STATE OF MAINE

WASTE MANAGEMENT AND RECYCLING PLAN

June 15, 1998

Prepared by the
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VISION STATEMENT:
1998 WASTE MANAGEMENT AND RECYCLING PLAN

The 1998 Waste Management and Recycling Plan will serve as an important source of information and policy guidance for solid waste issues in Maine. The development of this document is part of an ongoing planning process for managing Maine's solid waste; an updated plan is submitted to the legislature every five years. The analysis and projections provided are based upon the most current available data and information. However, unforeseen or physical changes in the solid waste infrastructure are likely to have an impact on these projections.

The State Planning Office believes that the plan should not be a static document which may be outdated long before the next scheduled plan update. It is hoped that this plan will become a living document which will respond to changes and developments in the solid waste infrastructure. It is SPO's goal to provide ongoing analysis and recommendations throughout the next five year planning cycle.

SPO's work plan is closely tied to the recommended state actions in the plan. While it is not possible to devote resources during the coming year to every project outlined in the plan, SPO has identified certain priority areas for 1998. We will continue to reevaluate our work plan and priorities in conjunction with new developments and needs.

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I. EXECUTIVE SUMMARY

A. Introduction

The 1998 Waste Management and Recycling Plan is presented in two parts. Part I focuses exclusively on Municipal Solid Waste (MSW); the recently completed Part II addresses all sections which provide information on special waste. The combined Part I and II documents serve as the Waste Management and Recycling Plan.

This plan will serve as a foundation for future state solid waste programs. As a result, it is critically important that all the information and data are as accurate and complete as possible. In the process of developing the plan, it came to light that the special waste sections of the plan would benefit greatly from additional data collection and analysis. For this reason, the decision was made to delay submission of the special waste sections and allow for additional time to evaluate further data needs and develop a data collection process. This data collection and analyses process was recently completed and the new information is incorporated into the plan.

B. Solid Waste Infrastructure

In general, Maine is successfully managing its solid waste. The combination of a balanced mix of management practices and consistent generation has enabled a solid waste infrastructure to evolve which provides reliable options and allows for relatively stable markets and costs. Some of the key components of this system include:

- a statewide municipal solid waste (MSW) recycling rate of 41%
- 2 commercial landfills with anticipated life past 2010.
- a ban on new commercial landfills which has reduced the importation of out-of-state waste
- 4 waste-to-energy facilities serving as the primary disposal method for much of the state's MSW.

Unless an unforeseen shutdown at a disposal facility were to take place or recycling/composting/beneficial use markets changed dramatically, we can expect the current system to continue to reliably manage Maine's solid waste for the next 5 years. While the outlook after five years is less certain, current projections indicate that there is adequate municipal and commercial landfill capacity for about the next 15 years.

However, to ensure that solid waste facilities can continue to manage the state's solid waste, we must remain active in investigating alternatives which reduce the dependence on landfills and effectively handle any increases in solid waste generation. An important part of this strategy will be to enhance markets for recyclables and diverted material.

C. Statistical highlights

The following statistics highlight some of the significant findings on Municipal Solid Waste (MSW) for 1996 and Special Waste for 1997.

Municipal Solid Waste:

- An estimated 90% of Maine households have access to recycling programs, up from 72% in 1992.

- The ban on new commercial landfills and the closing of most municipal landfills has left 10 remaining landfills in Maine (8 municipal and 2 commercial). This has effectively diverted most MSW into Maine's waste-to-energy incinerators.

The following statistics were derived from 1995 annual municipal solid waste reports submitted to SPO:

- Maine residents and businesses generated 1,339,352 tons of MSW, up slightly from 1,293,401 in 1993 and 1,245,745 in 1991. MSW generation in Maine has remained relatively stable over the past 7 years and, based on the projected economic activity and demographic changes, it is expected to continue to increase slowly in the near future.

- 41% of the municipal solid waste (MSW) stream was recycled statewide. This is a significant improvement over the 33% rate for 1993 and moves the state considerably closer to its 50% goal set for 1998. Maine now ranks among the top 10% of states ranked by percent of municipal solid waste recycled.

- Nearly 40% of the MSW generated was incinerated in one of Maine's four waste-to-energy incinerators. This level has remained stable over the past few years.

- The remaining 19% of Maine's MSW was managed through a combination of landfilling (12%), exporting (6%) and other methods (1%). The percent of landfilled MSW dropped from 34% in 1991 to 12% in 1995.

Special Waste:

[Because the data for Municipal Solid Waste (MSW) was collected in 1995 and Special Waste in 1997, aggregating and comparing MSW and Special Waste data is not appropriate. In addition, the methodology for computing total generation in the paper industry has changed since the last 5 year plan (uses 1991 data). Specifically, the methodology used to calculate the 1991 total overestimates waste totals. This is because certain wastes were managed by multiple methods and the waste was counted at each management level. Therefore, comparing 1991 and 1997 total waste generation amounts is also not appropriate.]

- The paper industry generated around 75% of the state's special waste in 1997 (1,321,821 tons). The three primary management practices for paper industry wastes were landfilling (51%), incineration (26%) and beneficial/other uses (13%). The remaining 9% is composted, sent to an in-state-disposal facility, land applied and sent out-of-state. This breakdown can be compared to the 1991 management breakdown: landfilling (68%); incineration (20%); and recycling/reuse (less than 3%). The remaining 9% was landspread, sent-out-of-state, or composted.

- In 1997, 445,390 tons of non paper company special wastes were generated. This is slightly lower than the 510,000 tons generated in 1991. This reduction resulted from lower asbestos, oil contaminated soil, and power plant ash generation. Offsetting that decrease was a slight increase in MSW ash generation.

- Sewage sludge, or biosolids, continue to be managed primarily through landspreading and composting. In 1997, about 76% of sewage sludge was landspread or composted; this is below levels for 1996 (89%) and 1995 (84%). The reduction in landspreading and composting is at least partially related to increased restrictions in available land for both activities.

D. Major Solid Waste Issues

Four major issues in MSW management have been identified. These include:

1. Costs of Solid Waste Management for Municipalities

Solid waste handling and disposal costs have risen significantly in recent years, often making this municipal budget responsibility among the top five items on municipal expense sheets. To address this issue, the plan provides analysis of two major areas of concern for municipal decision-makers and residents:

a. Reducing solid waste management costs; and

b. Soundly managing solid waste generated within the state with an emphasis on the hierarchy -- reducing, reusing, recycling and composting.

