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THE REALITIES OF RECYCLING

(Summary)

Report to the
1973 Minnesota State Legislature

Prepared by

Minnesota Pollution Control Agency
Special Services Division -- Weston Fisher and Jacquelyn Burke

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Summary

Introduction

Regardless of the value judgment placed on Americans' propensity to consume, the fact remains that consumption patterns in the United States have meant increased air and water pollution, limited mineral and energy resources, and mountains of trash. The solid waste stream in America has rushed from a trickling stream to Niagara Falls in the space of 50 years. In the past, few cared or even thought about the sorry consequences of the throw-away mentality. But times change. Increasing public attention on the solid waste problem has created a new awareness among the people of America and new demands for harnessing the rampant surge of waste and reversing its calamitous direction.

Recognizing this demand, the 1971 Minnesota Legislature requested a study of possible solid waste management options, particularly recycling. This report discusses the various options for reducing solid waste and makes recommendations for governmental action to both minimize solid waste and encourage rational use of resources.

Chapter I

In Minnesota, an estimated 6.2 billion pounds of municipal waste was generated in 1972. Such an amount would require enough garbage trucks to fill a two lane

highway in an unbroken line from the Twin Cities to San Francisco, California. Collecting, transporting and disposing of this material cost Minnesotans about \$62 million. With no action to reduce solid waste growth trends, Minnesotans might expect to pay \$111 million for solid waste removal by 1980.

In considering the results of a reduction in solid waste generation, one must include not just obvious problems of land use and costs but also such long-range implications as energy and resource savings and direct environmental impact. The basic thrust of this report is to suggest that a state program is needed in Minnesota to encourage the prudent use of materials to minimize solid waste generation and its attendant environmental impact, resource loss and cost to Minnesotans. Above all, policies should be adopted which create thrift in resource use.

One way to achieve such a new ethic of thrift is to discourage the single use and discard practices prevalent today, the proliferation of nonessential and overpackaged products, and the emphasis on "newness" and short-lifetime products. These behavioral trends administer a one-two environmental punch by needlessly wasting energy and natural resources and adding to the solid waste burden. Specifically in this regard, it is strongly recommended that Minnesota adopt policies which:

1) restrict the use of materials or solid waste components having an undesirable environmental or resource impact;

2) further examine and encourage through regulation, subsidy, or other means, extension of product lifetime for components entering the solid waste stream; and

3) encourage, through regulation, less wasteful use of materials having undesirable environmental or resource impact.

These policies might be implemented through encouragement of the following measures:

1) Increasing energy and mineral efficiencies in manufacturing, operating and maintaining products and equipment;

2) recycling materials where that alternative is feasible and designing materials to increase their recyclability;

3) discouraging nonessential uses; and

4) extending product lifetime.

Preliminary examination of those four avenues indicates that the greatest energy resource savings can be realized not through recycling, but through development of increased efficiencies in manufacturing, operating, and maintaining products and equipment and through extension of product lifetime. In fact, the state should not expend its very limited revenue at this time in the subsidization of large scale recycling operations, but rather such funds should be applied to realizing the above goal.

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Chapter II

Solid waste management techniques are chiefly disposal techniques. Those most commonly used are disposal in sanitary landfills and incineration. Both these methods have been found to be interim measures at best. Neither really provides answers to the more fundamental questions of solid waste generation.

One option to disposal is recycling. Though recycling has become a household word, some of the hard facts and subtle implications of recycling are not commonly known. Much consumer waste material cannot be recycled for lack of technology in sorting different materials used in the same package. The recycling of some material requires greater energy demand and creates more of an environmental impact than simply throwing the material away. Most important, demand for recycled materials must increase if recycling is to have a meaningful impact on the flow of solid waste.

Systems to Recover Energy from Solid Waste

These include

- 1) incineration with energy recovery;
- 2) a method known as pyrolysis;
- 3) anaerobic digestion to produce methane; and
- 4) the Hydrasposal/Fibreclaim System.

Of these methods, anaerobic digestion appears to have the least impact on the environment and offers the largest energy recovery. It is recommended that this form of energy recovery be

investigated further, particularly the potential costs and benefits of small generators associated with sewage plants, canning operations, feedlots, farming operations, and septic tanks. The other methods do not show significant recoverable energy potential.

Another solid waste management technique, large-scale composting, is not presently viable, although future potential may exist.

Volunteer recycling centers do little more than attract public attention to solid waste generation and, to a certain extent, educate the public about secondary materials. Consumers have traditionally placed a low value on products containing reclaimed materials largely due to the fear that "secondary" implies inferior quality. Volunteer recycling centers have helped the public to understand, however, that "secondary" refers to source of the material, not quality. Nonetheless, volunteer recycling centers are inefficient, may consume more energy than they save, and appear to lack economic feasibility. For these reasons and because solid waste management cannot be based upon volunteer efforts, it is recommended that the state not assist in the development of volunteer recycling centers.

Chapter III

Energy requirements for the production of material ultimately reaching the solid waste stream should be a major consideration in determining the methods of reducing solid waste.

