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THE SOLID WASTE DILEMMA: AN AGENDA FOR ACTION

Final Report of the Municipal Solid Waste Task Force
Office of Solid Waste
U.S. Environmental Protection Agency

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Americans produce more and more solid waste each year; we generate more per capita than any other nation. But, at the same time that we generate more waste, we are running out of places to dispose of it. Landfill capacity in some places is almost filled to the saturation point, and solid waste facilities continue to be difficult to site because of public resistance, commonly known as the "Not In My Backyard" (NIMBY) syndrome. Public resistance is often based on environmental concerns, unpleasant smells, noise, and truck traffic. Public resistance is not limited to landfills and combustors. Even materials recovery facilities and recycling centers can be difficult to site. (The feckless voyage of the "garbage barge" in 1987 and the ash barges last year have become national symbols of America's solid waste dilemma).

Although solid waste management is primarily a local responsibility, the problem is national in scope, and we need a national strategy to solve it. In response to this burgeoning problem, EPA created a Municipal Solid Waste Task Force in February 1988 and directed it to fashion a strategy for improving the nation's management of municipal solid waste. The following report was developed after extensive public input and consultation with a variety of knowledgeable groups and individuals.

The Agenda for Action offers a number of concrete suggestions for action by not only EPA, but also government at all levels, industry, and private citizens. This Agenda cannot be accomplished by government acting alone. Its accomplishment is contingent on a strong partnership among government, industry and the public. It calls for a "systems" approach to managing municipal solid waste; that is, the complementary use of source reduction, recycling, combustion and landfills to

comprehensively manage municipal solid waste. It also underscores the need for a fundamental change in the nation's approach to producing, packaging and disposing of consumer goods. In the past, "business as usual" meant an accelerating trend toward disposable products, convenience packaging, and an "out-of-sight, out-of-mind" attitude toward solid waste. As a nation, we can no longer afford this kind of "business as usual." We must adopt a new solid waste management ethic that minimizes the amount and toxicity of waste created by the products we make and purchase, produced during the manufacturing process, and generated by our day-to-day activities as consumers. That ethic must also maximize the amount of waste materials that are reused and recycled so that we achieve a fully integrated system for waste management. In short, we need to change the way we do business. This change will not be easy, but if we work diligently together, we will achieve our goal. I hope this report will serve as a centerpiece for this change.

The Agency is very encouraged by the strong support for the Agenda for Action that was expressed by states, localities, public interest groups, the waste management industry and the manufacturing industries. This support shows a real commitment to implementing the Agenda for Action. Based upon public comments, the Agenda has been modified somewhat. The most noteworthy changes are:

- To meet our 25 percent source reduction/recycling goal by 1992, greater emphasis is placed on composting. Development of quality guidelines and standards or guidelines for operation of compost facilities are also planned.

- No specific source reduction/recycling goal is established beyond 1992; however, the Agency anticipates that the 25 percent level will be exceeded, as capital equipment comes on-line for recycling various commodities, including paper.

- The goal for source reduction is articulated more clearly to indicate that we should reverse the ever-increasing per capita generation of garbage.

- More emphasis is placed on a "systems" approach to waste management, since meeting a 25 percent recycling and reduction goal still leaves 75 percent of the waste stream to be managed.

- Household hazardous waste (HHW) issues are noted in more detail and are included in the source reduction activities section.

- The need for better communication by states and localities to enhance siting is discussed, and EPA's communications experts are committed to working on this issue.

Finally, several changes to the schedules have been made, to reflect public comments and other factors.

--J. Winston Porter
Assistant Administrator
Solid Waste and
Emergency Response

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EXECUTIVE SUMMARY

This report is about what the government calls municipal solid waste, and almost everyone else calls garbage. As a nation, we generated about 160 million tons of solid waste last year; by the year 2000, we are projected to generate 190 million tons. This report is about how we should handle this outflow of refuse - the cans, the bottles, the leaves and lawn clippings, the paper and plastic packages, the broken furniture and appliances, the uneaten food and the old tires. This deluge of garbage is growing steadily and we must find ways to manage it safely and effectively. Eighty percent of garbage is landfilled. But we're running out of space to bury it in existing landfills; more than one third of the nation's landfills will be full within the next few years and many cities are unable to find enough acceptable sites for new landfills or new combustors. To eliminate this growing capacity gap, all levels of government, the public and industry must forge a new alliance to develop and implement integrated systems for solid waste management.

This report presents the goals and recommendations for action by EPA, state and local government, industry and private citizens to address the municipal solid waste management problems that are facing this country. These goals and recommendations are the result of the efforts of EPA's recently created Municipal Solid Waste Task Force. The Task Force gathered existing data on municipal waste and problems regarding its management, solicited input from interested persons and groups, held public meetings and developed a number of options to address these problems. This summary data is contained in a supplemental document titled "Background Document for the Solid Waste Dilemma: An Agenda for Action."

The types and extent of the problem in managing municipal solid waste vary from region to region depending on waste type, land use and demographic characteristics, but some trends and problems are clearly national in scope. From 1960 to 1988, we generated more waste every year, both in total tonnage and in pounds per person, and

this trend is projected to continue. In addition, we are running out of places to put our waste because old landfills are closing and few new landfills and combustors are able to be sited and built. There are concerns about potential threats to human health and the environment from combustor emissions and ash, from landfill emissions, leachate, and litter. High costs are borne by the waste generator and handler, as many areas of the country resort to shipping waste long distances by truck and rail to areas with available landfill or combustor capacity. Recycling, although a waste management technique popular with the public, is used currently to manage only 10 percent of our nation's waste, and is successful only when participation in separation and collection is high and market prices for secondary materials are favorable. Siting of recycling facilities is also becoming more difficult. Finally, manufacturers of products have no direct incentive to design products for effective waste management because they are not usually directly responsible for the ultimate costs of waste management. Similarly, most consumers do not have a direct economic incentive to throw away less, because they are not usually charged based on the amount they throw away.

This report recommends using "integrated waste management" systems to solve municipal solid waste generation and management problems at the local, regional, and national levels. In this holistic approach, systems are designed so that some or all of the four waste management options (source reduction, recycling, combustion and landfills) are used as a complement to one another to safely and efficiently manage municipal solid waste. The system is "custom designed" to meet local environmental, economic and institutional needs. A key element of integrated waste management is the hierarchy, which favors source reduction (including reuse) to first decrease the volume and toxicity and increase the useful life of products in order to reduce the volume and toxicity of waste. Recycling (including composting) is the preferred waste management option to further reduce potential risks to human health and the environment, divert waste from landfills and combustors, conserve energy, and slow the depletion of nonrenewable natural resources. In implementing source reduction and recycling, we must avoid shifting risks from one medium to another (e.g., groundwater to air) or from one population to another. Landfills and combustors will be necessary

for the foreseeable future to handle a significant portion of wastes, but are lower on the hierarchy because of the potential risks to human health and the environment and long-term management costs. This risk potential can be largely minimized through proper design and management. Integrated waste management can and should be implemented at a local level to the extent practical, and is a useful conceptual tool for making management decisions. But, it is not meant to be rigidly applied when local unique waste and demographic characteristics make source reduction and recycling infeasible.

The integrated waste management system is the framework for the national goals presented in this report. This report presents EPA's stated goal of managing 25 percent of our nation's municipal solid waste through source reduction and recycling by 1992. Composting of yard waste will play a key role in attaining this goal. While no long-term numerical goals are established beyond 1992, the Agency anticipates that the 25 percent level will be exceeded as capital recycling equipment comes on line. This will be especially true in the paper industry, where planning today will be essential to increasing domestic paper recycling in the mid-1990's. In addition, we must strive to reverse our ever-increasing per capita generation of garbage. We also must work to reduce the risks associated with landfills and combustors, inasmuch as these management alternatives will be necessary to handle most of the wastes. The risks of recycling need to be examined to determine if risk reduction is also needed for recycling. By implementing these goals, we can solve or reduce many of our municipal waste management problems.

This report outlines EPA's program to address these goals. It also presents a number of recommendations for state and local governments, industry, and consumers that will enable us to meet these goals. Information, assistance, and data must be made more accessible to everyone by generating catalogs of available materials, establishing a national clearinghouse, developing a "peer matching" program to allow all levels of government and waste management to exchange expertise, and developing a national research agenda for collecting new information and developing new technologies.

Planning at all levels of government is recommended in the report. National and regional planning conferences are needed to facilitate the exchange of information. This report contains a list of elements that state and local municipal solid waste management plans should include.

Source reduction should be fostered at the manufacturing, governmental, and local levels. EPA will study options for reducing lead and cadmium in products in order to reduce the risks of combustor emissions and ash, landfill leachate, and recycling operations. EPA will foster workshops for manufacturers and educators to promote the design of products and packaging for effective waste management. EPA will identify economic, regulatory and possibly legislative incentives for decreasing the volume and toxicity of waste. EPA will also take steps to facilitate Federal procurement of products with source reduction attributes. Industry should conduct waste audits, and determine ways to decrease the volume and toxicity of materials used in manufacture.

Recommendations for recycling (including composting) call for fostering implementation of existing Federal procurement guidelines (as well as evaluating ones for additional commodities), and creating an interagency working group to develop pilot and full-scale projects for separating recyclables in Federal agencies. Markets for secondary materials and recycled goods must be stimulated and stabilized; thus EPA will conduct market development studies for different commodities, will examine economic and regulatory incentives for using secondary or recycled materials, and will foster the formation of regional marketing councils for the exchange of market information. A National Recycling Council will be formed with members from all sectors of waste management to track recycling issues and problems and to recommend actions. Finally, EPA will study how to foster recycling lead-acid batteries, including examining the current incentives and disincentives associated with liability. Industry should step up its efforts in fostering the recycling of plastics. State and local governments should encourage separation of recyclables, conduct waste exchanges, and provide incentives for stable markets for recycled goods.

Finally, recommendations for decreasing the risks from landfilling and combustion include continuing EPA's ongoing efforts to develop air emission standards for new combustors and landfills, air emission guidelines requiring state standards for existing combustors and landfills, and revised minimum design and operation criteria for landfills. EPA recommends that ash management plans be developed as part of any plan for combustion of waste. EPA, in conjunction with trade associations, will facilitate development of guidance on training and certification for combustor and landfill operators. EPA will also study whether bans are necessary or desirable for certain types of waste.

These recommendations present a core program for governmental, industrial and citizen action which will help solve our nation's municipal waste management problems.

INTRODUCTION

This report is about what the government calls municipal solid waste and almost everybody else calls garbage. It's about bottles, cans, disposable diapers, uneaten food, scraps of wood and metal, worn-out tires and used-up batteries, paper and plastic packages, boxes, broken furniture and appliances, clippings from our lawns and shrubs--the varied human refuse of our modern industrial society.

All of us generate solid waste every day--a total for the nation of about 160 million tons a year. And the garbage deluge is growing steadily; with our current garbage practices, it could reach 193 million tons by the Year 2000. More than 40 percent of this solid waste stream consists of the paper and paper products we discard in our homes, offices and factories.* Yard wastes make up another 18 percent of the total. The other major components are metals, glass, food waste, and plastics (see Figure 1). Symptomatic of what social critics call our "throwaway society" are the many disposable products that are manufactured, imported, sold, used and thrown away; for example, we discard 1.6 billion pens, 2 billion razors and blades, and 16 billion diapers every year. "Convenience" packaging suited to our high-speed, increasingly busy life-styles--TV dinners, fast-food containers, microwavable bags of popcorn, and the like--make a substantial contribution to the flood of trash.

"Everybody wants us to pick it up, and nobody wants us to put it down."

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*In this report, the term "municipal solid waste" refers primarily to residential solid waste, with some contribution from commercial, institutional and industrial sources. In some areas, nonresidential wastes are managed separately, largely because industrial and some commercial sources produce relatively uniform wastes in large quantities, which makes them more suitable for alternative disposal techniques or recycling. Hazardous wastes, as defined by Federal and State regulation, generally are managed outside the municipal solid waste stream. Exceptions are household hazardous wastes and hazardous wastes generated in very small quantities, which are often placed in the municipal solid waste stream by the generator.

This report does not attempt to grapple with the issue of medical waste. This issue is the subject of a separate EPA Task Force.