Unfortunately, these two goals may be in conflict. To help municipal decision-makers sort through their options and balance these goals, the plan reviews solid waste strategies, and presents options and recommendations for individuals, communities, regional entities, and state government to consider when developing and refining their solid waste programs.

2. Markets

Markets for secondary materials have become more important in MSW management programs as recycling and composting programs draw more and more materials out of the waste stream. For communities that are at 35% or higher recycling rates, the amount of materials being captured constitutes a significant volume of their MSW stream. Having secure and stable markets for those separated items helps the program to succeed and allows for future program expansion. Obtaining higher value for the recyclables helps stabilize program costs. The plan explores the need for viable markets for all of Maine's reusable waste products.

3. Construction and Demolition Debris disposal

Management of construction, demolition and bulky wastes appears to be a growing problem. These wastes are typically landfilled; with the increased costs of locating and licensing disposal facilities for these materials, overall costs of disposal are rising. The state plan discusses these wastes as potential resources rather than only as waste products. By improving the management of construction/demolition and bulky wastes, costs can be controlled and the volume of material requiring landfilling can be reduced, further extending the life of landfills.

4. Beneficial Use

Beneficial use is the substitution of a waste product for a raw material in a manufacturing process, as a construction material or as a fuel. Currently, MEDEP is working to establish rules and procedures for beneficial use. The department's process involves calculation of the health and environmental risks associated with this substitution of waste for a virgin material and establishing under what conditions the beneficial use of wastes is appropriate. The outcome of this process is likely to have a major impact on the extent to which certain waste streams will be diverted from landfills. Beneficial use rules are near completion; this process was developed through the MEDEP's Chapter 418 rulemaking process; all requirements for proposed uses are contingent upon passage of the draft rules as presented.

Some examples of beneficial uses include using chipped tires and ash in road construction base and burning wood and tire waste in industrial boilers. Wood wastes, old tires, and ash constitute a significant portion of the solid waste stream. To the extent that these can be safely substituted for virgin materials, the state should promote these practices.

II. DEFINING THE SCOPE AND GOALS OF THE PLAN

A. Waste Management and Recycling Plan Statute

The requirements of the plan are clearly outlined in statute. The State Planning Office is to prepare the plan, in consultation with the DEP, every five years. According to 38MRSA 2122 (State waste management and recycling plan), the objective of the plan is to:

"prepare an analysis of, and plan for, the management, reduction, and recycling of solid waste for the state. It should be based on the priorities and recycling goals established in sections 2101 and 2132 [statewide 50% recycling rate]. The plan must provide guidance and direction to municipalities in planning and implementing waste management and recycling programs at the state, regional and local levels."

It further states that as part of the 5-year revision process, the plan "should incorporate changes in waste generation trends, changes in waste recycling and disposal technologies, development of new waste generating activities and other factors affecting solid waste management as the office [State Planning Office] finds appropriate".

In 38 MRSA 2132-A (State plan contents), it states that the plan must include the following:

1. **Waste characterization.** The state plan must be based on a comprehensive analysis of solid waste generated, recycled and disposed of in the State. Data collected must include, but not be limited to, the source, type and amount of waste currently generated; and the costs and types of waste management employed including recycling, composting, landspreading, incineration or landfilling.

2. **Waste reduction and recycling assessment.** The state plan must include an assessment of the extent to which waste generation can be reduced at the source and the extent to which recycling can be increased.

3. **Determination of existing and potential disposal capacity.** The state plan must identify existing solid waste disposal and management capacity within the State and the potential for expansion of that capacity.

4. **Projected demand for capacity**. The state plan must identify the State's need for current and future solid waste disposal capacity by type of solid waste, including identification of need over the next 5-year, 10-year and 20-year periods.

The scope of the plan is intended to be comprehensive, addressing all solid waste issues (MSW, CDD and Special Waste) to the extent possible. While Maine defines MSW to include construction and demolition debris, it will be addressed as a separate waste stream in order to draw attention to the unique management challenges it poses.

B. Applicability/Statutory references

The Plan is referenced in a number of solid waste statutes guiding state policy. Some of the more significant references include:

1. Public Benefit Determination of new or expanded solid waste disposal facilities (38 M.R.S.A. Section 1310-AA)

The statute on public benefit determination states that:
"Prior to submitting an application under section 1310-N for a license for a new or expanded solid waste disposal facility, a person must apply to the (DEP) commissioner for determination of whether the proposed facility provides a substantial public benefit."

The three standards to be used by the commissioner in the review of proposed solid waste disposal facilities for public benefit determination are:

a. Does the proposed solid waste disposal facility meet immediate, short-term or long-term capacity needs of the State;

b. Except for expansion of a commercial solid waste disposal facility that accepts only special waste for landfilling, is the proposed solid waste disposal facility consistent with the state waste management and recycling plan; and

c. The proposed solid waste disposal facility is not inconsistent with local, regional or state waste collection, storage, transportation, processing or disposal.

"In making the determination of whether the facility provides a substantial public benefit, the commissioner shall consider the state plan, written information submitted in support of the application and any other written information the commissioner considers relevant. The commissioner may hold a public meeting in the vicinity of the proposed facility to take public comments and shall consider those comments in making the determination."

The state's Solid Waste Generation and Disposal Capacity Report, which provides data for evaluating the first standard above, is updated by the State Planning Office every two years. The Waste Management and Recycling Plan, the guide for the second standard (consistency with the state plan), is revised every five years by the State Planning Office. These two documents are valuable tools in the commissioner's review process.

The statute is further defined and explained in the proposed Department of Environmental Protection's 'Solid Waste Management Regulations' that are scheduled to go through the Rulemaking process in early 1998. The draft rules (CMR 400.5) state that the application for a determination of public benefit shall be made on a form provided by the Department which includes a demonstration that the proposed

solid waste disposal facility meets the three standards defined above. It is recommended that in order to be consistent with the state plan, the applying entity must report:

1) achievements in meeting the State's recycling and waste reduction goals; and
2) plans for how the proposed facility will help achieve the municipal, regional, and State waste reduction, reuse and recycling goals.

It is proposed that when an application for public benefit determination for a proposed solid waste disposal facility is submitted to the DEP, the commissioner consult with the State Planning Office to receive current solid waste data or program information that would be used in their review of the application.

