

ECONOMIC IMPORTANCE

Statistics for the year 1968 (the last complete year available) give a cursory view of this nation's deepening dependence upon secondary materials and imports:

In the United States, secondary recovery of Nickel represents 31.7% **more than** the total domestic mine production for that metal; for Lead and Copper it is 15.3% and 1.1% more

than domestic mine production, respectively. Secondary recovery of Zinc and Aluminum represent almost ½ and ⅓ the total domestic mine production, respectively.

Secondary paper stock annually provides 25% of the total raw material supplied to producing mills. The reclamation and use of each ton of paper stock spares 17 full grown trees. Every ton of paper stock frees 3⅔ acres of forest land for some other productive use for one year. As one top industry official put it, "Any material that has gone through a portion of the normal life cycle from its source, refining, fabricating, has consumed a constantly increasing amount of labor, processing and transportation expense. The scrap industry is based upon the conservation of this value."

SOLID WASTE UTILIZATION

Correlative with the conservation aspect of the secondary materials industry is the effect of industry operations upon the crucial environmental problem of solid waste accumulation. For without the continuous and healthy operation of this industry, tens of millions of tons of textile, paper and metallic materials now being recycled and reused would accumulate as waste. This waste problem would be of such magnitude as to stagger the imagination. It would effectively suffocate our nation's streets and streams, making our everyday business and pleasure activities impossible.

To understand the true importance of solid waste utilization, all one need do is realize that of this nation's gross national product– now approaching the trillion dollar mark–8.4% is concerned with the production of items to **replace** industrial machinery, equipment, and consumer goods now in use. Much of this obsolete equipment becomes scrap. And this does not include the enormous quantities of material that become available in the manufacturing process itself. However, the secondary materials industry is constantly on the job of **recycling resources**—secondary materials. In fact, it is at both doors of the manufacturing cycle–providing increasing quantities of raw materials to be used in the growing manufacture of consumer products, and by purchasing the by-products of industry for processing and eventual reuse.

INDUSTRY PROFILE

With the growth of the industry and the increased demand for secondary raw materials, extensive expansion is taking place in the plant, equipment and laboratory facilities of industry firms. To keep pace with the handling of larger volumes of materials, to be able to properly process and package, to cope with the increased complexities of industrial by-products, and to guard against the contamination of these valuable materials–the industry has turned to the introduction of new and modernized equipment and technical systems.

Approximately 41% of Association* firms have multi-plant operations. (The average is over 2.5)

The "average" Association member employs—13.4 executive and supervisory employees and 77.5 plant workers. The "average" firm payroll is over $500,000.
More than half of the Association's firms have an annual gross sales in excess of $3,000,000 and the membership average approximates $10,000,000.

More than half of the Association's members value their capital investment in plant and equipment in excess of $500,000 and the average is $1,300,000. The total valuation placed on plant and equipment of just the Association's member firms is over $700,000,000.

Secondary materials move in international business. The flow of scrap metals, paper stock, textiles, rubber, plastics and other commodities plays a vital role in the economic growth and

*National Association of Secondary Material Industries, Inc.

stability of underdeveloped countries. Without these raw materials, many of these underdeveloped countries—lacking primary materials or the ability to pay for them—would suffer serious industrial handicaps. The larger nations of Europe and the Far East also are buyers of U.S.-generated scrap. As a result of this international trade, the U.S. also gains in balance of payments.

As the industry has grown and matured, so has its Association—NASMI. Now in its 58th consecutive year, NASMI not only continues with its many basic trade association activities, but also is concerned with such modern problems as solid waste utilization, air pollution control, and technological research.

Perhaps the late President John F. Kennedy said it best:

> **"...If any one word describes your industry it is 'resourcefulness'..."(Message to NASMI on its 50th Anniversary in 1963).**

STATISTICAL ABSTRACT

The secondary materials industry is more than a collection of companies with an annual gross volume in excess of $7 billion. It is a vital, well-organized economic force which provides an essential source of raw materials feeding practically all key industries comprising the nation's economy. It figures economically in the operations of practically all industrial concerns—both large and small. Here are just a few statistical highlights which dramatize the story:

> **Over 3,000,000 tons of nonferrous scrap metals are annually processed by dealers and consumed by smelters, refiners, and ingot makers in the U.S. This includes copper and brass scrap (1,500,000 tons); lead scrap (700,000 tons); aluminum scrap (700,000 tons); zinc scrap (225,000 tons); nickel base scrap (25,000 tons). In addition, scrap dealers and brokers handle substantial scrap metal which enters international trade; in 1964 about 225,000 tons, valued at over $100,000,000, were exported.**

