ABANDONED AND SCRAP AUTOMOBILES

William A. Vogely *

THE AUTOMOBILE has greatly changed life in the United States in the past 50 years. From a luxury in the early days which only a few could afford, the automobile today has become a necessity which brings many benefits to all of our people. It has brought us problems too, one of which is the problem of disposal of abandoned and scrap automobiles, and about which I wish to talk today.

The rate at which cars are being junked has become so great that the esthetic problem of unsightly "graveyards" and abandoned and rusting hulks is now a matter of public concern.

Old, neglected cars are very durable and difficult to conceal. Abandoned on the streets or on public or private property, they detract from the appearance of urban neighborhoods and the rural countryside. When gathered together in dumps or graveyards, they create an eyesore which, in recent years, has grown to the point where steps are being taken to control it in many communities.

From the national viewpoint, these vehicles, in the aggregate are a major raw material resource. They provide a source of millions of tons of remelted metals each year and hereby reduce the rate of depletion of nonrenewable mineral reserves. Automobile scrap has been processed and sold by the scrap metal industry for decades past, but in recent years this operation has not kept pace with the rate of accumulation of junked automobiles. Although the production of steel is at a record level, the use of scrap iron has declined substantially because of changes in steel technology.

The Bureau of Mines Survey

In order to provide basic factual information on the scope and size of the problem, the Bureau of Mines in 1965 made a fact-finding survey of the auto wrecking industry, the ferrous scrap processing industry and other elements pertinent to the problem. The primary objective was to identify the factors that influence the accumulation and movement of automobile scrap. Because of the desire to obtain reliable information as quickly as possible, and because the problem is not only complex, but also nationwide in scope, a sample surevy was made rather than a comprehensive mail

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canvass. Fifty-four districts representing a variety of urban, suburban and rural conditions throughout the United States were selected. These districts were classified into the following general categories: (1) urban areas with iron and steel based industrial economies; (2) urban areas with commercial or other than iron and steel economies; (3) suburban areas adjacent to each of the two types of urban areas just mentioned; (4) rural areas in proximity to industrial complexes, and (5) rural areas an appreciable distance from any urban economy.

In carrying out the survey, Bureau engineers interviewed 186 scrap processors and 1,075 auto wreckers throughout the country. Police, county and state officials also supplied comprehensive information on auto graveyards, abandoned cars, junk cars on private property, and local laws and regulations. The interview data were used to prepare a complete analysis and factual report on each study area.

The information obtained in the interviews was used to prepare a report titled *Automobile Disposal — A National Problem* which can now be purchased from the Government Printing Office. This report sets forth the factors which influence the movement of auto scrap from the auto wrecker, through the scrap processor and to the steel mill for use in the production of new steel. Major scrap consumers, brokers and trade associations provided significant information on technologic factors and their influence on the competitive position of automotive scrap relative to other types of steel scrap. Additional information on statutory regulations that affect scrap operations was obtained from officials of certain cities having more than 100,000 population.

A compilation of some of the vital statistics obtained in the survey indicated that the total population of the 54 areas surveyed was about 15.8 million, annual car registrations totaled 6.5 million, or 1 car to about every 2.5 people, and a total junk car inventory of 510,000 of which 73 percent was in auto wreckers' hands, the remainder being abandoned in auto graveyards and elsewhere and consequently outside the normal industrial flow. One of the most interesting facts uncovered was that the annual rate of acquisition of junk cars by the auto wreckers in the survey areas was only about 1.3 percent in excess of their rate of disposal to scrap processors. In other words, the junked autos which move into the industrial flow through the auto wreckers yard apparently are accumulating at a low rate.

Factors Causing the Accumulation of Junk Automobiles

There are many factors influencing the accumulation of junk automobiles and during the course of the Bureau survey, a list of over 80 such factors

was compiled. A given factor may be predominant in one area and relatively insignificant in another. Conditions vary so widely throughout the country that each area must be considered individually.

Before we review some of the more important causes of junk auto accumulation, let us pause for a moment and briefly review the process which takes a junked or abandoned car off the streets and through the auto wreckers yard until it disappears from public view. If an old car has been abandoned on a public street, the owner probably didn't leave the car's title in the glove compartment for the convenience of the police. In many jurisdictions, the junk car must be held for a period of time, usually from 30 to 90 days, while an attempt is made to locate the owner. Consequently a wrecker truck is called to haul it off to the police impounding lot, — at the expense of the local government, of course. After the waiting period is over and no owner has been found, the legal paper work of clearing the title must be completed and the car auctioned off at public auction or turned over to an auto wrecker. The latter often has a contract with the local government and gets paid to take the car away to his lot where he lines it up with all the other junked automobiles. That is where the general public usually sees it and where it may sit for more than a year, perhaps several years, before it is finally stripped of reusable parts or salvageable metals, such as the carburetor, starter, generator, battery, wheels, doors, radiator and radiator grill, bumpers, and so on. Once stripped, it is passed on to the scrap processor and finally out of public view.

Auto wreckers usually operate in one of two ways: (1) park the vehicles in yards and strip the parts as they are required for sale, or permit the customer to remove them; and, (2) strip the vehicles to the bare hulk immediately, and either place the parts in storage, or sell them to rebuilders or wholesale outlets, the stripped hulk being passed on to the scrap processor in a minimum of time. Economic factors such as the local demand for parts, inventory taxes, land values, storage space, and community pressures influence the method of operation. The size and location of the yard are of major concern to the operator and the cost of land usually is dependent on land utilization in the surrounding area. The expansion of a yard, the establishment of a new yard, or even the continued existence of a yard may often be subject to control by zoning ordinances. Rural areas usually have few restrictions pertaining to land use and in general rural land is relatively inexpensive and easily acquired.