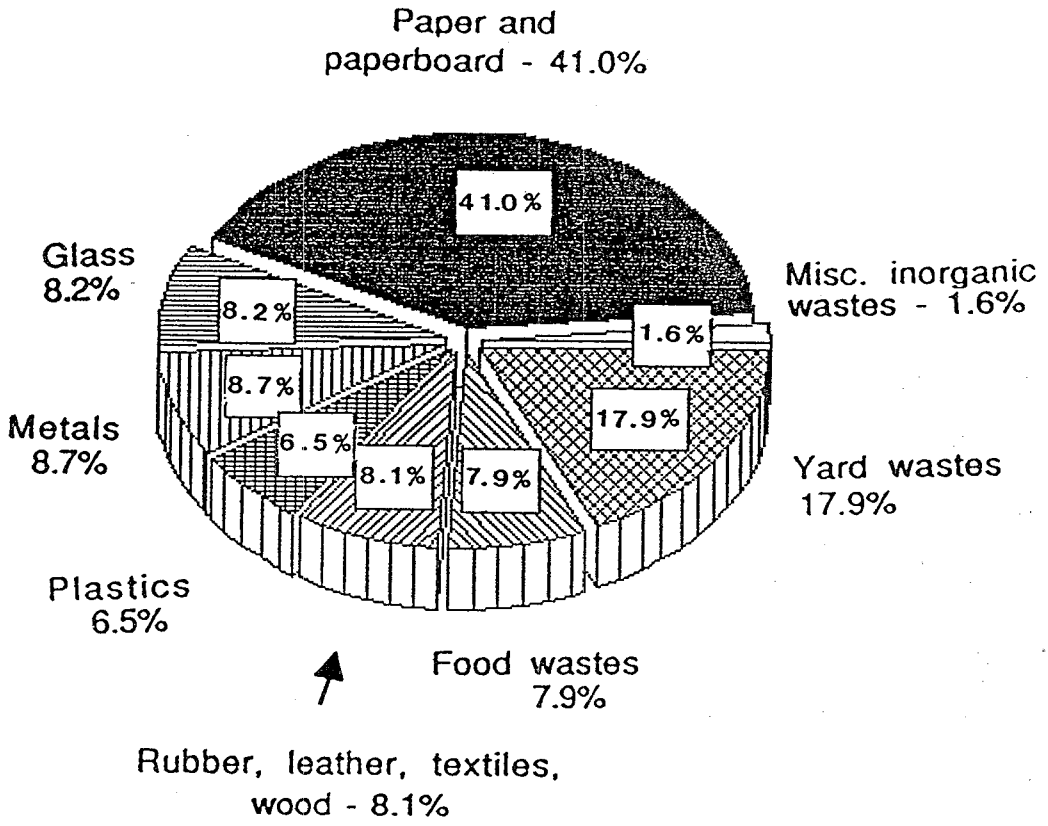

FIGURE 1 - GROSS DISCARDS, BY WEIGHT, OF MSW MATERIALS, 1986

(Source: Characterization of Municipal Solid Waste in the United States, 1960 to 2000; Franklin Associates, 3/30/88)

People who manage solid waste say that the First Law of Garbage is: "Everybody wants us to pick it up, and nobody wants us to put it down." Many Americans want their trash to disappear quickly and quietly from their backyards and curbs, never to be seen or heard from again. And the last thing they want in their neighborhood is a landfill, combustor or recycling center--all of which are associated in the public mind with noxious odors, possibly dangerous pollution, and noisy traffic.

These two social forces--the throwaway mentality on the part of manufacturers and many consumers and the NIMBY syndrome--have combined to create a serious and growing solid waste problem in many American cities. As a nation, we are generating more garbage all the time, and we don't know what to do with it. Ineffective or irresponsible disposal of all this waste has the potential to degrade the environment and cause risk to public health. We're running out of space to bury it in existing landfills; more than one-third of the nation's landfills will be full within the next two to three years. Yet because of the NIMBY syndrome and concerns over potential threats to human health and the environment, many cities are unable to find enough acceptable sites for new landfills. Siting new combustors can be equally difficult; many people are concerned as to whether garbage can be burned without producing dangerous air pollution and residues. The problem has gotten to the point that some American cities are paying premium prices to have their trash shipped to other counties, states, and even foreign countries.

"The annual U.S. generation of 158 million tons of municipal solid waste would fill a convoy of 10-ton garbage trucks, 145,000 miles long ... over half way from here to the moon."

In response to this solid waste dilemma, many states, localities, and concerned citizens have stepped up recycling activities and formed comprehensive waste management programs. With their progressive programs, some localities are far ahead of any Federal program for municipal solid waste, while other communities and states lag far behind and may not even recognize or anticipate a problem. The private sector, in the form of the waste management, secondary materials, and manufacturing industries, have also recognized the benefits of recycling and have successfully implemented programs. The Federal role for municipal waste management has ranged through the years from an active nonregulatory role prior to 1980, to a less comprehensive, more regulatory role

since 1980. In the past several years, EPA has proposed revised minimum standards for designing and operating municipal landfills; issued procurement guidelines for some recycled goods; issued a Report to Congress on air emissions from municipal waste combustors; published an Advance Notice of Proposed Rulemaking for regulating air emissions from new and existing combustors; issued combustor guidance to new source permitting authorities; developed a report on the efficacy of the current nonhazardous waste regulations; recently initiated several bulletins and brochures to promote used oil recycling; and conducted a toxicity study on municipal waste combustor ash. EPA also is developing guidance for proper handling and disposal of combustor ash residuals.

More recently, the Environmental Protection Agency created a Municipal Solid Waste Task Force in February 1988 to specifically address the problem of increasing waste generation and decreasing management capacity. The Task Force was given the assignment of quickly assessing the size and scope of the solid waste problem, examining alternatives for solving it, and developing a well-coordinated strategy of action for improving the nation's management of municipal solid waste.

In an effort to make the strategy credible and practical, the Task Force solicited comments from the public and interested groups and organizations. Seven public meetings were held in May, September and October in Boston, Dallas, Seattle, St. Paul (Minnesota), Washington (D.C.), Los Angeles and Atlanta. A 60-day public comment period on the draft strategy was also provided. The Task Force also identified interested trade associations, environmental groups, and government organizations and offered drafts of its analysis for their review during the development of the draft strategy. These comments from the public contributed substantially to this Agenda for Action.

This report presents the Task Force's national action agenda.* There is no single solution to this complex problem. A myriad of activities must be implemented, both in the short and long term, by all of us in order to solve the current and future problems with municipal solid waste. This report suggests a number of things that government, business, industry and citizens can do to reduce the production of solid waste and better manage the solid waste that is produced: manufacturing products with consideration for their ultimate management as wastes; encouraging, producing and buying products that are made from recycled or recyclable materials; separating bottles, cans and paper and turning them in for recycling; improving the safety and efficiency of landfills and combustors; and wherever practical, choosing source reduction and recycling over landfilling and combustion as the preferred methods for managing municipal solid waste. A mix of these options must be molded into an integrated waste management system where each component complements the others to safely and efficiently manage the waste. Local environmental, economic and institutional needs will, of course, play an important role in determining the mix at the local level. While this report acknowledges that the bulk of waste will be managed through combustion and landfills, it emphasizes a significant shift to source reduction and recycling. The report reiterates EPA's stated goal** of diverting 25 percent of the nation's municipal solid waste from landfills and combustors through source reduction and recycling by 1992. Much of this goal will be met through increased recycling with a special emphasis on composting of yard waste. But EPA believes that implementing source reduction, by not increasing our present per capita generation of municipal solid waste, is vitally important. In the longer term,

"Each of us contributes an average of 1,300 pounds a year to the growing mountain of garbage, and each of us, if we're willing, can cut back on the amount."

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*Only the Task Force's recommendations are included in this report; the data and information supporting the recommendations can be found in a supplemental document entitled, "Background Document for The Solid Waste Dilemma: An Agenda for Action, Draft Report of the Municipal Solid Waste Task Force." (EPA #530-SW-88-054A) and "The Solid Waste Dilemma: An Agenda for Action, Appendices A-B-C" (EPA 530-SW-88-054B).

**This goal was first stated by the Assistant Administrator of the Office of Solid Waste and Emergency Response, J. Winston Porter, in a speech at the Fourth Annual Conference on Solid Waste Management and Materials Policy, on January 29, 1988.

the Agency anticipates that the 25 percent goal will be exceeded as capital recycling equipment comes on line. This will be especially true in the paper industry, where planning today will be essential to increasing our domestic paper recycling capacity in the mid-1990's. Another crucial long-term goal is to reduce the per capita generation of municipal solid waste. Some proposals, such as government incentives to encourage the production of long-lasting products that can be reused or recycled, will be controversial; but the solid waste problem is serious, and controversy is not sufficient reason to ignore workable solutions.

When Congress passed the Resource Conservation and Recovery Act of 1976 (RCRA), it recognized that state and local governments have primary responsibility for municipal solid waste management, but it also gave EPA regulatory and assistance responsibilities in this area. Many of the recommendations in this report were developed with the recognition that strong national leadership is essential in finding solutions to what has become a widespread national problem. National leadership means not only establishing national goals and policies, but setting a good example by purchasing recycled or recyclable products and by separating waste to facilitate recycling or safe disposal.

Each of us contributes an average of 1,300 pounds a year to the growing mountain of garbage, and each of us, if we're willing, can, at least, stop increasing the amount of waste requiring disposal. In the longer term, we can reduce our per capita generation of waste. Industry can also work toward reducing the volume and toxicity of products and packaging that will ultimately require disposal. The report recommends a number of educational and other programs to inform citizens and industry about their responsibilities and opportunities to help stem the tide of solid waste.

It is important for all of us--government, business, and private citizens--to acknowledge that our country has a solid waste problem and to begin the difficult but inescapable task of finding solutions. If we wait, the problem will only get worse. If this report stimulates thought, discussion and action to help improve the management of our nation's municipal solid waste, it will have accomplished its purpose.

SCOPE OF THE PROBLEM

When local officials are asked to list the chief problems associated with municipal solid waste, they usually cite the growing shortage of landfill capacity and the high cost of managing waste. These two management problems are especially severe in some American cities, where disposal costs have soared to more than $100 per ton of waste because of long-distance hauling and high landfill and combustor "tip" fees.[1] The international wanderings of the "garbage barge", forlornly searching for a last resting place for garbage from Islip, New York, graphically illustrated the capacity shortages in populous communities. Some states and localities have responded to this problem by enacting laws requiring mandatory recycling or discouraging waste generation.

"In 1960, Americans generated waste at a rate of 2.65 pounds per person per day; by 1986, that figure had jumped to 3.58 pounds."

High costs and capacity shortages, however, are only symptoms of a more basic problem: Most of America's citizens, officials and industry have yet to recognize their responsibility for the growth in solid waste and for the problems caused by that growth. In 1960, Americans generated waste at a rate of 2.65 pounds per person per day; by 1986, that figure had jumped to 3.58 pounds, and the trend is projected to continue into the Year 2000.[2] Generation of every kind of waste is up, including paper, plastic, glass, and metals, as shown in Figure 2. An American generates approximately one pound per day more waste than his/her counterpart in West Germany, an equally industrialized nation.[3] Much of the difference can be traced to the high