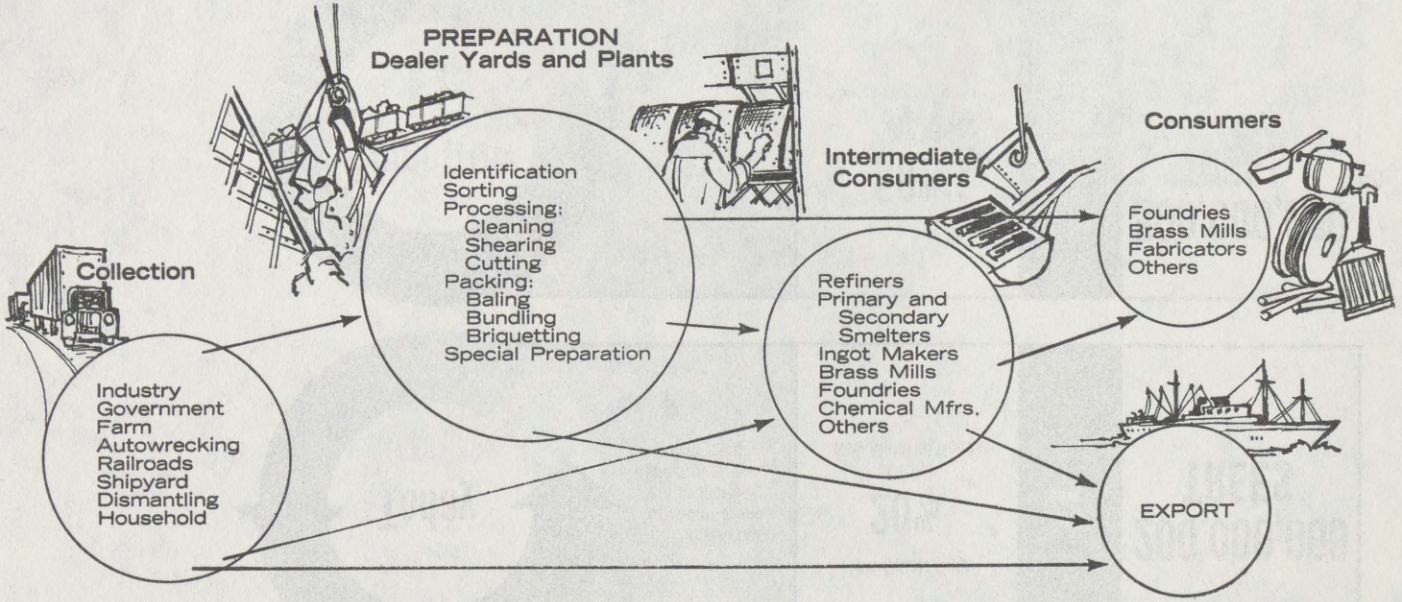
Scrap is a substantial percentage of the total raw material supply. Approximately 45% of the total available copper is recovered from scrap by the secondary material industry, as is 30% of all aluminum and 18% of all zinc. More than 50% of the total domestic lead supply is recovered from scrap.

> **Over 11,000,000 tons of paper stock is recovered and processed by the industry for the nation's paper, paperboard and building material mills. Paper stock represents almost one-fourth of the raw material supply of the paperboard industry.**

Textile secondary materials are an equally important factor to both domestic and international consumers. Annual sales of these commodities approximate $400,000,000.

NASMI's own business survey puts the plant and equipment investment by the Association's members at $700,000,000. The average investment is in excess of $1,300,000.