From what is known about energy requirements for solid waste components, the following conclusions and recommendations can be made:

- 1) "Throw-away" products should not be made of aluminum.
- 2) Recycling of steel and aluminum should be encouraged.
- 3) Recycling of paper should be preferred over incineration of paper to generate power.
- 4) Paper packaging of all sorts is preferred over plastic packaging, unless the plastic packaging is re-used several times.
- 5) Returnable beverage containers should be much preferred over non-returnables.
- 6) Manufacturing of glass bottles from virgin material is currently preferred over "remelt" recycling of throw-away bottles.
- 7) Waste glass should not be used as material for asphalt.

Chapter IV

Paper

About half of Minnesota's 6.2 billion pounds of yearly waste consists of paper, generally classified as either packaging or non-packaging. Packaging material normally enters the solid waste stream within a month of use and nearly always within a year. Non-packaging paper generally has longer life; however, some, like newspapers quickly enter the waste stream.

The problem with waste paper is deciding whether to simply dispose of it through burial or incineration or to reclaim it as energy or pulp. It has been demonstrated through various studies that recycling paper is a better option than burning it in an attempt to reclaim energy. Therefore, it is recommended that steps be taken to encourage the further recycling of paper products for pulp reclamation.

About 22 percent of the nation's paper production was recycled in 1970, compared to the World War II level of 35 percent. Recycling paper is a complicated business, but steps can be taken to simplify the procedure and thus increase the percentage of paper recycled. One of the chief difficulties is the removal of non-paper material, such as cellophane windows in envelopes, to prepare the paper for recycling. Such intentional foreign material in paper products -- dubbed "pernicious contraries" by the British -- should not be used in paper products if the fibre is to be reclaimed.

Most of the 22 percent of waste paper now recycled occurs during the manufacturing and distribution stages where there are large, homogeneous flows of paper located on site or within hauling distance of a potential user. Of the 22 percent, only about 3 percent of the recycled paper comes from residential post-consumer sources. If the important precondition of increased demand is met, perhaps the greatest potential for increased recycling lies with post-consumer waste paper from commercial sources.

Most residential waste paper lacks the mass and homogeneity necessary to easily facilitate recycling. Short of newspapers,

it appears that residential paper waste could best be reduced at the source by restricting such things as unnecessary and excess packaging. However, waste paper from the commercial sector (business, industry, and government) could and should be recycled at a much higher rate. It is therefore recommended that the state of Minnesota and private business examine internal operations to determine potentials for waste paper recovery by:

- 1) determining local market demand for various paper grades;
- 2) identifying within internal operations, large, homogeneous flows of marketable paper; and
- 3) studying methods and economics of collection, sorting and sale of reclaimed material.

Also, the state should take the lead in developing reclaimed fiber markets by adopting procurement policies including maximum amounts of recycled content wherever possible.

As another step toward encouraging the recycling of waste paper, the state should, through tax and other policies, encourage the development of re-pulping facilities in or near metropolitan areas.

It should be stressed, however, that efforts to increase the percentage of waste paper recycled cannot be achieved without first increasing demand for recycled paper products. This is really the key to more recycling of paper.

Leaves

With leaves included in the statewide burning ban, more and more of them have entered the solid waste stream in Minnesota, creating an added solid waste burden and representing a loss of potentially valuable soil conditioning material.

It is recommended that residents compost their leaves wherever possible and that excess leaves be composted by cities or counties, rather than placed in landfills.

Plastic Packaging

From a commercial viewpoint, the businessman who advised Dustin Hoffman in the film The Graduate, to enter the plastics industry was dead right. The manufacture of plastic packaging alone jumped from 333 million pounds in 1958 to 1.8 billion pounds in 1966 -- a 550 percent increase in eight years. Also, plastic type bottles are rapidly replacing the glass bottle in a number of areas. There is no doubt, however, that the increased use of plastic in American society has had a severe environmental impact.

Because virtually all plastic is derived from petroleum, single use of plastic packaging material represents a disturbing misuse of this non-renewable resource. Also, because most plastic material does not decompose, it tends to accumulate in the biosphere and in some cases may actually interfere with biochemical processes in living systems.

Certain plastics have especially detrimental environmental impacts. Polyvinyl chloride -- the clear plastic of the rigid shatterproof bottle -- produces hydrochloric acid when incinerated. The so-called "floating plastics", such as the styrofoam cup, cannot be biologically degraded and may become a permanent floating contaminant of lakes and oceans. Plastic shotgun shells are an increasingly visible residue in Minnesota forests. Steps should be taken to restrict the use of such materials.

With growth in the plastics industry increasing, non-returnable use of all plastic should be discouraged, including over-wrapping of foods and consumer goods with plastic film and the use of the one-way plastic bottle. Use of plastic one-way milk, soft drink, beer, and liquor bottles should be prohibited in Minnesota.

Aluminum Containers

The aluminum can share of the metal container market jumped from 3.6 percent in 1965 to 10.7 percent in 1970, with further inroads into this market continuing. In 1968, the amount of aluminum used for metal cans was roughly equal to the amount of aluminum used by the shipbuilding, railroad and aircraft industries combined. By 1971, the use of aluminum for metal cans had almost doubled over the 1968 level.