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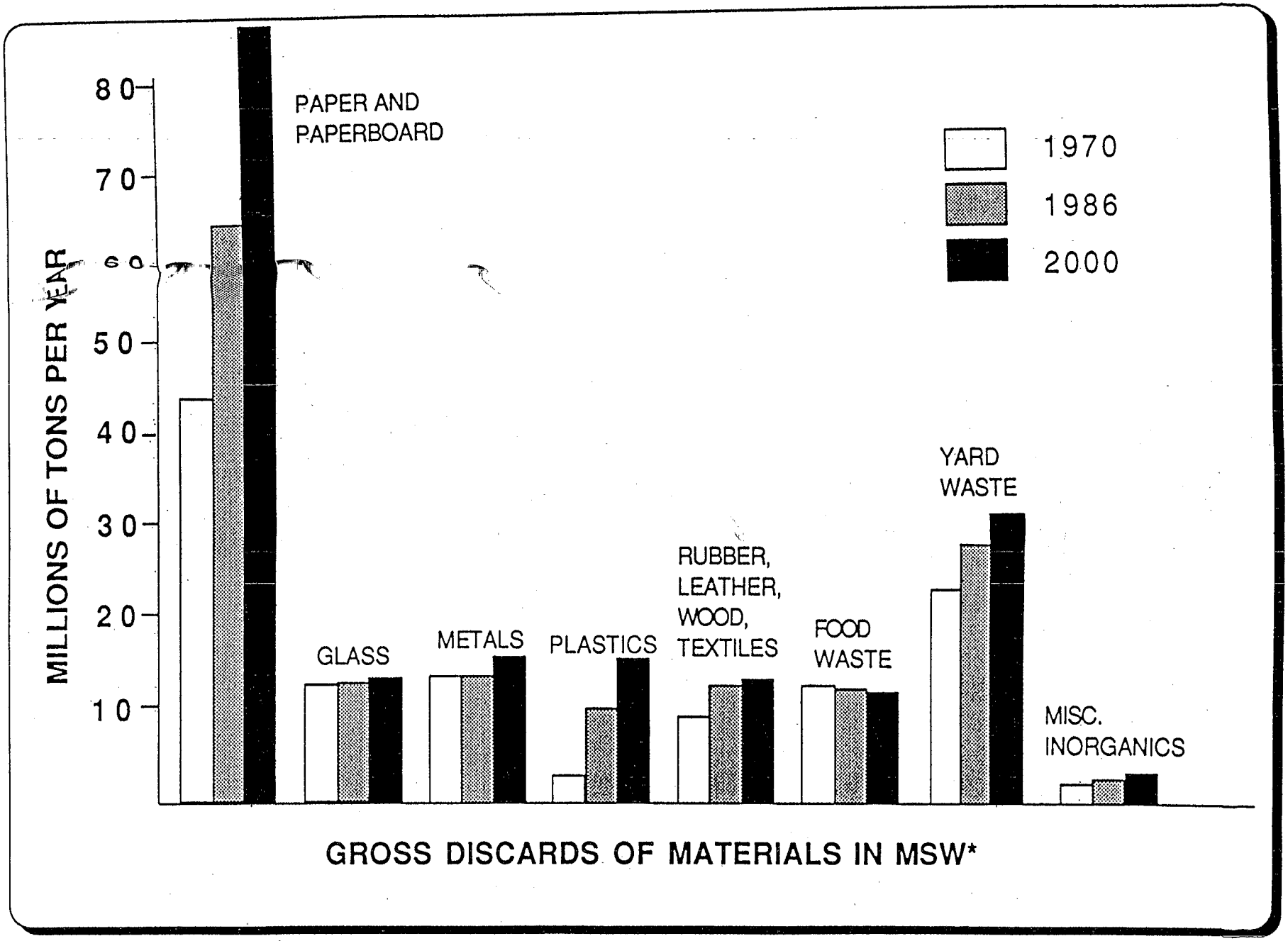
[1] Frank J. Sudol and Alvin L. Zach, "Recycling in New Jersey: the Newark Experience," Resource Recycling, Volume VII, No. 2, May/June, 1988, p. 28.

[2] Characterization of Municipal Solid Waste in the U.S. 1960-2000 (updated 1988), Franklin Associates, March 30, 1988.

[3] Allen Hershkowitz, Ph.D., "Garbage Burning--Lessons from Europe: Consensus and Controversy in Four European States," Inform, 1986, p. 13.



*Ref: Characterization Of Municipal Solid Waste In The United States, 1960 To 2000; Franklin Assoc, 3/30/88
(before material or energy recovery)

FIGURE 2

level of product manufacture and consumption in this country and the need for convenience on the part of increasingly busy families. In general, American consumers have no incentive to limit their waste generation, because they are not charged for disposal according to the amount of waste they produce. Nor are there many incentives for manufacturers to design their products and packaging in a way that takes into account the effective management of those products when they are eventually discarded.

At the same time more waste is being generated, less processing and disposal capacity is available to handle it. One-third of the nation's landfills will be full by 1991, which means that waste that is now disposed of in these facilities will have to be disposed of elsewhere. Many existing facilities are closing either because they are filled or because their design and operation do not meet Federal or state standards for protection of human health and the environment. New facilities must be built to replace this diminishing capacity but must be environmentally sound, preserve valuable resources, and not present undue risk to human health. The incentive to build new, environmentally sound facilities and adopt better management practices may not exist in some areas because of the current practice of "waste flight," in which waste is shipped by truck or rail across state and county lines to areas with available capacity. If not done concurrently with long-term planning to solve the capacity problem for a region, the short-term solution of waste flight only delays the inevitable management problem in the locality shipping the waste, and hastens potential problems in the area that receives and disposes of the waste.

Efforts to site new landfills, combustors and recycling centers, however, are met with mounting opposition. This opposition may stem from concerns about environmental or health risks from contaminated ground and surface waters and soil, toxic ash from municipal waste combustion, and air emissions; from resistance to such nuisance factors as noise, smells, and truck traffic; and from anxiety over property values. Because few governments have established effective dispute resolution mechanisms, "siting impasses" result when local politicians are unwilling or unable to override the objections of their constituents. These siting disputes illustrate the fact that

few of us are eager to assume responsibility for either our neighbors' wastes or our own.

Although recycling and reuse of waste materials are publicly acceptable methods for managing municipal solid waste, the existing waste management infrastructure often discourages effective recycling efforts. For example, a national policy supporting the use of a waste management "hierarchy" has been in effect since 1976.[4] Under the hierarchy, source reduction and recycling are the preferred options for managing solid waste. Combustion and landfilling are to be used only when the preferred options are unavailable or insufficient. Overwhelmed by the burgeoning amounts of waste that must be removed from the curb every day, many waste managers are unable to plan or implement the hierarchy at the local level. As a result, 80 percent of the nation's waste is landfilled; only 10 percent is recycled and 10 percent combusted. This reliance on landfilling may stem from a desire for a single, "quick-fix" solution; more recently, many public officials seem to be turning to mass-burn combustors as the "silver-bullet" answer to their waste management problems. The temptation to build a facility that can combust 2,000 tons of garbage a day may be difficult for a hard-pressed waste manager to resist.

Why aren't many states and localities implementing the waste management hierarchy? One reason is that local officials may consider recycling programs too costly. They also may not consider recycling a reliable way to handle municipal solid waste because success in recycling depends heavily on markets for secondary materials as well as public participation levels, both of which can fluctuate widely. And, information on the true costs of each waste management option mey not be available.

This brief description of the scope of the problem is by no means comprehensive. It is meant to establish the basis for setting goals and actions for a national strategy. Chapters 2 and 3 of the Background Document provide a more thorough description of the problems involved in managing municipal solid waste.

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[4] Effective Hazardous Waste Management (Non-Radioactive); Position Statement, Federal Register, Volume 41, No. 161, August 18, 1976.

INTEGRATED WASTE MANAGEMENT

The term "integrated waste management" refers to the complementary use of a variety of waste management practices to safely and effectively handle the municipal solid waste stream with the least adverse impact on human health and the environment. An integrated waste management system will contain some or all of the following components:

- Source reduction (including reuse of products)
- Recycling of materials (including composting)
- Waste combustion (with energy recovery)
- Landfilling.

In integrated waste management, all the elements work together to form a complete system for proper management of municipal waste. Waste stream constituents are matched to the management practices that are best suited to those particular constituents, in order to reduce toxics, reduce quantity, and safely extract any useful energy or material from the waste prior to final disposal.

Every community can "custom-design" its integrated waste management system to emphasize certain management practices, consistent with the community's demography and waste stream characteristics. For example, a community like Las Vegas, Nevada, where landfill tipping fees as low as $6 per ton reflect the ready availability of land[5], may choose to continue to rely on landfilling as its primary waste management practice after evaluating the feasibility of source reduction and recycling. Conversely, a

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[5] C. L. Pettit, "The 1987 Tip Fee Survey - Last Year's Rise was the Biggest Ever," Waste Age, Vol. 19, No. 3, March 1988, p. 77.

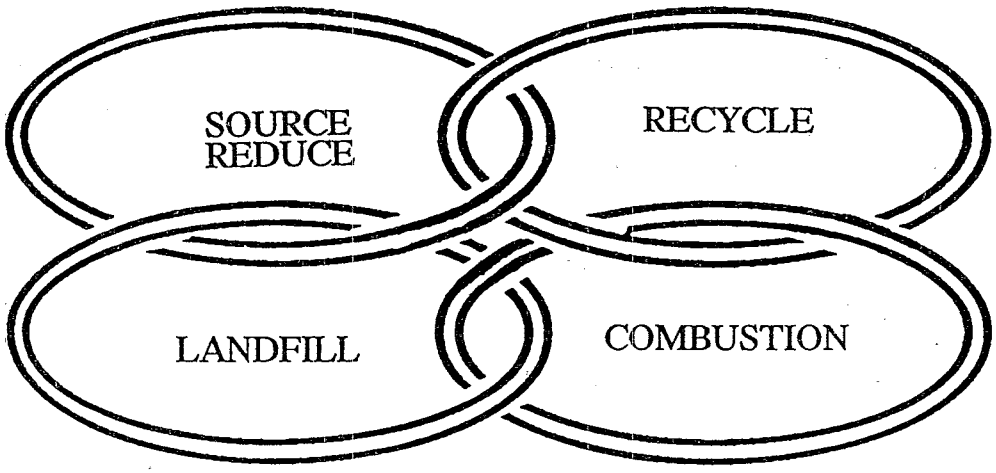
town such as East Lyme, Connecticut, where disposal costs exceed $100 per ton, finds recycling an essential way to handle a major part of the waste stream.[6]

Every community can "custom-design" its integrated waste management system to suit its needs.

In an integrated waste management system, each component is designed so it complements, rather than competes with, the other components in the system. For example, combustors should be designed to handle a volume of waste with a certain Btu value after allowing for the effect of recycling on total waste volume and Btu values. Failure to do this can lead to a situation where materials which would otherwise be recycled are not because they are needed as fuel for the combustor.

Hierarchy of Integrated Waste Management

To most effectively reduce our waste management problems at the national level, states, municipalities, and the waste management industry should use the hierarchy described below for evaluating the components of integrated waste management against the community's needs. Of course, strict adherence to a rigid hierarchy is inappropriate for every community. Manhattan, Nevada will very likely choose a different mix



[6] "Transcript of the Public Meeting on Municipal Solid Waste," Boston, Massachusetts, May 9, 1988. RCRA Docket #F-88-MTFN-FFFFF, EPA, Office of Solid Waste, 401 M Street S.W., Washington D.C. 20460

of options than Manhattan, New York. But the integrated waste management hierarchy is a useful conceptual tool for both communities to use in setting goals and planning for their particular mix of waste management alternatives.

The hierarchy begins with source reduction and reuse to reduce both the toxic constituents in products and the generation of large quantities of waste. Source reduction, as defined in this report, may occur through the design and manufacture of products and packaging with minimum toxic content, minimum volume of material, and/or a longer useful life. Source reduction may also be practiced at the corporate or household level through selective buying habits and reuse of products and materials. Effective source reduction slows the depletion of environmental resources, prolongs the life of available waste management capacity and can make combustion and landfilling of wastes safer in the short and long term by removing toxic constituents. Source reduction is not used by local waste handlers for managing the waste that is picked up every day; rather, it cuts back on the amount and the toxicity of the waste which is handled. However, local government can encourage as well as practice source reduction.

The second rung in the hierarchy is recycling of materials, including composting of food and yard waste. Recycling is near the top of the hierarchy because it prevents potentially useful materials from being combusted or landfilled, thereby preserving waste disposal capacity. Recycling is a technology that can prevent depletion of valuable landfill space, save energy and natural resources, provide useful products from discarded materials, and even make a profit (especially when the avoided costs of combustion or landfilling are taken into account). Thus, public officials and waste handlers should give serious consideration to the practicality of recycling and composting programs in their communities.

Although lower than source reduction and recycling in the hierarchy of desirable waste management options, waste combustion is useful in reducing the bulk (although not all) of municipal waste and can provide the added benefit of energy production. Although combustion is not risk-free, a state-of-the-art combustor that is well

operated should not present a significant risk to human health and the environment. When recycling is part of a community's or a waste handler's chosen integrated waste management system, combustion can complement recycling by reducing the bulk of the nonrecyclable, nonreusable waste. Likewise, combustion can be made more efficient by source reduction and removal of recyclables which are less conducive to combustion or which could lead to potentially harmful stack emissions or operational problems caused by heterogeneous waste mixtures. Residual ash is another problem associated with combustors because of the sometimes high metals content and the need to manage it properly.