Individual owners sell, give, or sometimes pay an auto wrecker to take a junk car. The transaction depends on the auto wrecker's appraisal of the

value of the car for reusable parts and on the prevailing prices for automotive scrap. Many wreckers dislike to take old model vehicles which have little or no parts value, and can only be resold as scrap. The preparation of a junked car for sale to a scrap processor often involves the stripping of copper wiring, copper radiator, generator and other copper containing items, removal of zinc die cast parts such as carburetor, door handles, and trim, the battery for recovery of lead, the nonmetal parts, and other similar items. In studying some of the technical problems of auto wrecking, the Salt Lake City Laboratory of the Bureau of Mines dismantled two typical vehicles to determine their metal content. To give you an example, a 1954 Chevrolet hulk yielded over 2,700 pounds of ferrous metal, 35 pounds of copper and copper alloys, 21 pounds of lead, 41 pounds of zinc alloys, 8 pounds of aluminum alloys, and 363 pounds of nonmetals.

Most of the combustible materials such as upholstery fabrics, plastics, rubber, grease, undercoating, fibreboard, felt and insulation on wiring are generally removed by burning in the open where no air pollution laws are in effect. Open burning is prohibited in many areas and consequently hulks must be transported outside of the restricted zone for burning. In some metropolitan areas processors have installed special incinerators but these installations are expensive and hand stripping may be the chosen method. However, hand stripping also is time consuming and consequently expensive and the stripped material must be trucked to a public dump, an incinerator or an open burning area for disposal.

An important element in vehicle disposition costs is transportation. An old car may be delivered to the auto wrecker by the owner under its own power or it may be towed behind another car or tow truck. The auto wrecker himself may purchase late model wrecks and haul them to his yard with his own equipment. Some large operators travel long distances using auto transport trailers and acquire six or seven vehicles on one trip.

The processor usually receives from one to seven hulks at a time from the wrecker by truck delivery depending upon the type of truck used. If the hulks have been flattened, as many as 20 or 30 can be loaded on a flatbed truck or trailer.

Independent collectors in some areas obtain junked autos from owners, municipal pounds and elsewhere and deliver them to the scrap processor, thereby providing an important service especially in areas where the auto wrecker refuses to accept older model vehicles.

Sometimes the collector will take stripped hulks from the auto wrecker's lot and deliver them to the scrap processors thereby providing transportation

facilities. The collector often will be required to haul the stripped hulk out of an area where burning is prohibited, and burn it elsewhere before delivering it to the processor. Occasionally it is necessary for the collector to flatten hulks for the shredder market especially when long-distance transportation is involved.

Such factors as the prevailing prices of scrap, availability of flatteners, transportation rates, and the existence of price allowances for long-distance shipments determine the distance that hulks can be transported.

Scrap processors sort scrap into various grades, cut or shred it into usable sizes and bail or press lighter gauge material into bundles of proper dimension and density. The processed scrap is sold either directly to the steel mills, to foundries or to brokers in carload lots.

Brokers usually handle the purchase of scrap by locating and supplying adequate quantities of scrap of the quailty needed by the steel mills. The mill determines whether the scrap is satisfactory and acceptable for remelting. The brokers also represent scrap processors in negotiations for any adjustments proposed by the mill.

Processed scrap is generally transported by rail, barge, or ship. The processors located far from consuming mills and foundries find themselves at a definite transportation cost disadvantage in competing with prices near the steel mills. The cost of transporting materials which compete with scrap such as pig iron, iron ore, and iron pellets also has an effect on scrap movement.

The legal framework within which the disposal of worn-out automobiles takes place has a strong influence on their movement and on disposal facilities. Many municipalities have regulations prohibiting the abandoning of automobiles on public property, but often times state laws are the only restrictions. Ordinarily no penalty is provided for leaving a vehicle on ones own private property, but occasionally abandonment on another persons' private property is prohibited. The mode of enforcement and penalties vary widely.

The zoning regulations applying to auto wreckers and scrap processors are many and varied. In urban areas operations usually are restricted to special industrialized zones. Some zoning regulations require fencing or camouflage for new operations and also for nonconforming establishments. New auto wrecking operations are prohibited in some urban areas and many cities limit expansion of current facilities while others require issuance of a permit by the zoning board. Auto wrecker and processor license fees are

required by some municipalities and charges may range from $10 to $650 a year depending upon yard size, inventory, or gross sales. Many cities have occasional or periodic inspection systems. In some cases restrictions are also placed on other nuisances such as dust, noise, air and water pollution.

Ordinances, laws and regulations in existence today contain many features which encourage the movement of automotive scrap. There is one deficiency in the legal framework which aids in the accumulation of junk cars and that is the fact that the owner of the vehicle usually can abandon his vehicle on his own property without penalty or financial expense. This problem is now being solved in some areas by enacting license requirements, abandonment penalties, by special provisions in zoning laws or by levying of personal property taxes on all automobiles in possession of the owner irrespective of their operating condition. A statutory requirement which places inescapable responsibility on the vehicle owner, whether a private citizen, operator of a wrecking yard, or scrap processor, and gives him an incentive to pay the cost of moving vehicles toward consumption as automotive scrap could effectively prevent the further accumulation of junk cars and could lead to the gradual reduction of the total inventory of junked vehicles in the nation.