Aluminum production requires much more energy consumption than does steel, with the result that an apparent unnecessary loss of energy occurs through the use of aluminum for one-way

packaging. Because of this high energy requirement, coupled with pollution associated with aluminum smelting and refining, it is recommended that aluminum not be used in making food or beverage containers, and that a prohibition of the sale and manufacture of all-aluminum containers be instituted in Minnesota, excluding frozen food packaging until some acceptable alternative is found.

Cans and Glass Bottles Other Than Containers for Beer and Soft Drinks

Growth in non-beverage cans and glass bottles is relatively low due chiefly to the rapid growth of plastics in this area. For the general category of non-beverage containers, it is recommended that a state plan be developed for the gradual introduction of standardized containers to facilitate recycling or reuse.

The Aerosol Can

The aerosol can represents the worst in packaging from both an environmental and resource standpoint. Because the aerosol can represents a highly energy consumptive package, a health hazard, an explosive hazard, and a package which cannot be recycled, it is recommended that its use be severely restricted.

Beverage Containers

As late as 1958, 98 percent of packaged soft drinks came in returnable bottles with a corresponding figure of 58 percent for beer. Then came an intensive effort by can manufacturers

and retailers to further penetrate the soft drink and beer markets. The result has been most successful, with one prediction indicating that by 1975, 82 percent of packaged soft drinks will be in non-returnables.

In Minnesota, per capita consumption of non-returnable beverage containers is projected to rise to 215 units in 1973, up from 58 in 1958, with the most dramatic growth occurring in non-returnable bottle consumption from 8 units in 1958 to 77 projected for 1973.

From the viewpoint of energy savings, use of all returnable beverage containers in 1971 would have saved roughly the energy equivalent of nearly 23 million gallons of oil in Minnesota alone, or about 6 gallons per Minnesota resident. This is on the order of 4 times the energy to be saved by recycling 25,000 automobiles. On the national level, an all-returnable system for beverage containers would create an energy saving roughly equivalent to pyrolyzing one-half the total U.S. residential, commercial, and industrial wastes. And with domestic natural gas supplies running low, it is estimated that some 967 million cubic feet of natural gas could have been saved in Minnesota in 1971 from a ban on non-returnables.

Nationally, more steel was used in making non-returnable beverage containers in 1968 than in the entire shipbuilding industry. A ban on non-returnables in Minnesota would result in a state savings of an estimated 23,600 tons of steel per year, roughly the savings to be realized by recycling 18,880

automobiles. An all-returnable system nationwide would save nearly 2 million tons of steel annually.

Non-returnables also contribute significantly to the solid waste stream entering Minnesota landfills. A ban or deposit on non-returnable beverage containers would reduce the estimated number of beverage units entering Minnesota landfills in 1973 by nearly 90 percent -- from about 874 million units to about 90 million. This would mean an equivalent reduction in solid waste of 12,258 truckloads per year of an average 15 cubic yard garbage truck.

In short, many environmental benefits would result from a ban or deposit on non-returnables, including a reduction in energy consumption, a saving in minerals and materials consumed, a reduction in solid waste generated, monetary savings for Minnesota consumers on the order of \$24 million, and a reduction in litter.

Abandoned Motor Vehicles

The 1971 Minnesota Legislature enacted a \$1 fee on the transfer of title of any motor vehicle weighing over 1,000 pounds in order to finance a new abandoned motor vehicle recycling program administered by the Solid Waste Division of the Minnesota Pollution Control Agency for the 1971 biennium. The Agency estimates roughly 25,000 abandoned vehicles will be recycled under this program in fiscal 1973. The program should result in major savings of both mineral and energy resources and its success should provide a model for legislation in other areas where incentives for reuse and recycling of materials are long overdue.

Chapter V

It is no longer sufficient for the state to deal with solid waste by simply regulating its collection, transportation and disposal. It is imperative that the state begin to deal with materials use before solid waste is created.

Perhaps the major recommendation of this report is that a state program is needed to encourage the use of materials in a manner which minimizes environmental impact, resource loss, and economic cost to the people of Minnesota. This program should be given the authority, staff and funds to carry out the above goal.

In addition, the state should immediately examine internal operations to identify:

- 1) unnecessary materials consumption and waste generation,
- 2) policies which discriminate against secondary materials,
- 3) purchase and use of materials and products which are difficult to recycle, and
- 4) potentials for salvaging waste.

We would also urge the Legislature to take several additional immediate steps:

- 1) A ban on throw-away soft drink and beer containers.
- 2) A ban on all-aluminum container sale and manufacture, excluding frozen food packaging until an acceptable alternative is found.

3) A one-cent tax on single-use plastic containers and a twenty-five cent tax on aerosol cans to discourage use and to generate revenues for the state materials use program.

4) A prohibition on retail sales of throw-away plastic milk, soft drink, beer, and liquor containers.

5) Restrictions on the use of plastics having detrimental environmental impacts such as floating plastics, PVC plastics, and plastic shotgun shells.

It is further recommended that there be no major state funding for programs involving incineration or pyrolysis of solid waste to generate power. Similarly, there should be no state funding of volunteer recycling programs.