Landfilling also is lower in the hierarchy than source reduction, reuse and recycling, but is essential to handle wastes such as nonrecyclable waste and the noncombustibles such as demolition waste and construction debris. In addition, landfills can provide the benefit of energy production through recovery of methane gas. Landfills designated for handling combustion ash residuals are essential and, in the absence of alternative ash management plans, must be planned and designed in conjunction with the combustor. Landfills should also be used for materials that cannot practicably be managed in any other way. A well-constructed, properly operated landfill should not present a significant health risk. As previously mentioned, some communities and waste handlers, based on land availability and population characteristics that make recycling impractical, may choose landfilling as their principal method of managing municipal waste. For the foreseeable future, landfills will be necessary to handle a significant portion of wastes, so steps must be taken to make landfilling as safe as possible.

Who's Responsible?

We all are. Everyone has a role in making integrated waste management work. Industry has a responsibility to consider source reduction, reuse and recyclability in designing products and packaging, and to use secondary materials in their manufacture. Citizens have a responsibility to learn about the products and packaging they buy and the waste they create. What is in the product? What is recyclable? What is

potentially harmful? How long will the product last? How much does it cost to dispose of it? Every individual and corporate citizen should assume responsibility for waste disposal and adopt a "pay-as-you-throw" attitude--a recognition of the true costs of disposing of the wastes we generate.

Who's Responsible?
WE ALL ARE.
Everyone has a role in making integrated waste management work.

Waste management companies, including processors and handlers of secondary materials, have a responsibility for planning and implementing integrated waste management for their communities. They should work in partnership with state and local public officials to plan and implement integrated waste management and to educate the public. This partnership can be an effective mechanism for managing municipal solid waste.

All levels of government, especially state, tribal and local, are ultimately responsible for managing waste and planning the mix of management options that will most effectively handle the waste stream. The Federal government should participate in municipal solid waste management by establishing national goals and leadership, developing education programs, providing technical assistance, and issuing regulations. The Federal government also has a role in establishing a framework for state, Tribal and local planning, setting minimum standards for facilities, and encouraging the manufacturing industry to design products and packaging for effective waste management, as well as to utilize secondary materials in manufacturing. Finally, all levels of government should set a good example by purchasing recycled or recyclable products and products that have been subject to source reduction whenever possible, and handling their own wastes in a way that facilitates recycling and reuse.

Planning

Planning is a vital component in achieving a national goal of integrated waste management. Siting, designing, and building a landfill or combustion facility can take many years. Similarly, collection and recycling programs may take several years to develop to full scale. This delay is especially difficult for communities

experiencing an immediate waste handling capacity shortage, but it also may affect communities that face possible capacity problems in the future. Thus, states, Indian Tribes and local communities should actively plan short- and long-term waste programs based on current and projected characteristics of their waste streams.

Evaluating and implementing, where feasible, the integrated waste management hierarchy at the local level helps solve the problems associated with waste management. Minimizing toxicity and volume through source reduction, reuse and recycling directly addresses the problem of capacity shortage and potential risks from toxic constituents.

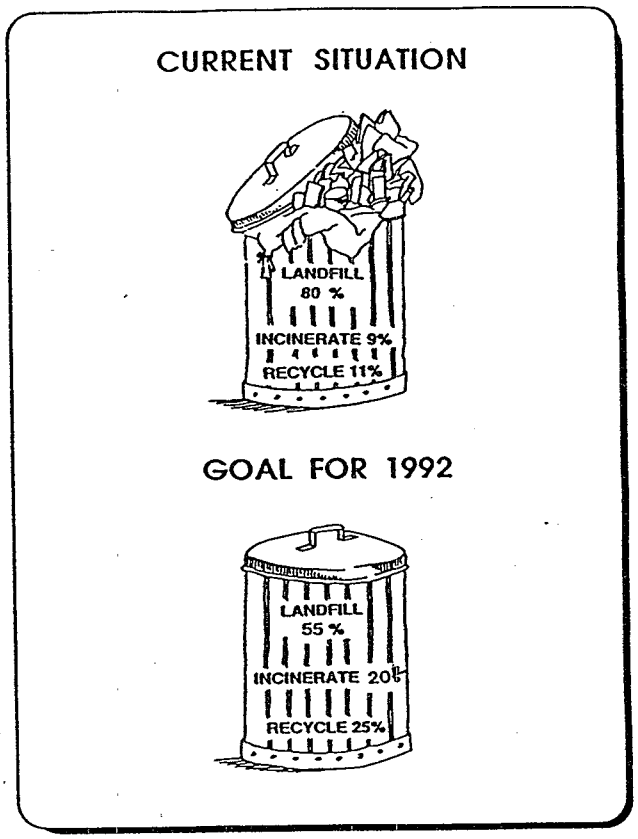
NATIONAL GOALS

The problems associated with municipal solid waste management, including cost and capacity, are felt most directly and can best be handled at the local level through implementation of integrated waste management practices. These problems, however, are also regional and national in scope. The widening gap between available capacity and levels of waste generation demands national solutions and a long-term commitment by all. We can no longer rely on landfills to handle 80 percent of the nation's waste. The United States must find a safe and permanent way to eliminate the gap between waste generation and available capacity in landfills, combustors, and in secondary materials markets.

How can this goal be accomplished? We must take short-term actions now in order to solve the problems of today and tomorrow. Above all, we must increase source reduction and recycling activities while making all management options reliable and safe. EPA believes that, to the extent practical, source reduction and then recycling are the preferred options for closing the gap and reducing the amount and toxicity of waste that must be landfilled or combusted. To foster implementation of this preference for source reduction and recycling, EPA set a national goal in January 1988 of 25 percent source reduction and recycling (up from the current 10 percent) by 1992. Although recycling (with special emphasis on composting of yard waste) will play the major role in achieving this goal, source reduction is an important component. While no long term numerical goal has been established, we anticipate that the 25 percent level will be surpassed as capital recycling equipment comes on-line. This will be especially true in the paper industry, where planning today will be essential to increasing domestic paper recycling in the mid-1990's. Our nation must stop the increase in our per

The United States must find a safe and permanent way to eliminate the gap between waste generation and available capacity in landfills, combustors, and in secondary materials markets.

per capita generation rate. And, in the long run, we must also strive to reduce it. Source reduction and recycling help prevent many of the problems associated with municipal solid waste, including the pressing need to site new landfills and combustors to handle the large volumes of waste being generated. Preventing generation of wastes and diverting waste components from landfills and combustors into reuse, recycling or composting helps to alleviate siting problems and potential risks to human health and the environment attributable to improper management. Thus, planning and implementing these activities now yields benefits in managing wastes in the years to come. Reaching the 25 percent source reduction and recycling goal will mean that the remainder will be handled by combustion and landfills. On-line and already permitted, combustors are projected to handle about 20 percent of the waste stream. The remainder (about 55 percent) is projected for landfills.



Even the most effective source reduction and recycling efforts, however, cannot handle the total waste stream. Thus, EPA believes that all waste management practices should be made safer. We will need landfills and combustors into the foreseeable future to process and dispose of a significant portion of the waste stream. Improving the safety of these disposal alternatives, as well as materials recovery and recycling facilities, can help protect human health and the environment and can only help gain public acceptance of all such facilities.

Objectives

The Task Force has identified six objectives for a national agenda for action to solve the municipal solid waste dilemma. By fulfilling these objectives, we help overcome many of the problems associated with municipal solid waste management, including siting problems, increased waste generation rates, concerns over human health and the environment, and, perhaps, some of the high costs of waste management. In addition, by carrying out these objectives--especially by increasing source reduction, recycling, and effective planning--government, industries, waste managers and citizens will have helped fulfill the concept of integrated waste management and will learn to look beyond the "single solution" to waste problems. The objectives are:

1. **Increase the waste planning and management information (both technical and educational) available to states, local communities, waste handlers, citizens, and industry, and increase data collection for research and development.**

2. **Increase effective planning by waste handlers, local communities, and states.**

3. **Increase source reduction activities by the manufacturing industry, government and citizens.**

4. **Increase recycling by government and by individual and corporate citizens.**

5. **Reduce risks from municipal solid waste combustion in order to protect human health and the environment.**

6. **Reduce risks from landfills in order to protect human health and the environment.**

The following Agenda for Action is structured within the framework of these six objectives. Each objective is briefly described, and roles for government (Federal, state, tribe and local), industry and citizens are summarized. A table of next steps follows each objective, for easy reference by the reader.

The Task Force received many suggestions on potential actions, and studied a number of different options. The following action items are culled from the larger array of options, and constitute a minimum program for meeting the above-stated goals. Most of these actions received broad-based support from public commentors. Elements that were noted by commentors as being especially important are a national clearinghouse for information dissemination, Federal procurement guidelines for recycled goods, market development studies for recycling, design and operation standards for landfills, and air emission and operator certification standards for combustors.

AN AGENDA FOR ACTION

To most effectively reach the goal outlined above, the Task Force's recommended actions focus on reducing large-volume contributors to the waste stream. For example, paper and yard wastes are targeted for special action because they contribute nearly 60 percent of the waste stream. While EPA has targeted paper and yard wastes for special consideration, the Agency realizes the importance of addressing other wastes to reduce toxicity, and to pursue opportunities for recycling. In addition, "orphan" wastes such as tires and batteries are highlighted because they are not now managed in any cohesive way, and can present environmental and health problems and management headaches.

I. OBJECTIVE: INCREASE AVAILABLE INFORMATION

Technical assistance, education, and research and development are important ways to encourage informed participation in achieving waste management goals. These goals may be the national goals, as described above, or they may be the basis for state, tribal or local integrated waste management programs. Educational materials increase awareness of good waste management "ethics" while technical assistance ensures that all types of waste handlers (individuals, government, industry) have all the information that they need to manage wastes safely and effectively. Data collection and research and development expand the boundaries of our knowledge, giving us new information, new technologies and new solutions.

Through participation in every level of effective waste management, citizens and the manufacturing industry must take responsibility for the waste they generate. The way to enhance participation is through development and efficient delivery of educational and technical guidance for all audiences. This section describes development of technical and educational guidance, data collection and research and development programs, and delivery systems such as a national clearinghouse and a "peer

matching'' program that matches experts in waste management to communities in need of help.

Develop Materials on General Topics and Specific Technical Areas

-Technical Guidance Documents-

Guidance and materials on the technical aspects of source reduction, combustion, recycling, landfilling, composting, and collection are important for increasing the quality of waste management by everyone. These materials provide the ''how-to'' for the consumer, industry, the government, and the waste handler to effectively reduce waste generation, and prevent management and environmental problems.

Educational materials provide a way to change ''business as usual'' in our society by giving people the necessary background information to determine ''good'' and ''bad'' waste management.

The technical materials should address at least these areas:

- What factors decision makers should consider in choosing among waste management options.
- How each community can compare the risks of each management alternative in order to assist in siting decisions.
- How state and local governments can communicate risks for municipal solid waste management alternatives to the public.
- How to determine the true costs of waste management, and how to calculate the management costs avoided through choosing one waste management alternative over another.
- How citizens and businesses can implement source reduction through their consumption habits (e.g.,ways to reduce paper consumption through double-side copying).
- How to set up a community recycling program.
- How homeowners can effectively backyard compost their yard wastes, and can use backyard or commercial compost in landscaping, building, or gardening.

- How to create incentives for and overcome barriers to successful source reduction and recycling programs.

- What to look for in designing and operating combustion facilities, including waste-to-energy methods, and landfills.

- How to market secondary materials and energy generated by waste-to-energy plants and methane from landfills.

- How to market compost, and ensure quality compost products.

- What terms like "recycled" and "recyclable" mean (what the minimum amount of secondary materials is for a product to be called "recycled").

- How to insure that goods labeled as "recycled" or "recyclable" are genuine.

- How to collect and process tires, including a processing method for making refuse-derived fuel from tires and guidance on marketing this fuel, management of tires in landfills, management of tire piles, and recycling of tires.

- How to handle lead-acid batteries, including guidance on proper design and operation of collection and processing facilities and metal-recovery operations.

- How to manage and reduce household hazardous waste, including paints, cleaners, solvents, used oil, etc.

- How biomedical wastes should be handled and treated.

- Whether labeling such as "recycled," "recyclable," and "designed for safe disposal in an combustor or landfill" is effective and feasible. (Such labeling is believed by many to be useful in raising public consciousness. But, concerns over issues such as the need for Federal oversight, defining these terms, and "truth in advertising" problems must be studied.)