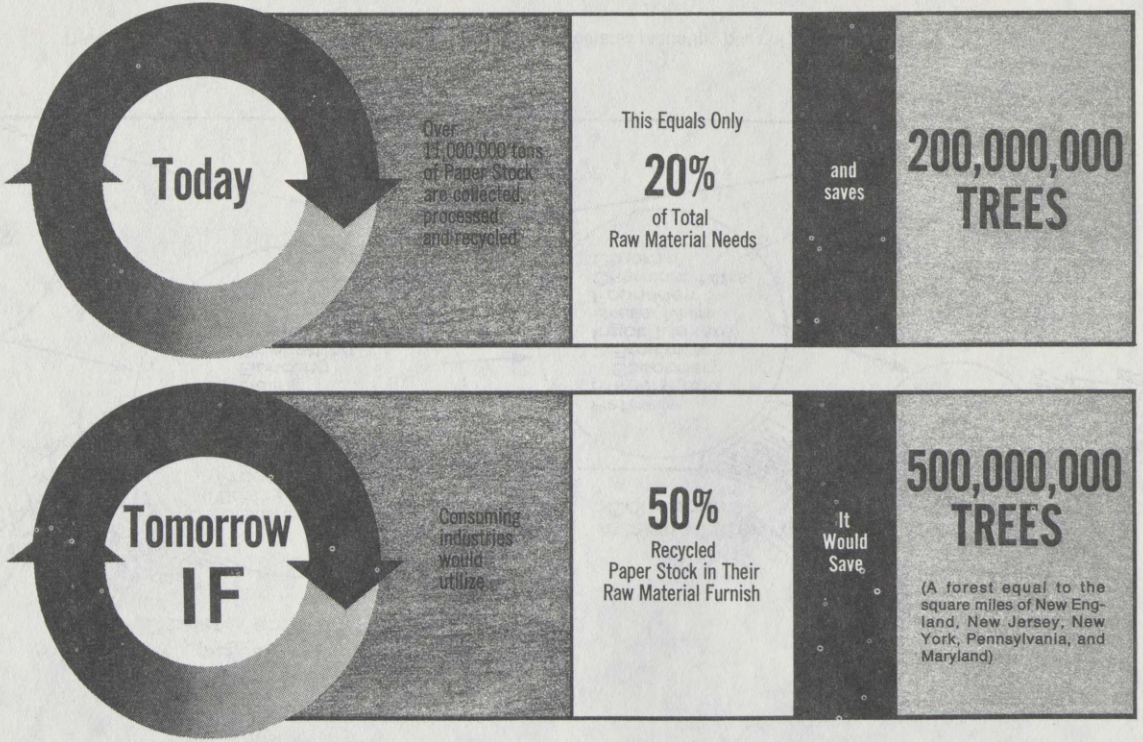
RECYCLING NONFERROUS SCRAP METALS



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

NASMI "RECYCLING RESOURCES"

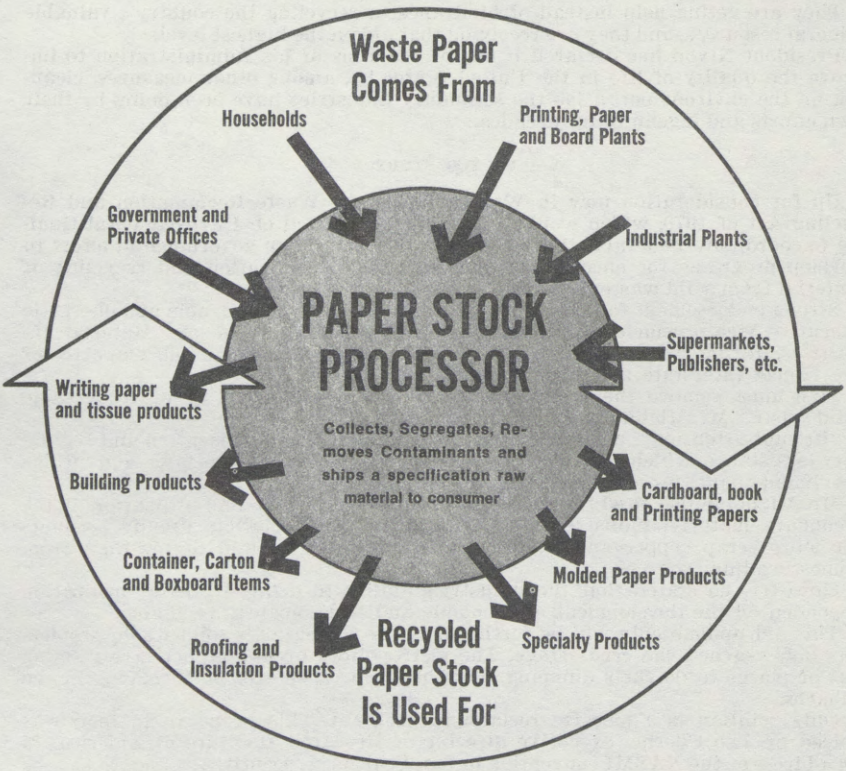
PAPER STOCK: SOLID WASTE RECYCLING – CONSERVATION IN ACTION



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.

NASMI "RECYCLING RESOURCES"

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"

[From American Metal Market, Apr. 8, 1970]

Secondary Industries May Get Long-Overdue Aid in Recycling

(By Ted Polansky)

The nation's secondary industries, often the victims of repressive legislation in the past, now find that the pendulum is beginning to swing in a more beneficial direction.

They are geting help instead of hindrance in recycling the country's valuable mineral resources, and they are receiving that aid on the highest level.