The Bureau of Mines survey obtained data which can be used in a number of ways to estimate the magnitude and other characteristics of the national junk car problem. The survey indicated clearly that a large number of junk cars are in the United States, that they are widely distributed, that a large proportion is visible to the public and that the bulk of the inventory of junk cars is in the yards of auto wreckers and scrap processors. Estimates of the total number of junked cars in the United States vary widely and statements in the press from time to time have implied that the total may be of the order of 20 to 40 million. The Bureau of Mines Survey indicates that the number may not be that large. Based on the 54 representative areas surveyed, the figures indicate an average of 83 junk cars per 1,000 population in rural areas and 26 cars per 1,000 population in urban and suburban areas. If these figures are assumed to be valid nationally, the national total of junk cars approximates 9 million.

In summary, the evidence obtained in the case studies made by the Bureau of Mines indicates: (1) a large number of factors influence the accumulation of automobile scrap and conditions differ so greatly from area to area that the local influence of individual factors varies widely; (2) junk automobiles are being salvaged and remelted at a high rate, but there are many areas in which economic and technical factors are so disadvantageous

that movement of automotive scrap is being impeded; (3) price has a strong effect on the prompt movement of scrap from the automobile salvager to the ultimate consumer under present use patterns. Price of scrap also has an effect on the auto parts salvage industry in determining the payment at which the market for scrap becomes so attractive that the movement of autos in and out of the auto wreckers' yards is speeded up and the volume of vehicles that bypass the wrecker is increased. Distance from wrecker to processor which is reflected in transportation costs is a critical factor in this pricing situation. Higher scrap prices especially would stimulate the movement of vehicles having little or no used parts value; (4) changing technology is affecting the structure of the scrap processing industry itself particularly in the areas in which shredders have been built. Introduction of shears suitable for the production of automotive slab, and improved systems of stripping and baling automotive scrap also are having effects not only on industry structure, but also on markets. These methods are making available to the steel mills processed scrap with improved chemical qualities and in a variety of physical forms; (5) changes in automotive design and material specifications could have an effect on auto scrap accumulation rates. Commonly copper and other nonferrous metals contaminate iron and steel in a manner that renders them difficult and expensive to remove and tends to degrade the quality of ferrous automotive scrap; (6) the high scrappage rate and existing inventories of junked cars in wreckers and processors yards, auto graveyards and elsewhere continue to keep the disposal problem in the public eye. Junked cars cannot be eliminated from the scene, but almost complete utilization can be achieved and the esthetic problems reduced to a minimum. Existing laws and regulations or enforcement practices often permit the owner to abandon or neglect the disposal of his vehicle without penalty. This deficiency results in esthetic and public disposal problems. Statutory requirements that place financial responsibility for disposal of the vehicle on the owner provides an incentive to movement toward consumption as automotive scrap; (7) if consumption of the entire supply of junk vehicles is to be an objective of public policy, automotive scrap must be given competitive advantages over other types of ferrous scrap through price reduction, quality improvement, or development of new markets.

The automobile disposal problem is but one of the solid waste problems. I would like to take a moment to apprise you of other aspects of the work going forward in this area.

The Solid Waste Act of 1965 spelled out the scope of the activities of the Department of the Interior as follows:

"The Secretary shall conduct, and encourage, cooperate with, and render financial and other assistance to appropriate public authorities, agencies, and individuals in the conduct of, and promote the coordination of, research, investigation, experiments, training, demonstrations, surveys, and studies relating to the operation and financing of solid waste disposal programs, the development and application of new and improved methods of solid waste disposal and the reduction of the amount of such waste and unsalvageable waste materials." For Interior, this mandate relates to the problems of solid waste resulting from the extraction, processing, or utilization of minerals or fossil fuels where the generation, production, or reuse of such waste is or may be controlled within the extraction, processing, or utilization facility or facilities and where such control is a feature of the technology or economy of the operation of such facility or facilities.

In order to implement the intent of the Solid Waste Disposal Act the Department of the Interior, through the Bureau of Mines, has embarked on a two-pronged program. One is to define the solid waste problem and suggest some avenues of attack for solving the problem and the other is to conduct and stimulate research activities in an attempt to substantially reduce the mounting burden stemming from our society's propensity to generate solid waste.

By July 1968 we will have published a comparable study to the junked car, on solid waste generation from mining and processing activities. This effort will be a case study report which will highlight the major geographic locations with solid waste problems of this type.

Based on this latter effort, the Bureau has selected certain 'representative' problem areas and will, during this fiscal year, conduct an engineering-economic study to delineate more specifically the generation of solid waste from mining and processing operations and the costs involved in present disposal practices.

We expect, through such study efforts, to be able to suggest ways to minimize waste disposal environmental problems.

Many of you are aware of the efforts of Bureau scientists at our College Park Metallurgical Research Center who are searching for possible solutions to the problem of disposal of some 125 million tons of municipal refuse generated in the United States each year. Before beginning work on development of salvage methods for this refuse, it was necessary to know the composition of the residues. The immediate task was to establish reliable methods for sampling and analyzing these materials. This problem, which

was the initial phase of the College Park project, has now been completed with studies having been made on residues from five incinerators in metropolitan Washington, D.C.

The conclusions of this study were: (1) techniques used in these studies indicate that sampling of incinerator residues can be accomplished on a relatively small scale with good results; (2) glass constitutes the major fraction in all of the samples and averages about 44 percent by weight; (3) relatively large amounts of unburned paper in some residue samples, as much as 12 percent, points up the need for more efficient burning; (4) salvage of all metallic values in the residues, which averages nearly 30 percent by weight, could provide a source of revenue for municipalities and aid in conservation of our natural resources; (5) salvage would also reduce the volume of landfill required for disposal of the balance of the residues by as much as 50 percent. This would double the life expectancy of residue landfill sites and reduce haulage costs by half.