Work on some of these materials is already underway by EPA, state and local governments, the waste handling industry, trade associations and public interest groups. For example, EPA is working on communication tools for state and local governments to use in siting facilities. This list of materials is a sample of what could and should be done, but it is by no means exhaustive. EPA will evaluate what is available and what is needed for technical materials.

-Educational Materials-

Educational materials provide a way to change "business as usual" in our society by giving people the necessary background information to determine "good" and "bad" waste management. The target audience for these materials is varied, including waste generators (households, businesses, and industry), waste planners, and waste managers. It is as imperative to inculcate the ethics of integrated waste management into the public works official as it is the homeowner.

Many excellent educational materials have already been developed by some states, localities, public interest groups, and trade associations. A comprehensive educational program should, at a minimum, address the following areas and audiences:

- Pamphlets and brochures for the general public, describing the components and concepts of integrated waste management, the risks and costs associated with various management options, and questions that citizens should ask about the wastes they generate and waste management in their communities. Brochures should also emphasize questions citizens should ask themselves about the waste they generate and should encourage citizens to conduct waste audits on their household wastes.

- Curricula for school children and teenagers that not only explain different waste management methods and issues, but also incorporate municipal waste issues into a variety of subject areas (e.g., arithmetic problems) in order to raise general consciousness. Such educational materials could also include coloring books, videos, and field trips.

- Materials and forums to inform the design and manufacturing industries of the importance of source reduction and the design of products and packaging with an eye toward the eventual safe disposal or recycling of the waste.

- Materials to encourage participation in recycling. Collection and separation methods for glass, metals, paper and plastics, by both households and businesses, would be stressed. Other materials could include pamphlets explaining the cost savings associated with recycling process and scrap wastes in industry. Materials could also include bumper stickers, posters, and billboards.

- Informational pamphlets explaining the true costs of waste management. These would be used by waste handlers, local governments and citizens for making more informed decisions.

EPA will collect existing materials and foster development materials necessary to fill the gaps in general educational materials.

Data Collection and Research and Development

Adequate and accurate data are vital underpinnings to any municipal solid waste program. We cannot evaluate the progress in meeting national or local goals without data. Adequate data allows us to make informed decisions and prevent undue risks from waste management. Important data gaps that must be filled in include characterization of the waste stream and waste management practices. A comprehensive research and development program is necessary to continue upgrading the quality of waste management practices. Industry and all levels of government must forge a partnership for conducting research and development in all areas of municipal waste management. Industry especially can assume a leadership role in the areas of source reduction and recycling technologies by finding substitutes for toxic materials in products, reducing the volume of material in products, and increasing recycling practices and technologies.

-Characterize the Waste Stream and Waste Management Practices-

The Federal and state governments should gather summary data generated by the public and private sectors on waste characteristics and management practices. This data should be used to trace national trends and facilitate short- and long-term planning. All levels of government should institute databases for tracking volumes and types of wastes in order to facilitate planning at the state and local level. This characterization should study individual constituents in the municipal solid waste stream to determine progress in source reduction and recycling and targets for significant volume and risk reduction.

-Research and Development-

Research and development is needed in technical areas related to combustion (ash and air emissions), landfilling, recycling technologies, designing for effective waste

management (e.g., reducing toxics, increasing recyclability and durability) and source reduction. More work is also necessary to further characterize the risks associated with various waste management options. This includes characterizing this effects on global climate.

EPA is developing a national agenda for research and development necessary to augment what is currently underway. EPA will coordinate its initiative closely with those of private industry, states and academia. In cooperation with these groups, EPA will generate a national research agenda providing for coordinated studies in various areas such as the assessment of emerging commercial technologies, appropriate municipal waste combustor operating conditions and air emissions control technology, appropriate management of combustor residuals, improved landfill design and operation, improved siting and monitoring methods, improved recycling techniques, and identification of substitute materials for toxics in products. In addition, EPA will continue to involve other parties in its research efforts.

Establish Systems to Disseminate Information and Assistance

Some states, trade associations, and public interest groups have taken the initiative to form state or regional "libraries" or telephone "hotlines" on a variety of waste management subjects.

Although many excellent educational and technical materials, expertise, and data exist, systems for sharing these materials, data and expertise are sadly lacking. Some states, trade associations, and public interest groups have taken the initiative to form state or regional "libraries" or telephone "hotlines" on a variety of waste management subjects. However, a systematic, nationwide information-sharing mechanism for all waste management subjects and audiences does not currently exist. This lack of a nationwide system results in relatively few people accessing the technical and informational materials that they need. Another result is duplication of effort by organizations developing materials that, unknown to them, already exist.

-National Clearinghouse-

A national clearinghouse will provide the mechanism for citizens, government and other organizations to request and receive materials on any subject related to municipal waste. The clearinghouse will act as a distribution center for materials, and may develop some of these materials. Materials for distribution by the clearinghouse would include those educational and technical guidances and results of research and development mentioned earlier under this Objective, bibliographies of available literature in different subject areas, and materials developed by the Federal government, states, municipalities, public interest groups, trade associations, and industry.

EPA, in partnership with another entity such as a university, public interest group, or trade association, will partially fund the clearinghouse, at the outset, but the clearinghouse should become nearly self-sustaining. EPA could fund the clearinghouse through a variety of mechanisms including seed money to a university, a public interest group, governmental associations or other nonprofit organizations. EPA's Office of Research and Development, or the Agency's RCRA Hotline could also be instrumental in running a clearinghouse. EPA is looking at funding from existing resources.

-"Peer Matching" Program-

As part of the clearinghouse concept, a "peer matching" program would match the expertise available in local communities, trade groups, states, Indian Tribes, EPA regional offices, or universities to waste managers in other communities in need of assistance. Such a program would effectively use existing resources to better manage municipal solid waste. For example, a community wishing to design and implement a curbside collection program for recyclable materials could use the peer matching program to tap into the expertise of a community with a similar program. The program would function as a "database" of people and experience to match the needs of communities seeking assistance.

-Other Information-sharing Mechanisms-

In addition to the large-scale programs outlined above, many mechanisms for delivering information on waste management may be useful at the national, regional, state, tribal and local level. These smaller systems focus on particular audiences, a certain subject area, or a certain message, and include the following:

- Accessing existing organizations and their networks of constituents, such as Keep America Beautiful, the Governmental Refuse Collection and Disposal Association, National Association of Counties, National League of Cities, and many more
- Magazine and newspaper articles, radio and television shows and advertisements to raise awareness of waste management and responsibilities
- Itemized tax bills, quarterly reports, or "garbage bills" to educate the waste generator on costs of waste management
- Public meetings and hearings on waste management issues
- Labeling of products by industry as to proper disposal methods.

EPA has worked with the Environmental Defense Fund to generate a national advertisement campaign on recycling.

Summary of Participants in Increasing Available Information

Technical and educational materials and data collection methods should be developed by EPA, states, Tribes, municipalities, public interest organizations, all industry (waste management, design and manufacturing, secondary materials) and trade associations. All parties have expertise in a range of waste management areas and should contribute to developing needed materials. EPA will tap into existing materials, where possible and develop materials through in-house expertise and/or grants to other organizations and universities. For example, in developing a model methodology to calculate both the true costs of waste management methods and the costs avoided by choosing one method over another, EPA can take advantage of methodologies already developed by various groups, and compile them into a general model with an

accompanying sensitivity analysis to indicate the most important components of the cost equations. EPA will formulate a research and development agenda, using input from outside parties.

For information-sharing mechanisms, as mentioned previously, EPA will plan and provide seed money for the national clearinghouse and peer matching program in order to assure national distribution and accessibility. State, tribal and local governments, being closer to the generator of waste, are often in the best position to target messages and audiences for educational materials. Incorporating public education programs into the state, tribal and local planning process, especially materials and forums related to siting any new municipal solid waste management facility, allows for consistent and comprehensive programs. State, tribal and local governments should also incorporate materials related to solid waste issues and management into the public and private school curricula, and pass on to the waste generators the cost of waste management in the community.

Some local governments have imposed waste management "user charges," levied on households and businesses based on the amount of garbage generated.... "pay as you throw."

Some local governments have imposed waste management "user charges" on households and businesses based on the amount of garbage generated. These "pay as you throw" policies can show the citizens, in very concrete terms, the cost of their garbage production. EPA needs to do more research on the effect of user charges on illegal dumping and littering. Finally, if people in the community are concerned about emissions or nuisance factors from nearby facilities, local officials should keep them apprised of monitoring results or other actions through regular bulletins, the newspaper, or other media.

TABLE 1.

NEXT STEPS FOR EPA TO INCREASE INFORMATION

Develop Educational Materials

Begin compiling available materials	NOVEMBER	1988
Catalog/bibliography of available materials	MAY	1989
Identify educational materials needed	JULY	1989
Review cost methodologies for true cost accounting	AUGUST	1989

Develop Technical Materials

Review and summarize state tire management programs	JANUARY	1990
Begin compiling available materials	NOVEMBER	1988
Identify technical materials needed	JULY	1989
Publish decision-makers guide for local waste managers	SEPTEMBER	1989

Collect Data and Establish Research and Development Agenda

National research conference	FEBRUARY	1989

Establish a Clearinghouse

Establish functions for a clearinghouse	JANUARY	1989
Clearinghouse operational	DECEMBER	1989

Establish a Peer Matching Program

Program operational	JULY	1989

II. OBJECTIVE: INCREASE PLANNING

Planning by any level of government and the waste management industry is vital for managing all municipal solid waste in a safe and effective way. Planning ensures that future capacity needs are taken into account when establishing programs. Planning also ensures that orphan wastes such as tires and lead-acid batteries are handled comprehensively, rather than with the current piecemeal approach.

Develop State and Local Strategies for Integrated Waste Management

-State Strategies-

State strategies for managing municipal solid waste are important in addressing the current problems faced by communities within the state, and in forecasting and preventing future problems. State strategies force governments to look beyond the single solution to today's problem to a comprehensive waste management plan that will head off or respond to future problems. Indian Tribes, which manage their municipal solid waste independently from the states, must also generate comprehensive strategies for managing solid waste.

State strategies force governments to look beyond the singular solution of today's problem to a comprehensive waste management plan ...

States and tribes should plan for overall integrated solid waste management. This planning should be done by collecting and evaluating local plans, setting statewide goals for waste handling, and developing policies or legislative initiatives that help the state attain these goals. Indian Tribes should generate plans for individual reservations by seeking assistance from Tribal associations, states, or the Federal government. In planning, states and tribes should work with waste management and secondary materials industries to access existing networks for collection and marketing of waste and recyclable materials.

State and tribal integrated waste management strategies should contain at least the following components:

- Goals for source reduction and recycling of materials
- Materials and markets that will be targets for source reduction and recycling
- Market development plans for secondary materials, including intermediate markets (brokers, scrap dealers and processors), final markets (manufacturers), and use of existing networks of secondary materials dealers
- Composting plans, including collection, processing (backyard, municipal and commercial) and marketing methods of yard waste.
- Short and long-term capacity assurance
- Calculations for properly sizing combustion facilities, after accounting for waste diverted through recycling
- Land-use planning for siting new facilities
- Dispute resolution methods to prevent stalemates in siting any type of waste management facility
- Plans for collecting and managing "orphan" wastes such as tires and lead-acid batteries
- Education and technical assistance programs, including education on true-cost accounting and cost avoidance, and risk assessment methodologies
- Methods for communicating to the public the results and methods of assessing risks of waste management alternatives
- Methods for ensuring public participation in decision making and planning
- Enforcement programs for design and operation of waste handling facilities
- Examination of state government procurement policies to promote recycling and source reduction, and separation of recyclable goods
- Investigation of regional solutions on a multistate basis, as well as an intrastate basis
- Plan for segregating, treating, transporting and disposing of medical waste

State planning conferences and regional workshops to provide a forum for states to share their expertise, programs, and problems will encourage states to plan. Some conferences and workshops will be sponsored by private organizations. Others will be sponsored by EPA. For example, the Association of State and Territorial Solid Waste Management Officials (ASTSWAMO) will sponsor a conference in July of 1989; EPA will sponsor several regional workshops in 1989. In addition, EPA regional offices will review strategies voluntarily submitted by states and tribes and offer technical assistance upon request. Review of state strategies will help EPA develop technical guidances and areas for peer matching.