2. Innovative Disposal and Utilization (38 M.R.S.A. 1304. 13) and Beneficial Use

This statute states: "Recognizing that environmentally suitable sites for waste disposal are in limited supply and represent a critical natural resource, the (DEP) commissioner may investigate and implement with the approval of the board innovative programs for managing, utilizing and disposing of solid waste. Innovative programs may include agricultural and forest landspreading of wood-derived ash, utilization of ash resulting from combustion of municipal solid waste, paper mill sludges, municipal waste water treatment plant sludges and the composting of yard wastes. The office (SPO) shall first determine that the proposed innovative disposal and waste management programs are consistent with the state plan. The commissioner shall review proposed innovative programs for each waste category and shall apply all controls necessary to ensure the protection of the environment and public health consistent with this chapter....."

Further application of the above statute is in 'Beneficial Use'. Beneficial use is the substitution of a waste product for a raw material in a manufacturing process, as a construction material, or as a fuel. Beneficial use is defined more thoroughly in the draft 'Solid Waste Management Regulations'; this definition is included in the definitions section of the plan. 'Beneficial use of waste' is related to the broader category of "innovative disposal and management technologies" specifically in land applications of certain sludges and other ash, residue and solid waste utilization projects.

It is proposed that where the office shall first determine that the proposed innovative disposal and waste management programs are consistent with the state plan, the office may recommend the evaluation and/or implementation of specific innovative disposal and waste management technologies.

This course of action recognizes that the development and application of innovative options may be largely based upon advances in technological and environmental sciences and, as a result, constant review and study will be necessary in order to bring these alternatives to the forefront in managing the state's solid wastes. Adopted DEP rules should result in minimum regulation of benign materials, allowing market forces to encourage development of options in this area.

C. Definitions

The plan will address each waste stream (as defined below) throughout each section of the plan. In this way, the plan will be as comprehensive as possible in addressing all solid waste issues in Maine.

The following are definitions for the purposes of the plan:

Beneficial use. * -- "Beneficial use" means to substitute a solid waste or waste derived product for a raw material such as, but not limited to, using the waste in a manufacturing process, as a construction material, or as a fuel. In order to constitute a beneficial use, the solid waste or waste derived product must be used in such a fashion that:

discharges of harmful constituents to the land, water, and air are minimized, and either:

a.) the waste provides an acceptable substitute for a comparable product produce with raw materials or meets or exceeds generally accepted product specifications and standards for that product, or

b.) the waste provides an acceptable substitute for fuels in a conventional fossil fuel or biomass fuel boiler or cement kiln.

Beneficial use includes agronomic utilization.

*** This is the proposed definition for beneficial use. For the purposes of the plan, this should be considered the definition.**

BEP: "BEP" means the Maine Board of Environmental Protection

Biosolids: Municipal wastewater treatment plant solids (sludge). This material, once stabilized, can be used for agricultural and horticultural applications (also referred to as sewage sludge).

Bulky MSW: "Bulky waste" means useless, unwanted or discarded tires, appliances, furniture or furnishings, wood waste, yard waste, inert fill, land clearing debris and construction and demolition debris.

Capture rate: "Capture rate" means the rate at which recyclables are recovered from the waste stream.

Commercial solid waste facility: "Commercial solid waste facility" means a privately owned waste facility that accepts waste from another for consideration and is used for the management of waste generated by persons who do not own or operate the facility. The term does not include a waste facility owned, controlled, operated or used exclusively by:

1. A public waste disposal corporation formed under 38 MRSA, section 1304-B, subsection 5;

2. A municipality acting under 38 MRSA, section 1305;

3. A refuse disposal district formed under the Maine Refuse Disposal District Enabling Act, 38 MRSA, section 1701 et. seq.;

4. The office under chapter 24 (38 MRSA section 2101, et seq);

5. The person or entity generating the solid waste disposed of at the facility, except that the facility may accept, on a nonprofit basis, no more than 15% of all solid waste accepted on an annual average that is not generated by the owner. A solid disposal facility receiving ash resulting from the combustion of municipal solid waste or refuse-derived fuel is not exempt from this subsection solely by the operation of this paragraph; or

6. A private corporation that accepts material-separated, refuse-derived fuel as a supplemental fuel and does not otherwise burn waste other than its own.

Composting. "Composting" means the biological decomposition of organic residuals under predominantly aerobic conditions and controlled temperatures between 110° and 150° F.

Construction and Demolition Debris (CDD): "CDD" means debris resulting from construction, remodeling, repair and demolition of structures. It excludes asbestos and other special wastes.

DEP: "DEP" means the Maine Department of Environmental Protection.

Disposal: "Disposal" means the discharge, deposit, dumping, incineration, spilling, leaking or placing of any solid waste, refuse-derived fuel or sludge into or on any land, air, water so that the solid waste or sludge or any constituent thereof may enter the environment or be emitted into the air, or discharged into any waters, including ground waters.

Front End Process Residue (FEPR): "FEPR" means the waste and byproducts including but not limited to ferrous metals, glass, grit, fine organic matter, and other solid waste removed from the MSW waste stream prior to incineration to increase its btu value.

Incineration: "Incineration" means the process by which municipal solid waste or refuse-derived fuel is disposed of through combustion, including combustion for the generation of heat, steam or electricity.

Municipal Solid Waste (MSW): Municipal solid waste (MSW) is the normal nonliquid waste from households, commercial establishments, and institutions, (e.g., schools and municipal offices). Liquid wastes, discarded automobiles, industrial wastes, hazardous and special wastes are excluded from Maine's MSW definitions.

Nonbulky MSW: MSW materials that can be placed in a 30 gallon garbage bag and that are not considered bulky waste.

Office: "Office" means the State Planning Office.

Recycling: Means the collection, separation, recovery and sale or reuse of materials that would otherwise be disposed of or processed as waste or the mechanized separation and treatment of waste, other than through combustion, and the creation and recovery of reusable materials other than as a fuel for the generation of electricity.

Reuse: "Reuse", for the purposes of the plan, means that the subsequent use(s) of the waste item are functionally the same as the original use.

Sludge: "Sludge" means any solid, semi-solid or liquid waste generated by a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or wet process air pollution control facility or any other such waste having similar characteristics and effect, but does not include industrial discharges that are the point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880).

Solid Waste: "Solid Waste" means the useless, unwanted or discarded solid material with insufficient liquid content to be free-flowing, including, but not limited to rubbish, garbage, refuse-derived fuel, scrap materials, junk, refuse, inert fill material and yard waste, but does not include hazardous waste, biomedical waste, septage or agricultural wastes. The fact that a solid waste or constituent of the waste may have value or other use or may be sold or exchanged does not exclude it from this definition. Solid waste includes both municipal solid waste and special waste.

Solid Waste Landfill: "Solid waste landfill" means a waste disposal facility for the disposal of solid waste on or in land. This term does not include landspreading sites used in programs approved by the Department of Environmental Protection.