The Bureau is highly optimistic about a process that utilizes steel scrap in an entirely different manner. Chopped-up scrap is heated in a rotary kiln with nonmagnetic taconite — a material that previously has resisted treatment for recovery of its iron content. The iron in both the ore and the scrap is converted to a magnetic iron oxide which can be readily concentrated. At this stage, a conventional iron-oxide pellet can be made containing more than 63 percent iron, or another Bureau technique can be applied to yield a prereduced pellet with an iron content of more than 80 percent. By late 1968 a prototype plant will begin operation near the western end of the Mesabi Range to demonstrate the process. The plant will have a daily capacity of 600 tons of crude ore. A commercial processing plant turning out 5 million tons of high-grade ore concentrates a year would consume 600,000 tons of scrap.

The Solid Waste Disposal Act of 1965 further provides authority for Federal agencies to establish a contract and grant program. Section 204 of the Act permits the Department of the Interior to make grants to and contract with public or private agencies, institutions, and individuals for research, training projects, surveys, and demonstrations relating to solid waste disposal. With very modest funding the Bureau is operating these programs at a level of $600,000 per year.

Study grants totaling $395,000 have been made with the eleven universities. These studies range from the recovery of mineral constituents to how to make plants grow on piles of mill wastes.

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Five contracts, amounting to $212,000, have been executed covering research efforts ranging from developing a new technology of recovering fly ash from gases discharged from coal-fired electric power plants to a search for methods of converting red mud residues from aluminum processing into lightweight porous ceramics.

This brief outline should give you an insight into the range of interests the Department of the Interior has developed in solid waste disposal. We have barely scratched the surface. It has taken many generations for the problem of solid waste to reach national importance. It necessarily follows that it will take time and substantially more money to reduce this problem to a tolerable level.

Let me close by emphasizing that solid wastes are a very important factor in our resource base. We must recycle our resources if we are to meet the rising demands for materials as the world population grows and living standards rise. Junk cars are a resource. We must use them constructively.

LEGISLATIVE NEEDS FOR A METROPOLITAN SOLID WASTE DISPOSAL PROGRAM

John J. Bosley *

HISTORICALLY, solid waste collection and disposal in the Washington Metropolitan Area have been carried out by local jurisdictions and private firms. Because disposal of solid waste has been manageable at the local level, the necessity for cooperative endeavors between local governmental units has been minimal. But, in the last few years, the magnitude of the problem has reached crisis proportions in some jurisdictions and is becoming acute in others. Recognizing this, the Council of Governments (COG) in 1965 provided the major portion of local funds for a joint study with the Northern Virginia Regional Planning Commission and the Maryland-National Capital Park and Planning Commission on the metropolitan Washington solid waste disposal problem. A consultant was hired and the report is nearing completion. At this time it would be premature to cite any of the detailed findings and recommendations. It is certain to demonstrate, however, that the problem has metropolitan dimensions requiring the cooperative efforts of the local jurisdictions. In turn, this raises the question of developing an organizational arrangement under which such cooperative efforts could be adminstered. Morcover, the severity of the problem in the District of Columbia already has prompted it to request that coG investigate the feasibility of establishing an organizational entity to administer a regional solid waste disposal program.

Existing Legislative Authority

Federal and state legislation has been enacted which enables local jurisdictions in the Washington Metropolitan Area to enter into cooperative agreements for sewerage disposal and water supply purposes. And, the authorizations in these statutes have been used. For example, the District of Columbia has entered into agreements with numerous local jurisdictions for the treatment of sewerage at its Blue Plains Plant. Ironically, there was a Federal statute enacted in 1930 which authorizes the District to enter into agreements with neighboring jurisdictions for the disposal of their combustible solid waste in the D.C. incinerators. Of course, this is academic; the District's own needs are in excess of the capacity of its existing incinerators.

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Legislative Alternatives

While authorization for cooperative agreements in the functional areas mentioned above have been useful, such arrangements also have limitations. The disposal of solid waste is a good example. As we know, no existing methods of disposing of solid waste are wholly unobtrusive to a community. Local governments attempting to negotiate arrangements to alleviate their individual solid waste problems come under great pressures from local citizens. However, the pressures inherent in such piecemeal negotiations can be substantially reduced if there is a metropolitan plan and program for the disposal of solid waste. Such planning and programming places the problem in a broader context, and, therefore, ameliorates much of the local objections that might ordinarily arise.

But, is there an adequate legislative basis to implement a metropolitan solid waste plan and program? No unequivocal answer can be given to this question. The consultant's recommendations and the degree to which the local jurisdictions accept them for implementation will ultimately determine the nature and scope of any metropolitan solid waste program. And, although definitive legislative formula cannot be proposed at this time, we can make certain assumptions.

Initially, it must be recognized that the metropolitan aspects of the problem cannot be solved by existing legislation. The District of Columbia does not have Congressional authority to enter into agreements with other political jurisdictions for the disposal of its solid waste. Although Virginia has a joint exercise of power statute, it does not apply to jurisdictions outside the State. Maryland has no specific statutory provisions pertaining to extraterritorial solution of its solid waste problems. Under these circumstances, we must look for other mechanisms for dealing with the short range solid waste problems in the metropolitan area.