-Local Planning-

Planning should be done at the local level as well, by:

- Characterizing the waste stream
- Setting municipal goals for recycling and source reduction
- Evaluating local markets
- Identifying incentives and disincentives for local integrated waste management
- Planning for "orphan" wastes
- Implementing true-cost accounting.

Plans should indicate the roles of the public and the private sector in implementing waste handling and other programs.

TABLE 2.

NEXT STEPS FOR EPA TO ENCOURAGE INCREASED PLANNING

Develop State Strategies

First regional workshop	APRIL	1989
EPA reviews selected state plans to provide Technical Assistance Program	AUGUST	1989

III. OBJECTIVE: INCREASE SOURCE REDUCTION ACTIVITIES

Source reduction, that is, minimizing toxics and volume in products and extending their useful life, is a key component for meeting national and local goals. Removal of toxics enhances the safety of recycling, landfilling, and combustion. Lead and cadmium are examples of known toxicants, present in variable quantities in many common products. Both lead and cadmium have been found in high concentrations in municipal waste combustor ash and leachate from municipal solid waste landfills. Volume reduction helps to eke out remaining capacity, thereby easing the "crisis" situation and allowing time for long-term planning. Although there are many players in source reduction, the design and manufacturing industry can provide a leadership role in instigating change and increasing source reduction activities. In addition, the Federal government can provide consistency through regulation or other national initiatives. Important source reduction activities include minimizing toxics, minimizing volume, increasing procurement of source-reduced goods and investigating ongoing source reduction activities.

By slowing the rate at which products are discarded, waste handling and disposal capacity can be extended.

Minimize Toxic Constituents and Materials in Municipal Solid Waste

Minimizing the amount of toxic constituents that enter the municipal solid waste stream is important in making every waste handling and management alternative safer. As discussed previously, minimizing toxic materials, such as lead and cadmium, can reduce metals in combustion ash residues, decrease the pollution potential of landfill leachate and combustor stack emissions, and increase the safety of recycling waste materials. Risk assessments are necessary, however, to determine if reducing risks at the disposal point in a product's lifecycle causes increased risks from the product at other points in its lifecycle, for example, during manufacture.

Products should not contain lead and cadmium when less toxic materials can be feasibly substituted. Lead and cadmium, although not the only toxic elements or compounds found in municipal waste, are good first candidates for examining the feasibility of substitution because high concentrations of both metals are found in combustor ash. Considerations for substitution include: the extent to which the metal is at a level or in a form that could lead to significant release upon disposal, technical feasibility, impact on product performance or cost, and financial burden to industry and the consumer. Industry should evaluate whether lead and cadmium can be feasibly replaced, while EPA will study the sources of lead and cadmium and determine regulatory and nonregulatory options.

Constituents other than lead and cadmium should be studied for their potential to release when disposed. These constituents could include those that have been found in municipal solid waste landfill leachate or air emissions, or combustor stack emissions and may include other metals and inorganic compounds, and organics. For example, source reduction policies applied to household hazardous waste can help decrease the toxicity of this waste, as well as minimize the volume.

Where substitution of less toxic materials would be burdensome, Industry should test products for their release and/or exposure when disposed of or recycled. Labeling those products that have been tested for disposal characteristics would be useful in informing the consumer and the waste handler how those products are best handled, recycled, or disposed.

Reversing the Increase in Per Capita Generation of Municipal Solid Waste Discards

-Manufacture of Products-

Minimizing the volume of products which are discarded into municipal solid waste will help reduce the per capita increase in waste generation, thereby changing "business as usual" in our society's garbage habits. In the long term, our nation must strive to decrease our current per capita generation rate of 3.5 pounds per day,

which is the highest in the world. In the short term, we have established a more modest, but achievable goal of stopping the increase in our per capita generation rate. If our per capita generation rate in the year 2000 were 3.5 pounds per day rather than the projected 3.94 pounds per day,* our total gross discards would be 171 million tons, rather than the projected 193 million tons. A decrease to 3.0 pounds per day would bring us below 150 million tons. In many instances, products, containers, and packaging should be made with less material. In other instances, the use of more material may be needed to facilitate reuse, thereby extending useful life. Thus, in developing products, manufacturers should consider the amount of waste generated in the disposal of their products and packaging, and should look for ways to reduce those wastes.

By slowing the rate at which products are discarded, waste handling and disposal capacity can be extended. Slowing the rate of generation of discards can be done by using products with longer useful lives, or that are reusable, repairable or can be remanufactured. For example, if the average consumer throws away only 16 tires in his/her lifetime instead of 32, then the amount of tires in the landfill, combustor, or tire pile is decreased by a factor of two. With approximately 220 million tires being discarded every year and 2 to 3 billion tires already stockpiled in potentially harmful monstrous heaps, this reduction in waste generation could have a tremendous impact. In designing products, manufacturers should consider whether the products, containers, and packages have longer lives, are reusable, or can be composted, in order to reduce the amount of waste that is generated. Similarly, consumers should be mindful of these considerations in purchasing products.

States have shown interest in economic incentives, including taxes, tax credits, and charges, and regulatory approaches to promote source reduction activities such as minimizing toxicity and volume of municipal solid waste. Although federal economic incentives and regulatory approaches may be useful in the future, EPA is not

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*Characteristics of Municipal Solid Waste in the United STates, 1960-2000. Franklin Associates, Ltd., 1988.

recommending their adoption at this time. Rather, EPA believes that these potentially useful tools require further assessment. For example, the Agency will assess the efficiency of state and local charges and taxes in reducing both the volume and toxicity of the waste. These charges, either fixed or variable, can be assessed at any transaction point from the manufacture of raw virgin materials through final disposal. There are a number of factors influencing the efficacy of a charge program that EPA will examine, including the ability of industry and the public to respond to the fees, the ease of assessing and collecting the charges, and the extent to which such charges change behavior. The study also will examine the use of economic incentives to promote source reduction.

To spur corporate involvement, a corporate recognition program is planned for companies and industries that have succeeded in reducing the volume and/or toxicity of materials used in their products. In addition, meetings between the chief executive officers of corporations and EPA senior officials will be conducted in order to educate corporate policy makers to source reduction, recycling and other waste management issues.

Organizing "Design for Source Reduction" workshops with design and packaging engineers, manufacturers, retailers, wholesalers and distributors and EPA will help build consideration of the waste management characteristics of their product into the corporate design and manufacturing process. Many factors are considered in design and manufacturing products; the Agency simply wants the waste management characteristics to be a part of that consideration.

-Waste Audits-

Businesses should conduct source reduction audits to find ways in which operations could be altered to generate less or to reuse wastes, including any nonhazardous solid process wastes that are entering the municipal solid waste stream.

For example, audits could suggest ways to reduce or reuse office and computer paper, to compost yard wastes generated by landscaping and construction companies, and reuse or recycle any process trimmings (e.g., leather, rubber, plastic, paper, wood) that are handled in the municipal solid waste stream. These commercial wastes often constitute a significant portion of the municipal waste stream. Therefore, localities should target these wastes and encourage industry to divert them, where practical, through source reduction and reuse.

-Backyard Composting-

Backyard composting can be a significant source reduction technique by reducing the amount of waste that must be collected and managed. (Compostable waste that must be managed by a waste handler or recycler in a central composting facility can be considered a form of recycling, whereas backyard composting can be considered reuse of a material and therefore a type of source reduction activity. The distinction is rather arbitrary, and thus is only for the purpose of discussion.) Public educational materials, school presentations, and workshops can encourage backyard composting of food and yard wastes by the homeowner. In addition, banning yard waste from landfills and combustors may provide a local incentive for composting.

Increase Procurement of Products and Packages with Source Reduction Attributes

By purchasing products that have source reduction attributes (less toxic materials, less volume of material per unit product, longer useful life), corporations and government can provide a leadership role for source reduction. Procurement helps to stimulate awareness of markets for these goods, which may provide incentives to industry to increase manufacture of these products and to phase out products that do not meet these specifications for source reduction.

Investigate Potential and Ongoing Source Reduction Policies and Activities

Because source reduction is a relatively new and difficult practice for municipal solid waste,* source reduction policies must be fully evaluated to determine their efficacy and impacts. For example, a study could be done of the actual reduction of waste in a household when purchasing habits are altered in favor of products designed for source reduction. Or, a pilot source reduction audit program for businesses could measure the results of source reduction efforts on the waste generated. Other areas of interest include:

- The use of photodegradable (degraded by sunlight) and biodegradable products and their impact on the environment and whether they are successful in alleviating solid waste and litter problems
- A database of source reduction related activities, including educational and legislative initiatives occurring in the United States and abroad (also examining the reasons these activities were undertaken and their degree of success)
- The effectiveness of programs that use fees to create incentives for households and businesses to reduce the quantity of waste they produce (including the effects on illegal dumping).

Summary of Participants in Increasing Source Reduction Activities

Obviously the most important participants in increasing source reduction activities are the manufacturing and design industries. They can assume a corporate leadership role in the United States to produce products that have less toxicity, generate less waste, have longer useful life spans, are reusable, repairable, or have other qualities that enhance waste management. In addition, trade associations should hold conferences and workshops for member companies focusing on design for effective waste management.

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*Some progress has been made in "waste minimization" or "source reduction" of industrial process waste (both hazardous and nonhazardous waste). Source reduction for municipal solid waste will build on those efforts.

Federal action to require removal of known toxic constituents from products may be necessary. In addition, Federal action may be necessary to ensure that manufacturers test these products, including household hazardous waste, and materials for their potential to release toxic constituents when landfilled, combusted, or recycled. EPA will evaluate the use of the Toxic Substances Control Act (TSCA), as well as investigate broader legislative mandates for authority for these requirements. In addition, EPA will continue to sponsor an annual national household hazardous waste conference to promote source reduction and proper collection and handling of these wastes.

EPA will work with the Department of Commerce and other agencies to investigate methods for stimulating industry to produce products with source reduction attributes. For example, a corporate recognition program which would spotlight manufacturers, businesses, and industries which engage in source reduction activities (e.g., minimizing waste volume and toxics generated) will be examined. In addition, EPA will sponsor studies on current state programs aimed at source reduction. As part of EPA's report to Congress on plastics, EPA will address the benefits and concerns associated with degradable plastics, and will seek to resolve the many questions about their efficacy in solving solid waste management problems.

Industry, all governments (Federal, state, and local) and the public should purchase products that minimize waste, are less toxic, last longer, or can be repaired or remanufactured. In the Federal government, EPA will be exploring, with the General Services Administration and other Federal Agencies, appropriate mechanisms to accomplish this goal.

TABLE 3.

NEXT STEPS FOR EPA TO ENCOURAGE INCREASED SOURCE REDUCTION ACTIVITIES

Minimize Toxic Constituents and Materials in Waste

Determine which products, if any, are sources of lead and cadmium	JANUARY	1989
Screen for potential substitutes for lead and cadmium	AUGUST	1989
Evaluate regulatory and non-regulatory options for restriction on, or substitution for lead and cadmium in products	NOVEMBER	1989
Initiate investigation of other toxic constituents in products	DECEMBER	1989
Evaluate need for Federal testing guidelines	NOVEMBER	1989

Minimize the Amount of Waste Generated

Study on economic incentives	DECEMBER	1989
Establish corporate recognition program	SEPTEMBER	1989
Design for source reduction workshops	JULY	1989

Increase Procurement of Products With Source Reduction Attributes

Form Federal Task Group to study procurement (same group as for procurement of recycled products)	NOVEMBER	1989
Study of possible changes in procurement policies	JUNE	1990

Study Ongoing or Potential Source Reduction Policies

Degradable Plastic Study by General Accounting Office	SEPTEMBER	1988
Initiate database for tracking state source reduction programs	JUNE	1989

TABLE 3. (Continued)

NEXT STEPS FOR EPA TO ENCOURAGE INCREASED SOURCE REDUCTION ACTIVITIES

EPA Report to Congress on Plastics	JUNE	1989
Initiate user fee study	NOVEMBER	1989
Household Hazardous Waste Conference.	NOVEMBER	1989

IV. OBJECTIVE: INCREASE RECYCLING

Recycling waste materials diverts potentially large volumes of wastes from landfills and combustors. Thus, recycling is absolutely vital to achieving local and national goals. Recycling is also important because it stops unnecessary depletion of valuable natural resources. Finally, recycling is an excellent educational tool to raise awareness in individuals of all types of waste management, because everyone must become conscious of what they do and do not discard. In order to increase recycling, markets must be available, more recyclables need to be separated, collected and marketed, a National Recycling Council should be formed, incentives and disincentives for safe recycling should be examined, and waste exchanges should be promoted. Of course, it is essential that, in the development of recycling programs, risks to human health and the environment are minimized from the recycling.