Special Waste: Solid Waste, generated by sources other than domestic and typical commercial establishments, that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, that it may disrupt or impair effective waste management or threaten public health, human safety or the environment and requires special handling, transportation and disposal procedures. Special Waste includes, but is not limited to:

1. Oil, coal, wood and multi-fuel boiler and incinerator ash;
2. Industrial and industrial process waste;
3. Wastewater treatment sludge, paper mill sludge and other sludge waste;
4. Debris and residuals from nonhazardous chemical spills and cleanup of those spills;
5. Contaminated soils and dredge spoils;
6. Asbestos and asbestos containing waste;
7. Sand blast grit and nonliquid waste;
8. High and low pH waste;
9. Spent filter media and residue; and

10. Other waste designated by the BEP, by rule.

Waste Reduction: "Waste reduction" means an action that reduces waste at the point of generation and may also be referred to as "source reduction".

Waste-to-Energy facility: "Waste-to-energy facility" means a facility that processes and/or combusts waste to produce fuel or energy. The four waste-to-energy facilities in Maine are:

- Maine Energy Recovery Company (Maine Energy), Biddeford
- Mid-Maine Waste Action Corporation (MMWAC), Auburn
- Penobscot Energy Recovery Company (PERC), Orrington
- Regional Waste Systems (RWS), South Portland

Waste Water Treatment Facility: "Waste Water Treatment Facility" means, for the purposes of this plan, a publicly-owned facility which processes (and manages) sewage sludge.

D. Data Sources

Data for the plan is based on the following sources:
All MSW data is based on Annual Municipal Solid Waste Reports, a private Broker/End-User Survey for commercial recycling data (collected every two years), and annual disposal facility reports (landfills and incinerators).

All special waste data is based on DEP Annual Municipal/Commercial/Industrial Landfill Special Waste Reports, DEP Sludge/Residual Utilization Program Annual Reports, and a 1998 Paper Industry Solid Waste Survey.

MUNICIPAL SOLID WASTE

III. WASTE CHARACTERIZATION AND MANAGEMENT

A. Municipal Solid Waste

1. generated, recycled, disposed

Municipal Solid Waste (MSW) generation in Maine has grown relatively slowly over the past seven years and, based on projected economic activity and demographic changes within the state, the rate of growth is not expected to change significantly in the near future. Maine residents and visitors generated 1,339,352 tons of MSW in 1995, slightly up from 1,293,401 in 1993 and 1,245,745 in 1991. MSW management methods and amounts (disposal, recycling, and generation) are examined for 1995 (**Figure 1**). These numbers were adjusted to account for imports and exports across state lines in order to include only waste generated in Maine.

The State Planning Office estimates that 41% of municipal solid waste was recycled in 1995. This is a significant improvement over the 33% rate for 1993 and marks a praiseworthy milestone for Maine. The methodology for determining the statewide recycling rate is described in Appendix A. For the purpose of calculating the state MSW recycling rate, the definition of recycling includes recycling, composting and reuse.

In 1989, the Maine State Legislature established the statewide goal of recycling 50% of the municipal solid waste. The target date to accomplish this was set for 1995 and later amended to 1998. This goal reflected the need to address Maine's solid waste disposal crisis, which grew from increased disposal costs and decreasing available landfill capacity.

A comparison of MSW generated, recycled and disposed was made for 1988, 1991, 1993 and 1995 (**Figure 2**). It demonstrates that recycling has handled a steadily increasing portion of Maine's MSW stream.

2. source, type, amount

Data for this section have been taken from a study conducted by the University of Maine in 1991, and EPA's solid waste update for 1996.

In 1991, the University undertook a waste audit study, entitled Maine's Household Garbage, of fourteen communities within the State. Populations ranged from 355 to 33,181 residents in coastal and inland rural, suburban, and urban communities. Garbage generation was broken down into two major categories, bulky and non-bulky, with the non-bulky separated further into 31 sub-categories. **Table 1** illustrates the annual average percentage weight of nonbulky waste categories for all measured municipalities.

The Environmental Protection Agency's national municipal solid waste breakdown, by composition and rates, is similar to what we find in Maine. **Figure 3** illustrates how waste generation in the U.S. has increased since 1960 on a per capita basis. It reveals that while total waste generation has risen steadily from 1960 to 1995, per capita generation has leveled since 1990.

Residential versus commercial waste generation rates

Actual field data on this issue is difficult to attain for the entire state. Some disposal facilities track commercial vs. residential deliveries while others do not. Sometimes collectors of trash are allowed to mix commercial waste on the same truck as residential, which quickly clouds measurement efforts. Based on conversations with landfill and transfer station operators, communities with populations near or above 10,000 generated half to two-thirds of the solid waste from commercial sources; communities above 20,000 generated three quarters of their solid waste from commercial activities; communities under 5,000 may find the opposite - - three quarters of the solid waste is from residents.

This solid waste generation determination is an important link in moving the State towards its' 50% MSW recycling goal. By better understanding the nonresidential portion of the municipal solid waste stream, which represents over 50% of Maine's MSW, appropriate reduction, recycling and composting programs may be developed and implemented.

3. management methods and costs

Alternative management methods for disposing of MSW (bulky & nonbulky) have been and continue to be a major focus of state solid waste programs. These alternatives include reuse, recycling, composting, and beneficial use. This section will describe all of the management methods, including incineration and landfilling, and the role each plays in managing Maine's MSW. It also details the costs for each method. In addition, section IV will discuss possible strategies for increasing the use of disposal alternatives and highlight areas where there is potential for improvement.

a. Reuse

The term "reuse", for the purposes of the plan, applies when the subsequent use(s) of the waste item are functionally the same as the original use. One method used to reduce or delay the flow of MSW discards into the solid waste stream is through reuse of the material. Reuse may be as simple as passing usable clothing on to others or turning non-usable clothing into rags, and reusing containers for storage. It may be more complex, as in the transfer of manufacturing byproducts to production facilities that are able to use these resources. Materials exchange programs are in place in Aroostook County (Aroostook Building Materials Bank) and Gray (Building Materials Exchange). Another materials exchange may be forming in eastern Maine. In addition, a number of municipalities have created swap barns as a reuse service for residents.

b. Recycling

One of the great successes of the past five years has been the creation of a statewide recycling infrastructure that is likely to remain a permanent part of the waste management system. In 1995, the state reached a statewide recycling rate of 41%, up from 33% in 1993.