Such an interim mechanism could be the creation of a nonprofit corporation composed of the local governments of the metropolitan area. This agency could undertake a modest metropolitan solid waste disposal program. Of course, such an approach would be premised on the authority of local governments to enter into contracts with nongovernmental entities for services.

This would only be a temporary solution. The corporation would not have the financial capacity to undertake a substantial program since service charges would be its main source of revenue. This would severely limit its acquisition of capital equipment and its ability to obtain long range financing. Moreover, it would not have the power of eminent domain and

therefore could not acquire sufficient areas for landfill or incinerator operations. Nevertheless, this type of entity might provide a stopgap program if the situation warrants.

When substantial capital investment for metropolitan solid waste facilities becomes necessary, consideration will have to be given to legislation creating a metropolitan authority, probably by interstate compact. But, in my opinion, any proposed regional authority should not be established solely to solve the metropolitan solid waste problem. Rather, it should have responsibility for all of the metropolitan environmental health problems. And, we are all aware that solid waste disposal is only one facet of the total waste management problem confronting the metropolitan area. The solution of the solid waste problem must be directly related to the region's efforts to abate air and water pollution and to provide an adequate water supply. Furthermore, any compact legislation could not be enacted without consensus of agreement of the local governments and approval of Congress. Therefore, the structure, functions and powers of such an organization will be subject to debate and controversy. Obtaining a consensus on these questions will require lengthy negotiations. But I believe such complex negotiations could be facilitated by adhering to certain basic principles. Of paramount importance would be the recognition, from the outset, that such an interstate authority would be the joint agency of the local governments in the area. Its governing body should be composed of local elected officials from these governments and not state appointed officials. If it is structured in this manner, it can be the vehicle to implement the policies and plans developed by the local governments through their cooperative efforts in COG. To assure this, the compact authority and COG should have an interlocking directorate or the organizations should be merged. Such an organizational structure would assure to the maximum extent possible, that the agency's programs would be carried out in accordance with the needs and desires of the citizens of the metropolitan area.

As I have already indicated, this would be a delicate and arduous task. But this is the nature of the legislative process. It must embody the desires of the majority and protect the rights of the minority. To a limited extent, this process has already begun. The local elected officials participating in the Council of Governments are aware of and concerned with these environmental problems. The metropolitan solid waste study now underway and COG's preliminary investigations of the institutional requirements for implementation of a metropolitan solid waste program are concrete evidence of their desire to take affirmative action to solve such metropolitan environmental health problems.

OPEN DISCUSSION: PANEL A

Achilles M. Tuchtan, Panel Chairman*

MR. PHILIP B. HALL†: What are the immediate or relatively immediate prospects of solving the problems of scrap automobiles? Is there any thought being given to a regional facility or facilities to solve this very pressing problem?

MR. VOGELY: I'll tackle the first part of the question. The junk car problem is many things to many people. I think that the accumulation of scrap automobiles outside of the industrial stream will be solved over the period of the next few years by either better technologies or by local action in places where the problem is really acute. This will be done in the form that I indicated, that is, making the owner of the car responsible in some way for its disposal into the industrial stream. The handling, however, of scrap cars — the winning of the reusable parts and then the remelting of the scrap body itself — is a process that is industrial in nature and will never be beautiful. What must happen is that it gets confined to areas wherein such industrial processes are acceptable to the population as a whole. Thus, I think the problem will be solved. It will take a combination of technology and local effort. As far as regional compacts are concerned, I cannot address myself to that. Perhaps you can, Mr. Tuchtan.

MR. TUCHTAN: Well, I have a comment here from Dr. Jack Lentz who is on the staff of the Washington Council of Governments. He says, "Shredding and incineration plant in the planning stage in Baltimore reported to be able to handle 2,500 cars a day." and COG's Regional Sanitary Advisory Board is investigating this and other techniques with the objective of adding to the best possible technology, the political mechanism to provide a region-wide approach. We are now in the studying stages.

MR. VOGELY: Yes, most of the scrap cars from Washington now flow to Baltimore, and if you improve the scrap processing facilities there you provide an outlet. This still doesn't solve the problem of the car that's abandoned on private property that never gets into the industrial stream.

MR. TUCHTAN: That is true. I know that in the jurisdiction from which I come — the city of Rockville — we have an ordinance regarding

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this problem. We have made it very clear, for example, to our citizens that we will remove gladly all vehicles that are abandoned on their property. It costs us, but from the health welfare and sanitation points of view, we want to do it, and have so advised them in a newsletter. That doesn't mean we're inviting everybody here to come out and leave junk cars on our city streets or lots.

ANONYMOUS: Does GSA refer to the method of solid waste disposal in solid waste collection contracts?

MR. EASTMAN: I believe that question is directed at the end act of disposal of the material that is collected by any contractor. If that is the intended question, we do not speak to the method in which solid wastes are disposed. Presumably, any contracting firm licensed to collect waste material must have a satisfactory means of disposing of that material. Possibly it's not satisfactory in light of the present acts of today. Maybe it's using Kenilworth Dump. But we do not speak in our contracts to the method of disposing those materials that are collected by contracting companies.

MR. PHILIP B. WISMAN*: Have you considered the alternative to landfills and incineration namely the recently perfected commercial composting method sponsored by waste conversion science foundation? They have units to handle 500 tons per day. This involves no landfills, no air pollution. Why not look into it, especially in view of the impending world shortage of fertilizer?

MR. BREMSER: Let me say 'yes.' We have looked into this, and as a small-scale operation, it's quite feasible. But to compost the refuse produced by upwards of 2 million people creates a very large marketing problem with what you do with a compost once you have it.