One of the many impediments to more recycling is the wide fluctuation of market availability for many secondary materials.

Stimulate Markets for Secondary Materials

One of the major impediments to more recycling is the wide fluctuation of market availability for many secondary materials. We need to stabilize both markets and supply so that they complement one another. Because recycling is often driven by demand, we need to stimulate the demand for these secondary materials to help avoid gluts in the marketplace and to coax change in our current industrial infrastructure. A variety of actions may result in market growth. These include the promotion of the procurement of recycled goods; market development studies for numerous commodities; nonprofit regional market information councils; procurement guidelines for recycled products; better separation and collection of plastics and lead-acid batteries; a National Recycling Council; studying liability disincentives and incentives; and waste exchanges.

-Establish Incentives-

States, including economic development agencies, have shown interest in tax credits and loans for industries using or processing secondary materials, or purchasing recycled goods as incentives for increasing these practices, thereby stimulating and stabilizing markets. Incentives must be targeted carefully to have a real impact. State and local incentives could include tax credits (including property taxes) and other fees in order to encourage existing industries to use secondary materials in the manufacture of products, or to lure secondary materials industries to communities that lack markets for their collected recyclables. Similar tax incentives could be used for industries and businesses that purchase recycled goods, as these companies are promoting stable final markets. Other incentives include low-interest loans for construction or expansion of secondary materials industries, and for businesses that purchase recycled goods. These economic incentives may be instrumental in changing individual and corporate behavior and will be included in the study on economic incentives noted earlier in the section on source reduction.

Each level of government should seek to identify and delineate economic disincentives to processing or purchasing secondary materials. Although many comprehensive analyses were done in the 1970's, tax laws and the economy have changed in the intervening years, creating a need to update our information.

Freight rates and other transportation issues are often cited as significant disincentives to procuring secondary materials. Given that transportation laws and policies have changed since the 1970's (when extensive studies were done), EPA will work with the Interstate Commerce Commission and the Department of Transportation to investigate whether transportation issues significantly affect the marketing of secondary materials, and whether changes to these policies are necessary to remove disincentives to creating stable markets.

Market development studies would be valuable in determining the regional, national, and international growth potential for the secondary (waste) paper market.

These studies, done at the state, regional, or Federal level, should evaluate ways to expand paper markets on a level concomitant with increased collection and separation of waste paper. EPA will conduct such a study, as well as similar studies on compost aluminum and glass. Market development studies for other secondary materials would identify ways to stimulate markets for these commodities. All market development studies should solicit input from the existing local and national secondary materials markets.

-Create Regional Market Councils-

Development of nonprofit regional market information councils can enhance communication among states and between localities so as to improve marketing and information-sharing regarding secondary materials and compost. To be effective, these councils must build on the existing markets and networks in their region. Such organizations can match markets with sellers and provide information on the amount and type of processing necessary, the long-term availability of the market, and the volumes that the market will bear. In addition, regional market councils can study regional market development and institute policies to enhance or stabilize markets. Membership in such an organization should include representatives from the waste management, manufacturing, and secondary materials industries, states, and public interest groups.

-More Procurement of Recycled Goods-

Procurement of recycled goods is an important way to stimulate final markets for recycled products. Organizations that purchase large amounts of products, such as governments, corporations and industry, can be especially helpful in stimulating markets. Purchases of recycled goods by consumers provide a clear signal to the manufacturing industry to produce and advertise recycled products.

Governments and corporations should issue procurement guidelines for recycled goods. Candidate products include numerous papers (office, computer, newsprint, corrugated, tissue), glass, plastic, compost, aluminum, steel, oil, tires, batteries,

etc. For example, the Federal government will study whether procurement guidelines should be issued for materials in addition to the ones already issued for paper, re-refined oils and tires, and the one in process for insulation materials. One example would be used automotive parts, or remanufactured engines or electronics. All levels of government could procure compost for use along roads and in landscaping public lands. EPA and GSA will form a working group with other Federal agencies to develop education and implementation programs for existing, planned, and potential guidelines in Federal agencies.

-Compost-

- **Yard Waste - Special Emphasis**

Composting of yard waste is a key element in the Agenda for Action because yard waste accounts for nearly one-fifth of municipal solid waste; it is a beneficial use; and the technologies, which vary from low-technology to high technology can be readily tailored to meet the needs of each community. As with recycling of other wastes, composting of yard waste is often cost-effective, especially when avoided costs are considered.

- **Co-Composting**

Compost from processed food and yard waste, municipal waste and co-composted municipal solid waste and sewage, and sludge is also an option which localities should explore. In Europe, composting facilities have been successfully operated for over 30 years. For example, in Sweden, over one-fourth of all solid waste is composted.

At the same time, it is important to assure that all composting facilities are run in an environmentally sound way and that the compost, itself, does not cause any significant environmental problems. Markets for compost also need to be further developed. Quality guidance for compost products are needed to provide national consistency and to assure that the compost will perform safely and adequately. EPA will establish guidelines for compost facilities and for compost. The Agency will also do a market development study for compost.

Better Separation, Collection and Processing of Materials

To reach a goal of increased recycling, more materials need to be separated, collected, processed, marketed and manufactured into new products. We have discussed ways to stimulate the two final steps (marketing, manufacture) of recycling, but we also need to stimulate the first three steps.

-Local Programs-

Collection, separation, and processing are essentially local issues, and as such, will not be discussed in detail in this report. In general, the more convenient collection is for the waste generator and for the waste handler, the higher the participation rate and amount of materials collected.

Many communities and states have devised successful mandatory or voluntary collection and separation programs. Again, the issue of mandatory versus voluntary programs is a local or state issue, depending on the community's or state's needs. Other local aspects of collection include the design of an education program and choosing among curbside pickup, drop-off centers, and materials recovery facilities. Local recycling coordinators can contribute significantly to the success of recycling programs. Training of these coordinators in education, collection, processing and marketing is therefore very important. EPA will generate guidance on training of recycling coordinators.

-Special Recyclables-

Two commodities currently are difficult to collect and/or process, but may be beneficial to recycle--plastics and lead-acid batteries. In addition, the processing of scrap metals by shredding (including appliances and automobiles) can present special problems.

Plastics are promising materials for increased recovery and recycling; however, collection and separation of different types of plastic are difficult, and hamper current recycling efforts. The voluntary coding of plastic types undertaken by the plastics industry is a helpful first step. Until plastic collection is substantially improved, recycling of plastics will continue to lag. Industry should step up its study of the problems and options for collection of plastics for recycling.

Lead-acid batteries are a problem to collect, process and dispose of. Although many are recycled, a significant number are not. Many battery recyclers are closing their doors, and many retailers and auto shops will not accept used batteries from the consumer. We must avoid potential risk to human health and the environment from the lead and acid in these uncollected (and possibly mismanaged) batteries. Regulatory and nonregulatory options for recovery of lead-acid batteries, including a mandatory "take-back," by manufacturers will be investigated to find practical ways to collect them for safe recycling.

"White goods" (appliances) and automobiles have been collected effectively by retailers and the scrap industry. Recently, however, the potential problems associated with the shredding of these goods may be detrimental to this important recycling sector. Possible contamination of the shredder residue with polychlorinated biphenyls (PCBs) and other contaminants must be investigated. We must ensure that these processes present little risk to human health and the environment, while assuring that the beneficial recycling of these materials continues.

Establish a National Recycling Council

A national advisory council on recycling policies should be formed, comprised of representatives from the secondary materials and waste management industries, public interest groups, states, localities and regional marketing cooperatives. This council would stay abreast of technical, regulatory, and legislative policies and initiatives that can enhance or hamper recycling efforts. The advisory council would also measure national progress in attaining goals of increased recycling. In

addition, a national council can explore international markets for secondary materials and study world trends. This council should obtain funding through its membership.

Examine Incentives and Disincentives For Safe Recycling

Industry has argued that potential liability under Superfund may inhibit the secondary materials and recycling industries from recycling materials such as lead-acid batteries, household hazardous waste, used oil, autos, and white goods (refrigerators, etc.). These secondary materials and recycling facilities may be liable because of the potentially toxic byproducts of processing, including lead and cadmium, and PCBs.

Potential liability may provide a disincentive for persons to operate a recycling facility, but also provides an important incentive for persons to properly manage their wastes. EPA should review the incentives and disincentives affecting these industries.

Industrial and Commercial Waste Exchanges

High volume homogeneous industrial or commercial wastes should be reused and recycled to the highest degree possible. As noted previously, these nonhazardous solid wastes can often end up as municipal solid waste, taking up valuable landfill capacity or disturbing operations at a combustion facility. Waste exchanges are an important way to relay these wastes from the point of generation to the market. In addition, these waste exchanges can often save companies significant costs in disposal. Many regional waste exchanges exist already. Communities and industries should access these existing networks or form new exchanges for their areas.

Summary of Participants in Increasing Recycling

-Participants for Stimulating Markets-

Economic incentives and disincentives should be reviewed by all levels of government and industry. EPA will update previous studies on economic factors, including transportation disincentives to recycling and potential economic incentives for industries processing or using secondary materials and for industries that purchase recycled goods.

Market studies for secondary materials should be done by industry and all levels of government. EPA will focus initially on paper and compost.

Industry should convert manufacturing processes to utilize secondary materials to a much greater extent, in order to stimulate secondary materials markets.

Everyone should purchase recycled goods where practical. EPA will form an Agency Working Group to foster federal procurement of recycled goods. This should be followed by establishment of a multi-agency Federal task group, made up of representatives from EPA, the General Services Administration, the Department of Defense, and other Federal agencies, to encourage Federal agencies to procure recycled goods and compost (e.g., National Park Service), and study how procurement of these goods may affect operations within the agencies. EPA has issued procurement guidelines for some commodities, including paper and tires, and is developing guidelines for others. The working group will also formulate ways for agencies to enforce procurement guidelines, to ensure that proper purchasing is occurring.

-Participants in Better Separation, Collection and Processing-

All levels of government should consider the merits of mandatory separation and collection of recyclables. An interagency working group will be convened to study the feasibility of a comprehensive separation and collection program for Federal Agencies. A model program to educate employees and encourage participation in paper recycling is under development by EPA.

Recycling in communities should be publicized by local governments and the waste management industry through the news media, schools, workshops, etc. The secondary materials industries should publicize their availability and existing network to the public and local government and should examine ways to expand their role in community recycling.

Industry working with government should continue to investigate ways to collect more plastics, while the Federal Government will investigate systems for assuring that car batteries are collected. EPA will evaluate the regulatory and nonregulatory options for promoting better management of batteries. Use of the Toxic Substances Control Act will be investigated. Finally, EPA will evaluate the management of "fluff" residue from shredding of white goods, autos, and other metals.

-Participants in Waste Exchanges-

States and industry should distribute information on existing waste exchanges through regional marketing councils and should assist local governments and industries in matching waste providers with recipients.

Municipalities and the waste management industry should characterize their waste streams and meet with the industries that contribute their solid wastes to the municipal solid waste stream. Local governments and waste handlers should develop local or regional waste exchanges and work with the industries at hand to find markets or uses for this waste.

TABLE 4.

NEXT STEPS FOR EPA TO PARTICIPATE IN AND ENCOURAGE INCREASED RECYCLING

Stimulate Markets for Secondary Materials

Study on existing economic and transportation disincentives to recycling	SEPTEMBER	1989
Study on potential recycling incentives to encourage recycling	DECEMBER	1989
Market development study for paper	SEPTEMBER	1989
Market development study for compost	SEPTEMBER	1989
Initiate guidelines for compost facilities	NOVEMBER	1989
Initiate guidelines for compost quality	NOVEMBER	1989
Form EPA Working Group for implementing procurement	NOVEMBER	1988
Form Federal Task Group for implementing procurement	NOVEMBER	1989
Final tire procurement guidelines	NOVEMBER	1988
Final insulation materials procurement guidelines	FEBRUARY	1989
Study on procurement of other materials	AUGUST	1989

Better Separation, Collection Processing and Recycling of Waste

Initiate model training program for recycling coordinators	NOVEMBER	1989
Review regulatory, non-regulatory options for batteries	AUGUST	1989
Evaluate recycling of white goods and other metals	ONGOING	
Form interagency work group on recycling and separation in Federal agencies	AUGUST	1989
Model education program for Federal agencies	JUNE	1989

TABLE 4. (Continued)

NEXT STEPS FOR EPA TO PARTICIPATE IN AND ENCOURAGE INCREASED RECYCLING

National Recycling Council

Facilitate the formation of the National Council	MARCH	1989

Review Incentives and Disincentive of Liability

Review of lead-acid batteries and metal-shredding byproducts	ONGOING

V. OBJECTIVE: REDUCE RISKS OF COMBUSTION

Combustion of municipal waste can be a viable waste management alternative for many communities. To increase the viability of this option, it is important to ensure that combustors are designed, operated, and controlled to minimize risks to human health and the environment from both air emissions and ash. Options for improving the safety of combustion include upgrading combustor performance standards, increasing education and technical assistance, establishing operator training and certification programs, and evaluating potential bans on combustion of some types of waste.