In addition, more Maine households are recycling today than ever before. Access to recycling programs increased from 72% in 1992 to an estimated 90% in 1996. This is the result of expanded recycling programs and greater public awareness. Even with increasing levels of participation in recycling, however, there remains the challenge both to reduce the amount of waste generated and also to improve the recovery rates for recyclable materials. **Table 2** provides a comparison by material of tons recycled for 1993 and 1995, which highlights the changes in recovery rates for each material.

Recycling programs and related costs

Municipal recycling programs are typically designed and modified to ensure maximum material recovery. As a result, a variety of program formats and strategies have been successfully employed throughout the State. Presented here is an overview of common recycling programs and related collection costs. Actual data are available for individual programs. However, to compare similar programs may be misleading due to the type of information included in each financial report and their particular form of accounting. Other factors to consider when comparing data are whether or not the program is mandatory or voluntary; whether or not there is a fee incentive encouraging recycling; and how long the program has been in place.

Typically, recycling program costs may be broken into three major areas:

- collection of recyclables
- processing of recyclables
- marketing of recyclables

i) Collection costs:

The relationship between collection of recyclables and delivery to the recycling center represents a major financial cost. The three systems in place in Maine today are:

curbside programs: a vehicle goes from stop to stop collecting recyclables; that total cost is usually borne by the program.

remote drop-off programs: capital collection costs are primarily the investment in containers. Because delivery of recyclables is the responsibility of the generator, hauling filled containers to the recycling center is the major operating cost to the program.

facility drop-off programs: the generator delivers the recyclables directly to the processing center. As a result, there are no collection costs to the program.