MR. ALEX F. PERGE†: Is there a rule of thumb figure for landfill needs per population unit, such as acre-feet per 10,000 people?

MR. H. LANIER HICKMAN, JR.‡: One acre per 10,000 population per year per 8-foot layer of fill. Has anyone considered a separate collection, say once a month of only newspapers for possible reuse?

MR. EASTMAN: I commented on that with respect to the collection of saleable paper. The government does segregate paper that is resaleable and that would be bond paper, letter paper; there would be paper that is scrap

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from printing processes, high-grade paper; it would be IBM cards used in the numerous data processing centers that are no longer required. These are all collected, segregated, filled, and sold to paper people for reuse purposes. I don't know whether that goes far enough to answer the question.

MR. TUCHTAN: Rockville has a program whereby all of our refuse is picked up in the backyard. We find that our citizens don't like to carry their garbage cans to the curb. We do not tell them what to put in those cans. They put anything of a refuse nature that goes into a garbage can. However, we do have a once a month repickup of anything they cannot dispose of. And that includes refrigerators, washing machines, springs, and mattresses, and what have you. And it's a service that the city renders to its citizens. I would say that if our community — the one I live in — is any example, if you were to ask the citizens to segregate and separate out their refuse, we would have a rough time on our hands. I wouldn't be standing here; I wouldn't be elected I can assure you. So, I think this is one of the problems we would have to consider, it's perhaps of a political nature, but people don't want to be pinned down to sorting their refuse.

FRANCIS A. GOVAN*: "Good incinerator sites are hard to find today and should be bought quickly." That's a quote of yours. Does the site selection criteria require the possibility of heat conversion plans as used in Europe and proposed in the U.S.A.?

MR. BREMSER: Not necessarily, the criteria for incinerator sites are basically that they be in a neighborhood where they're not offensive. This means generally a heavy industrial type neighborhood with access by highways, and streets in which heavy truck traffic is not offensive. These considerations are the most important issues. But a location where steam may be sold certainly should be a consideration.

MRS. E. JONES†: Is another interstate joint agency necessary to administer solid waste disposal? Isn't COG set up to function in this area now?

MR. BOSLEY: The determination of whether you would need additional institutional arrangements for implementation of programs for solid waste disposal largely will be determined by the type of regional program that is agreed upon. Certainly if the program is right to require large capital investment and the power of eminent domain, a metropolitan agency having a legislative basis will be required. This does not, in any way, indicate that the organization must be another special-purpose agency. If we have to

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consider a formal interstate organizationual arrangement, I believe that this region has reached the point where it must consider not only the solid waste disposal problem, but the other Metropolitan area problems that might in the future require some sort of organizational arrangement to effectively solve them. What I am really saying is that if we have to go to an organizational structure, let's go to the optimum one. Develop one that is going to reflect the needs of the region. We should establish an organizational structure complementary and supplementary to the local government activity in the region, not one which would compete with the local government. These are the decisions that we must consider in the next several months. It would be premature at this time to say that we must have an interstate compact agency because we just don't know; we don't know definitely what can be agreed upon to solve metropolitan-wide programs such as solid waste disposal. And until that is determined, we will not be able to establish any criteria or suggestions with regard to organizational structure for the carrying out of such programs.

ANONYMOUS: . . . Can the District of Columbia participate?

MR. BOSLEY: Well, there is some precedence for this. In 1958 and '59, there was a joint committee of the Congress, House and Senate, that studied Metropolitan affairs and problems in the Washington Area. Portions of recommendations of this committee, were enacted into law. One of the recommendations established was the Washington Metropolitan Regional Development Act. This legislation states that it is the policy of the United States Congress to encourage the District of Columbia and Federal departments and agencies to act in concert and to work together with the local governments in the Metropolitan area for unified solutions to those problems which are regional in scope. Further, it sets forth certain priorities that should be considered. Among priority items delineated is the solid and liquid waste disposal problem. The second recommendation of the joint committee concerned the development of a rapid rail transit authority for this region. Of course, this has come to fruition with the establishment of the Washington Metropolitan Area Transit Authority. The legislative authority to establish this agency — The National Capital Transportation Act of 1960 admonished that in negotiation of the compact other metropolitan problems requiring a unified approach to their solution should be studied. This was a recognition in effect, of the need for the District to participate in an organization having more than transit powers. I think it is significant here to indicate that the Washington Metropolitan Area Transit Compact (WMATA) also sets a precedent that justifies some of the suggestions that

I've made here today. For example, Congress permitted deviation from the normal compact organizational structure. The governing body of WMATA is not composed of individuals appointed by the governors of the States. Instead, the compact recognizes that the decision making process for this metropolitan region should incorporate the people that live within this area. Therefore, the compact specifically provides for the participation of the District Commissioners and the locally elected officials from Virginia and Maryland are its governing body. Consequently, there is ample precedence for the District's participation.

The more important questions really concern the type of structure which might be suggested and what its duties, powers, and responsibilities would be. Naturally there is bound to be a great deal of debate and dialogue on this issue. But I think that there's no doubt that back in 1960 Congress envisioned that there would be conditions requiring the District to participate in a joint agency with other local governments in this area to solve metropolitan problems.

MR. MICHAELS: Do you have information on the cost of installing air pollution controls in existing office building incinerators?

MR. EASTMAN: I do not have offhand, but I mentioned the fact that 18 of our incinerators have been surveyed to ascertain what corrective measures must be taken. Generally the measure will consist of water scrubbers. I do not recall what this will cost to accomplish. I have that information in the office. I do not have it readily at hand here.