President Nixon has declared it one of the aims of his Administration to improve the quality of life in the United States by, among other measures, cleaning up the environment, a job the secondary industries have been doing by their own efforts and ingenuity for decades.

UP FOR STUDY

Up for consideration now in Washington is the Waste Reclamation and Recycling Act of 1970, which would authorize the Council on Environmental Quality to coordinate Federal activities and provide maximum governmental effort to develop programs for encouraging greater use of reclamation and recycling of material from solid waste.

Strong endorsement for the bill was given by M. J. Mighdoll, able and energetic executive vice president of the National Association of Secondary Material Industries, during recent hearings conducted on the measure by a subcommittee of the House Interstate and Foreign Commerce Committee.

"We must remove the restraints which inhibit the recycling of recoverable solid waste," Mr. Mighdoll advised the committee.

"Prompt attention," he added, "must be given to possible incentive and regulatory assistance which can enable the industry to recycle, reclaim and utilize maximum quantities of solid waste."

Mr. Mighdoll also cited the scope of solid waste recycling and utilization by the secondary material industries today, noting this reclamation already accounts for more scrap copper and lead consumption in the United States than from domestic mining sources.

However, he stated that the industry's ability to achieve greater utilization depended on the development of economic and technological assistance.

This aid undoubtedly will be forthcoming for the nation's solid waste problem has now reached the crisis stage. The metropolitan areas, for one, are running out of places to do their dumping. This headache soon will be throbbing in the suburbs.

Only solution is a massive reclaiming program. This proposal, in fact, was voiced by Leo Cherne, executive director of Research Institute of America, in an address at the NASMI convention in San Francisco recently.

MUST BE RECLAIMED

Mr. Cherne declared that almost all disposed materials must be reclaimed, recycled and utilized in the general economy if deterioration of the nation's environment is to be checked.

"One of the terrible urgencies which lie before us," Mr. Cherne said, "is to make our garbage disposable and destructible."

He pointed out, for example, that the nation cannot indefinitely add 60 billion one-way bottles and cans to its refuse pile.

"We must learn to recycle almost all of our material," he warned.

The secondary industries have been doing their utmost to recycle salvageable material, and doing it virtually on their own. Now they are going to get some help.

It's about time.

Some Background Information About NASMI

NASMI stands for the National Association of Secondary Material Industries, Inc. Its headquarters are at 330 Madison Avenue, New York, N.Y. 10017. (Telephone: (212) 867-7330). M. J. Mighdoll is executive vice president

NASMI was founded in 1913 and is now in its 58th year as a trade organization.

NASMI represents leading firms in the secondary material industries in such fields as nonferrous metals, paper stock, textiles, and international trade.

NASMI is the key trade association in the recycling field—its members reclaim and recover materials valued at $7 billion annually.

NASMI through many of its committees comes to grips with the fundamental problems of the environment. Its Solid Waste Utilization Committee has been in the forefront of the activity to expand the reutilization of solid waste; its Air Pollution Control Committee has been working with H.E.W. in studies in the field of secondary aluminum and secondary zinc pollution control; Its Aluminum Committee is seeking to develop methods and techniques for the recycling of aluminum cans; its Precious Metals Committee is working on the reclamation of precious metals from photographic film.

NASMI officers, members, staff have been active throughout the country in working with municipal, regional, State and Federal governmental agencies on problems of the environment. The Association has published a number of studies in the field of air pollution control and solid waste recycling.

NASMI specifications in the area of nonferrous scrap metals, paper stock, and textiles are internationally accepted and business is done all over the world on the basis of these specifications.

NASMI runs extensive information and education programs. It issues newsletters, bulletins, pamphlets, books, etc. A week-long Metals Seminar for younger executive members of the industry, this August at the University of Wisconsin, will include courses on environmental problems, including the recycling of raw materials. The Association's Paper Stock Institute has supported research aimed at the increased usage of paper stock by the paper and board mills.

NASMI through its Washington representatives, maintains a continuing liaison with Government officials and legislators in the nation's capital.

NASMI throughout the year conducts regional meetings, conferences, workshops and seminars. It sponsors an industrial technology show in conjunction with its annual convention.

...for on-the-spot information relating to
the recycling of materials

contact: Si Wakesberg
NASMI
330 Madison Avenue
New York, N.Y. 10017
867-7330

Senator MONTOYA. The subcommittee will be in recess until 10 o'clock tomorrow morning.

(Whereupon, at 12:50 p.m., the subcommittee recessed, to reconvene at 10 a.m., Wednesday, March 4, 1970.)

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