Municipal Solid Waste
Management methods -- 1995

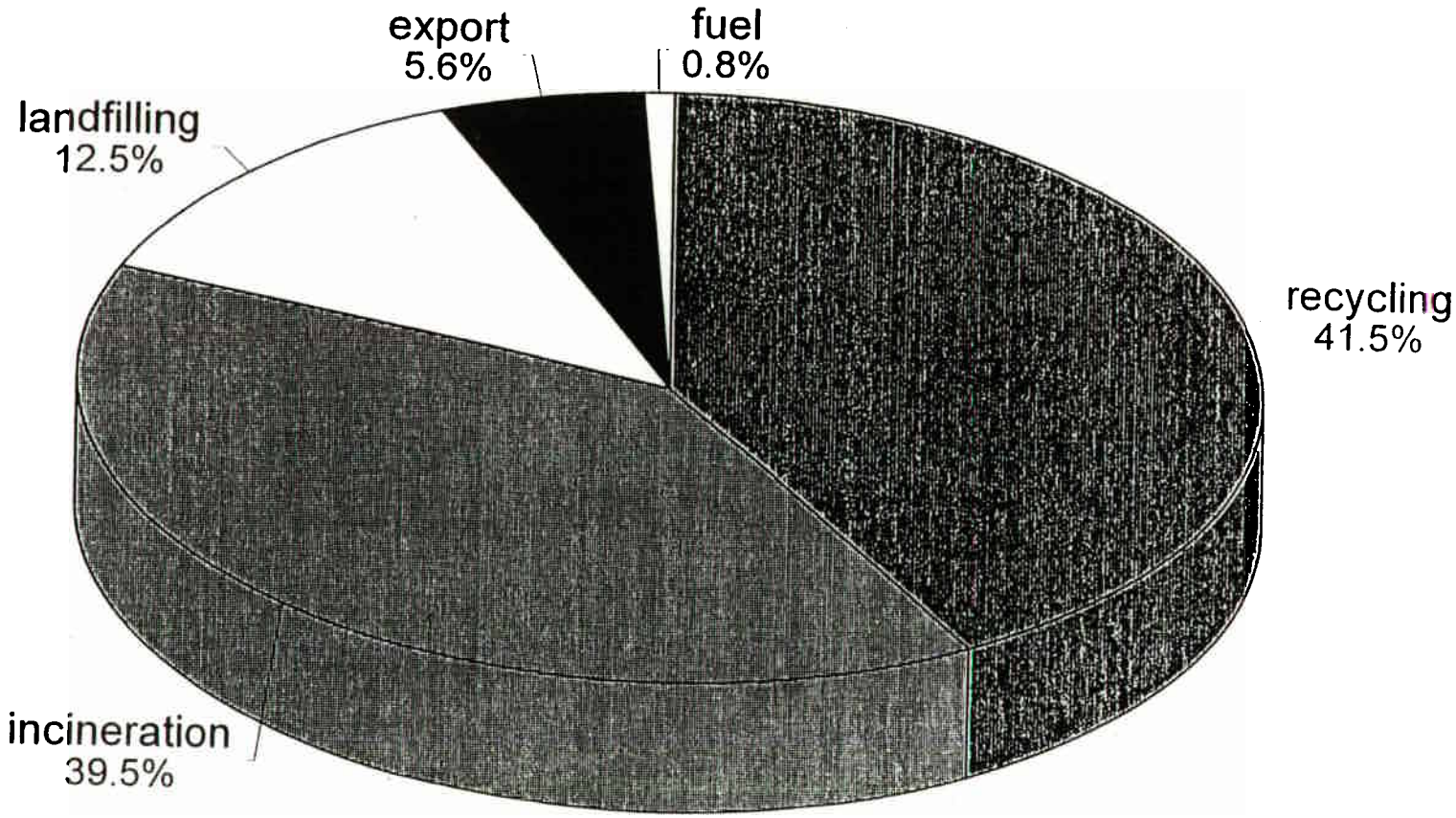


Figure 1

Municipal Solid Waste

Generation & Management 1988-1995

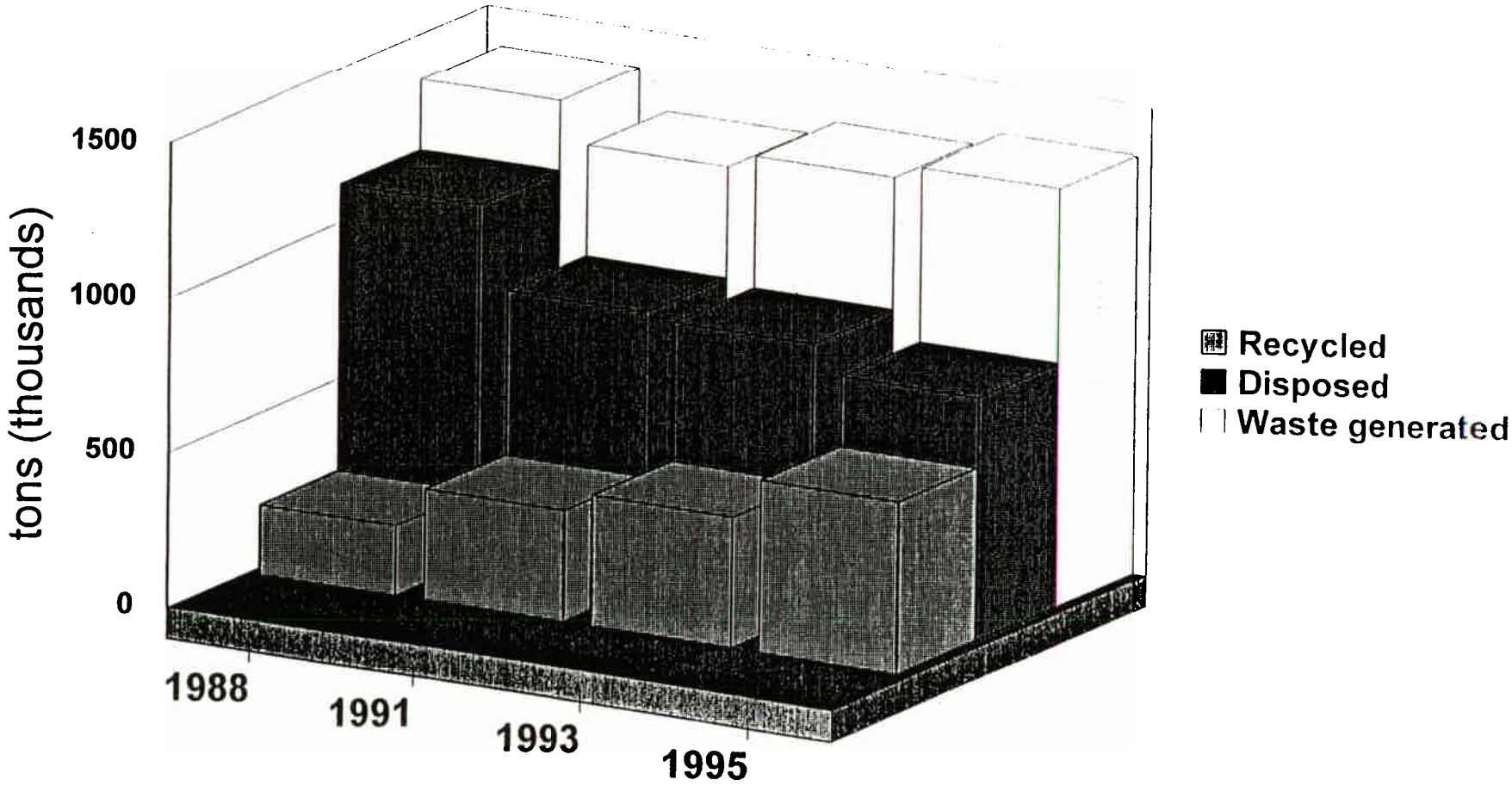


Figure 2

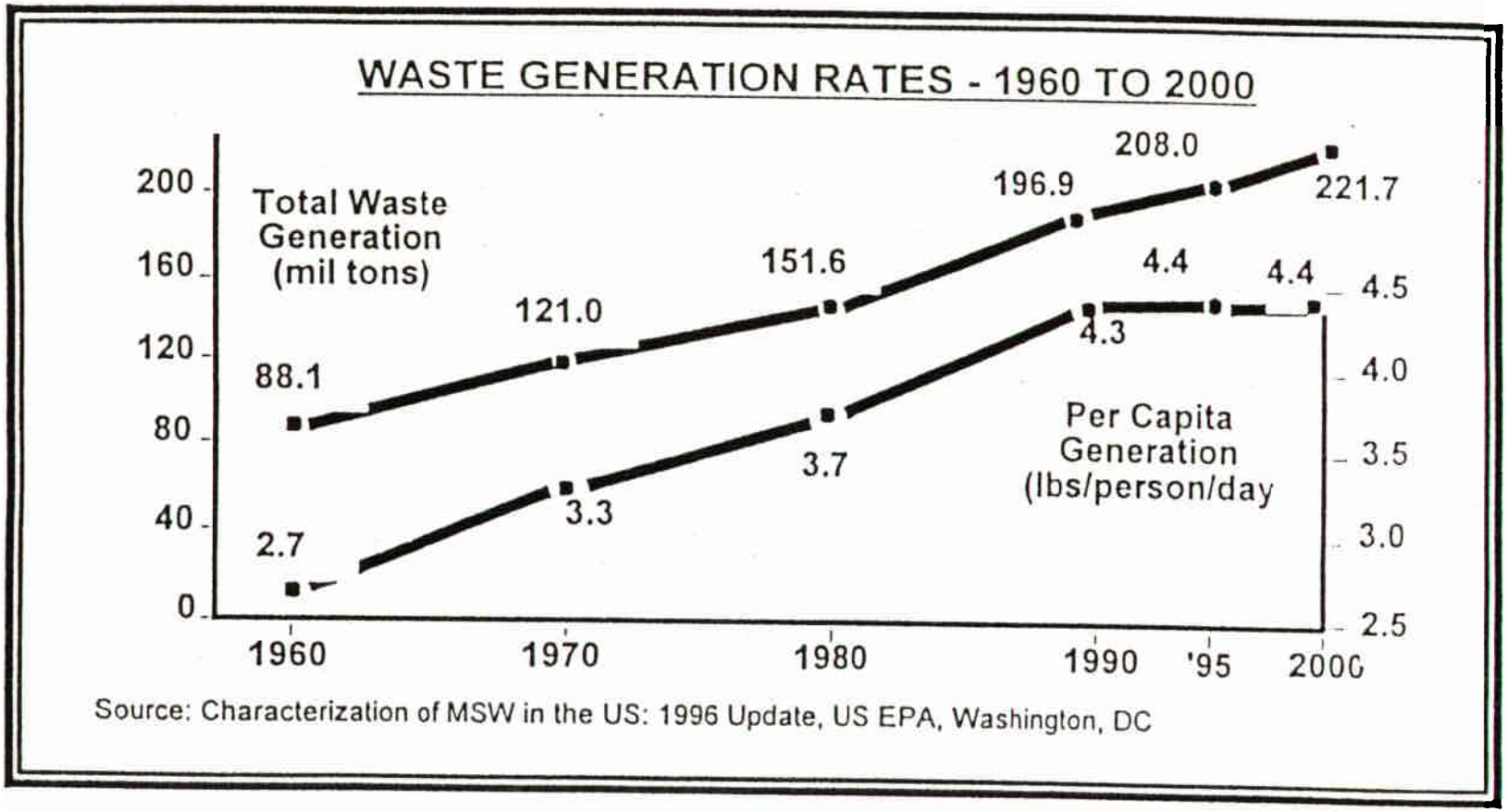
Annual average percentage weight of waste categories for all municipalities.