MR. TUCHTAN: I believe that your study on this, too, Mr. Eastman, is in connection with the District of Columbia's efforts to pass an air pollution control ordinance.

MR. EASTMAN: That is correct.

MR. TUCHTAN: We have two jurisdictions in this area which have had ordinances. The District is working on it, and seven others are now in the developing stage. So of the 15 participating jurisdictions in the Council of Governments we hope that certainly by the start of the next year we will have standardized our air pollution control ordinances in the region and have a region-wide program in effect.

MRS. E. JONES: In your opinion, is the air pollution bill passed by the Senate yesterday sufficiently comprehensive and enforceable to have real and/or immediate impact nationally? Is the House favorably disposed towards its passing?

MR. MIDDLETON: The Senate action represents a significant step forward, adopting, in essence, the Administration proposal on the Air Quality Act of 1967. I'm hopeful that passage in the House will allow us to proceed further in cleaning up the air in the United States.

MR. FREDERICK A. MORAN*: He's from Baltimore, and this is concerning burning stumps as "the cheapest method of disposal of stumps is burning" according to Mr. Bremser. This creates a spirit of mutual harassment between land developers and residential neighbors. If open burning were more closely controlled, what is the speaker's opinion of the ready use of other than the 'cheapest method,' i.e. mobile mechanical cutters and so on?

MR. BINNEWIES: I'm not sure I quite understand . . . I think that the emphasis of the question is why not the use of mobile mechanical cutters rather than the burning of stumps as the cheapest method of disposal. Did I interpret the question correctly? . . . We do use cutters quite a bit. The thing that I referred to particularly was the disposal of stumps from the Dutch Elm disease. We just about have to do this by burning, because if you distribute the wood by chipping or anyway like that, there's a very high danger of infecting other trees. In other cases of stump disposal, you can use chippers. As a matter of economics, it takes a while to chip up a stump; they're full of cross-grain, you know, and not very easy to get rid of, but it can be done. It takes longer than just to haul them out to a dump and throw them on a pile and eventually burn them up. They are usually not suitable for campground wood; the difficulty in splitting generally makes them not desirable. Stumps are probably the toughest part of the tree to dispose of.

FROM THE FLOOR: I wonder whether one of the panel would address himself to the problems of disposal of demolition debris.

MR. EASTMAN: I can only refer very briefly to this type of material as far as our program is concerned. I will allude to that accumulation of debris resulting from construction of our own forces which would constitute such items as plaster, wallboard, bricks, mortar, etc. This is the type of debris that we collect and then must contract with some contracting company to dispose of. Presumably this same contracting firm has some permit for disposing of these unburnable items in a suitable sanitary landfill area. With respect to major demolition, we let a contract whereby a wrecking company agrees to demolish and dispose of any of the demolished items he accumulates through that process.

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Again, our contracts do not speak to how a contractor will dispose of these materials. Maybe, this is something that we should speak to in terms of the overall problem. However, it has not been our practice within the demolition contract to specify the ultimate method of disposing of those materials.

MR. BREMSER: The normal practice, of course, is to take the demolition material which consists of lumber and broken concrete, brick, glass, and everything else generally knocked down by a headache ball and pushed over by a bulldozer and load it onto a truck and dump it somewhere. It's not a practical matter from the demolition contractor's point of view to try to separate the materials. If the material is from, say, a frame house and basically combustible, there is no reason why if you had a large-scale shredding installation, you could not put this material through a shredder and burn it in a normal incineration plant. Barring this, about the only thing to do with it is to burn it in the open. You may know that in Detroit, they have built some incinerators within the last few years specifically for the purpose of burning brush and tree debris and this sort of thing. There's no reason why this type of incinerator which provides a long retention time could not be used to handle basically combustible demolition debris.

MR. TUCHTAN: The Council of Government's model air pollution ordinance has a provision pertinent to demolition debris. I think the City of Rockville and Montgomery County employ this provision for construction of new structures. For example in housing areas where a developer comes in and builds a number of homes, open burning is a permitted but controlled practice. Scrap lumber and stumps can be burned on site. The control is applied to the kind of fire. For example there is the direct prohibition to the use of tires as a source of heat. An open burning permit is required.

We must also recognize that we cannot stand in the way of certain normal business or construction practices which in themselves do not create an air pollution problem of any magnitude. So we should permit business to be able to operate in those instances, such as construction where open burning can be undertaken without any material increase in air pollution.

The problem in air pollution is to tackle it at the greatest source, and the burning of stumps is a very minor one.

MR. G. DERRICKSON*: This is on the subject of junk and abandoned motor vehicle problems. I should like to supplement Dr. Vogely's statement

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by calling the attention of this conference to the publication of two valuable reports in this area by the Business and Defense Services Administration, U.S. Department of Commerce as follows:

1. *Iron and steel scrap, consumption problems.* Business and Defense Services Administration. U. S. Dept. of Commerce, Washington, D.C., 1966, 52 p.
2. *Motor vehicle abandonment in the U. S. urban areas.* Business and Defense Services Administration. U. S. Dept. of Commerce, Washington, D.C., 1967, 51 p.

TRANSPORTATION SYSTEMS

Robert D. Bugher *

WASTE DISPOSAL has been with man throughout his history. Every human existence produces waste and man's attitude throughout the ages has been:

(a) to get away from it as far as possible, "to take it down the road," or

(b) to change it into forms which are not objectionable.

Thus waste disposal involves both transformation and transport of refuse.