Combustion of waste can be a viable waste management alternative if it is designed, operated, and controlled to minimize risks to human health and the environment.

Upgrade Combustor Performance Standards and Ash Management

-Air Emissions-

The establishment of appropriate performance standards for municipal waste combustors serves several purposes, including protection of human health and the environment, consistency and efficiency in the design and operation of combustors, and increased public confidence in the safety of combustors. Standards for particulate matter control from combustors were initially established in the 1970's. Since then, pollution control technologies applicable to combustors have improved significantly.

Considering these technological improvements and other information compiled during the EPA's comprehensive study of municipal waste combustion, EPA issued an Advanced Notice of Proposed Rulemaking (ANPR) announcing intentions to revise standards for combustors. EPA plans to issue both performance standards for new sources and guidelines for states to use in considering additional control requirements for existing sources. These regulatory requirements for new and existing

combustors should ensure that the public health and environment are protected through the application of the best system of control technologies available considering cost, energy requirements, and other environmental considerations.

The current schedule calls for the new source standards and existing source guidelines to be proposed in November 1989 and promulgated in December 1990. In the interim, EPA has already taken steps to ensure that new sources install the best available control technologies. In June 1987, EPA issued guidance to new source permitting authorities that established the presumption that best available control technologies for combustors include dry scrubbers, efficient particulate control equipment, and good combustion practices. A recent survey of affected sources demonstrated one hundred percent compliance with the June 1987 guidance.

-Ash Management-

No combustor should be built without a plan for management of the residual ash. Such plans might include dedicated landfill cells with special pollution controls, stabilization, or contracts for recycling the ash for use in roadbeds. Local government should require a plan for safe and effective ash management when contracting for a combustion facility.

Education and Technical Assistance

Education and technical assistance regarding the combustion of municipal solid waste are important in increasing the safety and effectiveness of combustion. Citizens who are more educated about the design and operation of combustors can better assist in the planning for local waste management, and may be more willing to site properly designed and operated combustors. Operators of combustion facilities as well as local government can use technical assistance offered by the Federal government and industry in order to ensure safe and effective combustion of the waste.

All levels of government (local, state, tribal, and Federal) need to educate their citizens about the risks and benefits of municipal solid waste combustion, in addition to the other issues mentioned previously in this report. Local governments need to involve citizens in the decision-making process. Citizens want to know about the risks that they may be assuming in siting a facility in their neighborhood. Information on risks, as well as other relevant issues will be included in EPA's update of the Decisionmakers Guide.

Operator Certification

Operator training and certification programs can help ensure safe and effective operation of the combustor and pollution control equipment. Issues that need to be resolved concerning training and certification include: which level of government should establish training and certification requirements, which specific combustor plant personnel should be trained and/or certified, how frequently certification should be renewed, and others.

Some states have already initiated training and certification programs. EPA has maintained close contact both with these states and with the American Society of Mechanical Engineers (ASME) during ASME's ongoing efforts to develop a model combustor training and certification program. Although states and/or local governments are best suited to actually administer such programs, EPA will be considering the value of establishing model operator training and certification standards or guidance during the development of the regulatory program for new and existing combustors.

Banning Particular Wastes from Combustors

Existing data indicate that certain waste materials contribute relatively significant amounts of hazardous constituents to emissions and ash (especially toxic organics and heavy metals). However, data are currently inadequate to determine

precisely the effect on air emissions and ash of eliminating specific materials from the waste stream prior to combustion. EPA has commissioned a study to identify major sources of lead and cadmium which are disposed of in the municipal solid waste stream. As a follow up to this study, EPA will do a preliminary screen to see if there are potential substitutes for significant sources of lead or cadmium. If suitable substitutes may be available for lead or cadmium in any products, a regulatory evaluation will be initiated for those products to determine if restrictions on, or substitution for lead or cadmium is appropriate.

Despite the current paucity of data, individual governments at the state and local level may wish to consider banning specific waste materials from existing or planned combustors for various reasons. For example, a municipality struggling to initiate an effective yard waste composting program may find that banning yard wastes from combustion may increase composting rates. Such yard waste bans may also improve combustion of the rest of the waste stream by reducing moisture content and ensuring more consistent Btu values through the seasons. Local governments considering bans of certain wastes from combustors should ensure that sufficient capacity is available to properly handle the banned waste, and that the management option for the banned waste does not pose a greater risk to human health and the environment.

Municipal Waste Combustor Permits

Some states and communities have a policy of issuing combustor permits only when the combustor was planned as part of an overall evaluation of integrated waste management, including recycling. Thus, waste managers and planners would have to at least consider the practicality of establishing a recycling and/or composting program. Such practices can help to prevent reliance on "single solutions" and promote the concepts and practices of integrated waste management. Other communities should consider such action in order to leverage consideration of recycling programs and ensure proper planning.

TABLE 5.

NEXT STEPS FOR EPA TO HELP REDUCE THE RISKS OF COMBUSTION

Upgrade Combustor Performance Standards and Ash Management

Proposed air emission standards	NOVEMBER	1989
Final air emission standards	DECEMBER	1990

Operator Certification

Resolve issues	JUNE	1989
Decide whether to develop a model operator certification program	NOVEMBER	1989

Bans on Materials from Incinerators (See also Table 3, Minimizing Toxic Constituents and Materials in Waste)

Provide information on problem wastes (see also Table 6, Bans on Materials from Landfills)	DECEMBER	1989

VI. OBJECTIVE: REDUCE RISKS OF LANDFILLS

Municipal solid waste landfills are used to dispose of the majority of our nation's municipal solid waste, and will continue to be essential in the future. Although increased source reduction and recycling will reduce the volumes of waste going to landfills, and may make some waste more benign, we must increase the safety of landfills to ensure protection of human health and the environment, as well as public support when new ones must be sited. Operator certification, minimum design and operation standards, education and technical assistance, and studies on potential bans of some wastes from landfills all contribute to reaching the goal of increased safety and reduced volumes of waste needing landfilling.

Operator Certification

Properly designed and operated landfills require knowledgeable operators in order to ensure efficient and safe compaction of waste without damage to liners, leachate collection systems, or other design features. In addition, the monitoring required at municipal landfills requires an experienced operator. Certification of operators can help ensure that experienced operators run the facilities and equipment. Increasing the safety and effective use of landfills through certification can help prevent problems endangering human health and the environment, can increase public confidence, and can extend precious landfill capacity.

Municipal solid waste landfills are used to dispose of the majority of our nation's municipal solid waste, and will continue to be essential in the future.

Any certification of landfill operators should occur through state programs or through programs developed by trade and industry associations. EPA is planning to provide guidance on certification to states that want to develop and implement a

certification program. These programs could work similarly to the programs for combustor operator certification.

Increase Design and Operation Standards and Guidance

Minimum standards for the design and operation of landfills are critical for ensuring protection of human health and the environment over both the short and long term. Properly designed and operated landfills should provide safe disposal of waste, but do not efficiently reduce the bulk or toxicity of the waste. Thus, waste disposed in landfills degrades very slowly and safe design and operation throughout the life of the landfill is crucial.

Minimum standards for design and operation of landfills exist at both the Federal and state level. Revised minimum standards for design, operation, and location of landfills, including monitoring, closure and corrective action requirements were proposed by EPA on August 30, 1988, in response to requirements under the Hazardous and Solid Waste Amendments of 1984. When final, these standards will help to prevent future problems with releases of toxic constituents to ground and surface waters. Remedial action for existing and/or closed landfills that are posing potential threats to human health and the environment is also important. States must adopt and enforce these standards for existing landfills in order to ensure safe and effective operation of landfills. Many states have already developed stringent standards for operation and design of landfills.

EPA has also been developing air emission standards for new and existing landfills under the Clean Air Act to control emissions of volatile organic compounds that create an odor nuisance as well as a potential hazard to human health and the environment.

Education and Technical Assistance

Education and technical assistance by all levels of government and industry can decrease the risks posed by landfilling, upgrade design and operation, and increase public confidence in the management practice.

There is ongoing debate about the landfill characteristics which are best for managing municipal solid waste. This debate is concerned with whether a landfill should be "dry" (to prevent any leaching of hazardous constituents) or "wet" (to promote degradation at a higher rate). EPA will sponsor a technical conference of experts and engineers to further discuss this question, and any research necessary in the area.

As mentioned earlier in the section on combustion, education about risks, benefits, and other relevant information should be available to everyone. The decisionmakers guide which was mentioned earlier will include a discussion on landfills.

Finally, guidance on implementing EPA's final revised landfill criteria will be necessary for municipal waste landfill owners and operators. EPA will develop this guidance to aid in proper implementation.

Bans on Certain Wastes from Landfills

It may be desirable to restrict or ban certain wastes from landfills in order to increase the safety and effective management of the landfill and leachate collection system. Some wastes may be "bad actors" by contributing hazardous constituents to landfill leachate, producing explosive levels of methane gas or producing toxic air emissions.

What wastes, if any, should be banned from landfills should be considered by the Federal government, states and municipalities. EPA will provide information on which

constituents should be considered by states and localities for bans. Constituents such as oil, household hazardous waste, car batteries, tires, and yard waste will be considered by EPA. For any proposed bans, the management practice that would take the place of landfilling should be evaluated to ensure that this alternate management practice has sufficient current or future capacity and poses fewer risks than landfilling. For example, states and municipalities should ensure that composting facilities have adequate capacity to handle a large influx of yard waste which may have been banned from the landfill, or that new composting facilities will be built.

Landfill Permits

Some states and communities have a policy of issuing landfill permits only when the landfill was planned as part of an overall evaluation of integrated waste management, including recycling. Thus, waste managers and planners would have to at least consider the practicality of establishing a recycling and/or composting program. Such practices can help to prevent reliance on "single solutions" and promote the concepts and practices of integrated waste management. Other communities should consider such action in order to leverage consideration of recycling programs and ensure proper planning.

TABLE 6

NEXT STEPS FOR EPA TO HELP REDUCE THE RISKS OF LANDFILLING

Operator certification

Training materials for operators	SEPTEMBER	1989
State certification guidance	DECEMBER	1990

Design and operation standards

Propose revised minimum criteria for landfills	AUGUST	1988
Issue final criteria	DECEMBER	1989
Air emission standards proposed	MAY	1990
Final air emission standards	AUGUST	1991

Education and Technical Assistance

Technical guidance for the revised landfill criteria	JANUARY	1990

Bans on Materials from Landfilling (see also Table 3, Minimizing Toxic Constituents and Materials in Waste)

Provide information on problem wastes (see also Table 5, Ban on Materials from combustors)	DECEMBER	1989

CONCLUSION

Our nation has choices as to how we are going to deal with our ever-growing garbage problem. We can continue to create more and more garbage, or we can cut back. We can continue to bury most of our waste, or we can find feasible ways to recycle more of it. We can design products and packaging without considering disposal or we can design for source reduction and recycling. We can wait for local crises to occur or we can plan now to avoid them. In short, we can ignore the issue and hope it goes away, which it will not, or we can act now to deal with it. But whether we like it or not, our garbage is no longer "out of sight and out of mind."

The Agenda for Action establishes a "game plan" for addressing our garbage problem which underscores the need for an effective integrated waste management approach. including source reduction, recycling, combustion, and landfilling. It is not a panacea. but the Agency believes that its implementation will go a long way in safely eliminating the gap between the generation of garbage and our capacity to handle it, as well as provide for waste management that protects both human health and the environment.

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