Waste Category	Percentage NBDSW*	Percentage of Category
Paper		
Corrugated	2.92	8.83
Highgrade	3.04	9.22
Magazines	2.92	8.84
Newspaper	9.88	29.91
Other	14.09	42.64
Telephone Books	0.19	0.56
Total Paper	33.04	100
Plastic		
Bags	1.59	23.81
HDPE	1.23	18.41
Other	2.75	41.07
Rigid	1.12	16.71
Total Plastic	6.69	100
Glass		
Clear	3.39	83.46
Green/Brown	0.17	4.28
Other	0.50	12.26
Total Glass	4.06	100
Metal		
Aluminum	0.39	11.76
Ferrous	0.55	16.72
Nonferrous	0.07	2.09
Tin/Steel Cans	2.28	69.43
Total Metal	3.29	100
Other		
Food Waste	27.81	52.56
Batteries	0.13	0.25
Cat-Pet	3.86	7.30
Composite	4.74	8.96
Cosmetic/Toilet	0.61	1.15
Deposit Cont.	0.67	1.27
Diapers	3.78	7.14
Furniture/Carpeting	0.46	0.87
Hazardous	1.32	2.49
Household Demo	2.14	4.04
Miscellaneous	3.15	5.95
Textiles	4.24	8.01
Total Other Waste	52.91	100

Note: Some sub-columns rounded to 100.

Table 1

* NBDSW represents the residential portion of nonbulky MSW.



Printed from the MSW Factbook, Ver. 4.0, Office of Solid Waste, USEPA, Washington, DC, 1997.

Figure 3

From another standpoint, the costs to the environment of a curbside program (i.e., one vehicle collecting from 2500 residences) versus 2500 residences delivering their own recyclables to a drop-off facility has a value that is not typically factored into recycling program costs. On the other hand, the number of acceptable recyclables from a drop-off program may be higher in number than with a curbside program, although that in turn may not be true with a co-mingled or 'blue bag' curbside program.

Curbside

Curbside collection is considered to be the most effective collection system for the recovery of recyclables because it is easy for residents to participate and community peer pressure comes in to play. In this program, residents place designated recyclables at the curb for collection by the designated collector, (typically the trash collector). Recyclable collection may be the same day as trash collection (the most effective system) or it may be done on another day. Collection may be weekly or less often. The menu of accepted recyclables varies from community to community.

Costs to consider when evaluating a possible curbside program:

- Number of potential stops per collection mile
- Number and type of recyclables to be collected
- Furnishing of curbside containers (if done)
- System of curb placement (bagged, separated, mixed)
- Type of vehicle utilized (public owned/private owned - grant purchase)
- Percentage of resident participation anticipated
- Equipment costs
- Employee costs
- Resident education

[Cost examples: Bath - $.41/stop; Presque Isle (included in trash collection charge); Lewiston $.45/stop.]

Remote location drop-off

In this recycling program, containers (typically compartmentalized roll-ons or 'igloos') are placed throughout the community for people to deposit their recyclables. Selection of accessible sites may include shopping centers, public office building areas, transfer stations or major business locations. The containers are hauled away either when the container is full or on a set schedule and the accumulated recyclables are then delivered to a processing center. This type of collection system is most common for regions and groups of communities where the designated recycling center is not easily accessible for residents (or not permitted). The list of accepted materials may vary from region to region. The cost of hauling the filled containers to the processing facility may be borne by the generating community or by the regional entity operating the recycling center. Often a major problem is the contamination of the recyclables within the container, by garbage or by unacceptable recyclables.

MAINE STATE PLANNING OFFICE
1995 MAINE MSW RECYCLING SUMMARY

Materials	1995 Adjusted Total	1993 Adjusted Total
Office Paper	35,672.63	34,763.00
OCC	138,758.84	67,964.00
ONP	29,238.45	24,117.00
OMG	13,805.00	5,477.00
Mixed Paper	24,521.42	52,349.00
Other Paper	5,112.29	0.00
Total Paper	**247,108.63**	**184,670.00**
NonFer'sMetal	42,520.50	5,010.00
Bulky Ferrous	68,238.24	84,341.00
Tin/Steel Cans	13,823.25	14,406.00
Aluminum	3,880.00	3,783.00
Total Metal	**128,461.99**	**107,540.00**
Mixed Glass	1,168.05	1,204.00
Clear Glass	31,396.00	17,045.00
Brown Glass	20,263.00	11,648.00
Green Glass	35,363.00	9,375.00
Total Glass	**88,190.05**	**39,272.00**
HDPE	3,486.10	1,808.00
PET	4,836.00	0.00
Polystyrene	32.00	0.00
Other Plastic	1,915.95	4,707.00
Total Plastic	**10,270.05**	**6,515.00**
Textiles	**873.18**	**257.00**
Food Waste	17,034.55	5,081.00
Yard Waste	13,360.60	19,781.00
Wood Waste	16,657.87	15,240.00
Total Organic	**47,053.02**	**40,102.00**
Other Nonbulky MSW	**8,017.06**	**8,732.00**
Tires	8,511.00	13,769.00
CDD	18,311.00	20,508.00
TOTAL HARD TO MANAGE	**26,822.00**	**34,277.00**
TOTAL MSW RECYCLED	**556,795.98**	**421,487.00**

1. Data includes Municipal and Commercial Sources
2. Total 1995 MSW Generated including Bulky Waste: 1,339,352
3. Total 1993 MSW Generated including Bulky Waste: 1,293,401

TABLE 2

Costs to consider when evaluating a remote location drop-off program:

- Initial capital costs for containers
- Hauling costs (public owned/private owned - grant purchase)
- Distance of haul
- Site monitoring
- Resident education

Some member communities of Regional Waste Systems are paying the contractor between $1.35 and $1.49 per mile for hauling their roll-off container to the RWS recycling center.