The subject of this presentation concerning the utilization of transport systems deals only with one of the two very basic approaches to waste disposal. Waste transformation processes are discussed in other papers concerning waste reduction, incineration, composting and waste recycling opportunities. It must be recognized, however, that waste handling and disposal technologies are intimately related and that transportation is a key element of virtually all waste removal systems. Thus, to establish a framework for this presentation, it might be stated that efficient waste removal requires a tailor-made integration of both: (a) the waste collection and disposal efforts, and (b) the transportation system.

One cannot talk about a transportation system for solid wastes without consideration of the happenings at the point-of-waste origin. Both the type and quantities of waste are of concern. On-site reduction of solid wastes through home incineration, grinding, or pulping and salvage might reduce the quantities drastically.

Furthermore, the transportation system actually begins at the point of the waste origin. The waste originator is already part of the system if he must bring his garbage can to the curbside at a given time which corresponds to the collection schedules. Costs increase drastically — up to 50 percent in time per pickup stop, if the collection crews must get the cans from backyard storing places or out of garages. To reduce the handling and transportation costs at the point of origin it has become advantageous for some locations to use disposable paper sacks instead of the metal or plastic garbage can. Paper sacks are light weight, necessitate only a one way pickup trip, prevent the wastes from being blown around by high winds, reduce noise, and provide for an improvment in sanitary procedures. Paper sacks currently are sold at about 8 to 12 cents each with about a 3.5 cubic foot

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capacity. Some European countries, including Sweden, Denmark and Great Britain have begun to experiment with compression devices particularly in apartment buildings to increase the quantity of refuse that is fed into the sacks.

On the other hand, disposal efforts are of equal importance for the establishment of tailor-made transportation systems. Acceptable incineration placed in strategic locations will reduce or eliminate long distance hauling; effective composting, in turn, might require long distance hauling to be beneficial to areas where the basic soil needs improvement before fertilizers can be used with maximum advantage. In looking at waste disposal systems and their transportation elements it must be recognized that relative insufficiencies in one building block of the system may be more than offset through advantages gained by other considerations.

Historically, all means of transportation have been used for the removal of man's waste. At one time people carried the wastes or used slaves to remove it from the immediate environment. Waste also has been transported on horse back, by horse and wagon, by ship, by rail, by car and by truck. Improvements in transportation technology usually led to an improvement in the waste handling methods. The size of waste collection trucks, for example, has increased from 9 cubic yards in the 1920's or 1930's to up to 50-cubic-yard vehicles experimented with today which are equipped to empty and load heavy containers automatically.

It is estimated that currently about 40,000 vehicles are used exclusively in the United States for the collection of solid wastes. These vehicles represent an investment value of about $400 million. Refuse collection trucks, varying in size from 10 to 30 cubic yards can cost anywhere from $10,000 to $30,000 per unit. In addition, equipment storage and maintenance facilities amount to about 12 percent or $48 million of the mobile equipment value according to a recent APWA survey.

There are several different types of collection trucks in use at the present time. The increase in the quantity of paper wastes and the decrease in ashes has resulted in a high-volume low-density refuse which lends itself readily to compaction. Rubbish may be as light as 200 lbs per cubic yard while garbage or ashes may weigh more than 1,000 lbs a cubic yard. The 18-cubic-yard to 20-cubic-yard capacity vehicles are the most popular ones today. There are several different types of compaction trucks in use including: (a) rear loading hopper type bodies which use either a single blade or a flight conveyor for sweeping refuse into the body; (b) a side

loading unit in a rectangular or cylindrical body which uses a movable hydraulic bulkhead for both compaction and ejection; and, (c) a special container collection vehicle which is a top loading unit which uses the movable bulkhead for compaction and ejection.

The cost per ton of refuse collected varies, of course, considerably, depending upon local wage rates, equipment cost, collection policies, the spatial distribution of pickups and the respective refuse amounts, traffic density on streets used by the collection trucks and the route and haul distances. Costs per ton of refuse are quoted from $3.90 to about $14.00 for normal combined refuse excluding bulk objects.

Unfortunately, waste disposal has always been saddled with considerable socio economic burdens. Being at best a nuisance, waste disposal had to make do with absolute minimum amounts of money, manpower, and equipment. As a result waste disposal frequently has been and in some instances is still handled in a rather pedestrian manner.

Solid waste disposal in the United States today is estimated to represent a $3-billion industry with about 70 to 75 percent of that amount spent on waste transport alone. Furthermore, the total production of solid wastes calculated on a per capita basis has grown from 2 lbs per capita per day in the 1920's to more than 4 lbs per capita per day today. It is estimated to grow at an annual rate of about 4 percent. It appears already safe to say that in the near future, on the average, nearly 1 ton of solid wastes per person per year must be collected and disposed of. Also, while our environment once was capable of absorbing and digesting all of man's wastes, it is no longer able to do so. Environmental pollution has become a major threat to all urbanized settlements. Yet the task and challenge of waste disposal still will continue to grow.

The population of the United States is expected to double by the year 2000. It is forecast that much of this explosive growth will take place in urbanized areas, such as Washington, D.C. Coupled with an increase in industrial and commercial activities as well as the direct per capita consumption, such growth will result in staggering problems for solid waste disposal and management. Considering the amounts of solid wastes involved plus the spatial concentration of the waste generation, it becomes obvious that solid waste management involves most operating factors generally found in mass production, mass transportation and mass service. This "mass" aspect of waste removal activities requires that well and thoroughly developed system approaches be used to handle the removal in an adequate, efficient and economical manner.

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