Facility drop-off

In this collection format, individuals deliver the recyclables directly to the recycling center for processing. This type of recycling program maximizes the education opportunities because the deliverer can easily be shown what and how to recycle, as well as receive information on non-accepted materials. In this format, collection and delivery costs are borne directly by the generator and are not typically considered in determining costs of this program.
Costs to consider:

- Staffing on site
- Resident education

Since there is no direct cost for the collection and transportation of recyclables in this type of program, none are presented.

ii) Processing costs

The costs associated with the preparation and processing of recyclables for marketing vary significantly from program to program. This variation is due to the myriad approaches and systems used in this phase of recycling, as well as to the number and type of recyclables accepted. Examples include:

- Degree and level of cleaning required
- Amount of sorting and separating necessary
- Type of baler used (downstroke, horizontal)
- Method of feeding baler (hand, machine, conveyor)
- Volume and schedule of recyclables delivery

Average processing costs range from $25 a ton (for larger programs with more mechanized handling systems) to over $80 a ton (for smaller programs with more labor intensive systems).

iii) Marketing Costs

Costs associated with marketing may include:

- contact with broker or buyer and their fees
- loading (if done offsite)
- transportation/shipping expense

An important marketing cost item actually is incurred in the processing costs. If the material being prepared for recycling is not the quality required by the broker/buyer, the load could be rejected at the buyer's station, resulting in it being returned to the recycling center or 'downgraded'. If this happens, the recycling center does not receive the originally anticipated value of the load.

Usually, the cost of marketing is absorbed by the broker's fee, with no direct cost to the processing facility. For example, if a mill is buying newsprint at $35 a ton, the broker would quote the recycling center a figure reduced by the amount of the broker's fee, which may range from $4 to $10 a ton (or higher). The value quoted to the recycling center would be somewhere between $25 to $31 per ton. The broker's fee often varies from mill to mill and from material to material.

The cost of loading the container or truck for marketing is usually absorbed into the recycling center's costs. The expense of shipping is often borne by the buying mill although it may be required of the broker thus the broker's fee will increase. Materials that are not collected and processed in volumes large enough to warrant a buyer's attention need to be delivered by the recycling center itself, resulting in a direct charge to the recycling program for transportation.

c. Composting

Composting has long been considered the environmentally preferred way of treating organic discards. Composting is the biological decomposition of organic residuals under predominantly aerobic conditions and controlled temperatures between 110° and 150° F to create a humus-like soil amendment. Most often compost programs are designed to include yard wastes (leaves and grass clippings), food wastes, other organic materials in the solid waste stream, agricultural wastes, wastewater treatment plant sludge, or mixtures of some or all of the above.

According to 1993 Maine municipal solid waste generation data, the combination of food wastes, yard and leaf waste, and waste paper (excluding magazines) comprised 57% of the total residential waste and commercial solid waste generated in Maine. Food waste alone comprised 25% of the residential waste generation total and 15% of the commercially-generated waste. These figures indicate that organic wastes continue to compose a significant portion of the residential solid waste stream.

<u>Summary of composting practices and costs</u>

Composting can take a number of different forms. The two major methods for composting include backyard composting and source-separated, centralized composting. Costs vary greatly from program to program, depending upon materials accepted, transportation, processing and marketing activities.

i.) Backyard composting

The number of residents with backyard compost piles is difficult to determine, as is the amount of organics removed from the individual's waste stream into the compost pile. By composting, residents are keeping the organics out of the waste stream from the start, preventing that tonnage from being included in the solid waste generation and disposal figures for a given community. The products of home composting programs can be used by the homeowner to improve landscapes and gardens.

Education services available to residential composters are often furnished through the local recycling program. The Master Composter program, supported by the state and the University of Maine Cooperative Extension, is a 40-hour program where the fundamentals of composting are taught to volunteers who, upon completing training, go out into the community and assist homeowners with composting efforts.

Another type of food waste reduction activity done at home is vermicomposting. This is where worms (typically redworms) are used to consume food and paper wastes in bins typically set up in the basement. The worms eat and digest the food and paper, creating a vermicompost that is very beneficial to house and garden plants. Little or no odor is created by this process and the volume of organics that the worms are able to process is remarkable. In one instance a pound of worms handled 65 pounds of food waste over 110 days.

Related costs

Backyard composting may be done without enclosures or may use an enclosure costing from $5 to more than $75. Appropriate household food wastes (meat, bones, fat, etc. are unacceptable) can be reduced through the biological decomposition process, thereby diverting 25 to 30% by weight of a household's solid waste.

Leaves, grass clippings and similar yard debris may also be composted by residents. The leaves can serve as a source of carbon for the food composting process.

Minimal effort will provide the homeowner with a rich, organic soil amendment for home gardens and lawns. A community could promote backyard composting through education and information programs. Some communities even have furnished compost bins to residents as a further incentive.

ii.) Centralized composting

There are a variety of strategies and concerns to be evaluated when designing a composting facility. Major factors include: (1) what materials to include in the composting process; (2) what composting process is to be used (technology available ranges from relatively low-tech methods such as windrow composting to more capital intensive processes such as in-vessel composting); (3) odors created by the selected wastes; and (4) the facility's proximity to nearby residents. Finding the right combination of

waste materials, technology, and site location will be important factors in the success of a project. Currently, the most common composting method used in Maine at this time is the windrow and static pile methods.

Over 35 municipal composting facilities handling leaf and yard waste are in operation in Maine. As anticipated, the heaviest delivery times are autumn and spring. Some communities also include a small amount of food discards (often collected from the school's lunch program). Many facilities offer the finished product at no charge to residents. In addition, the community's public works department may use the compost in their projects. Other facilities charge nominal fees and recover some of the costs incurred in producing the compost.

Additionally, there are nearly 60 other permitted composting sites in the State that handle a variety of organics, including:

- food wastes;
- biosolids; or sewage sludge;
- paper mill sludge (includes short paper fibers);
- cull potatoes;
- processing byproducts of fruit (blueberry and apple);
- fish byproducts;
- items such as wood chips, sawdust and wood ash.

Because paper decomposes in an active compost operation, it is sometimes included in a waste stream feasibility analysis of composting potential. The analysis considers the question: 'is that the highest and best use for that material?' Paper also can be recycled. As a result, there may be a conflict over which course of action (i.e., composting or recycling) should be followed. Often, recycling of the paper product is the highest and best use for that material. However, if the markets for that designated paper stream are poor or nonexistent, or if transportation costs are prohibitive, or some other economic (or environmental) factor overshadows its recycling value, then inclusion of that paper into a composting program may be the best available option.

Related costs

Municipal composting typically involves managing leaf and yard trimmings, with or without food waste from residents/institutions or with manures. Typically, the Public Works Department manages the facility in conjunction with their other duties so that specific costs are not always readily available. For communities that track those costs, the major expense is creating and turning windrows to maintain an active composting environment. Community programs primarily use front end loaders. There are several towns that have commercial-style windrow turners that assist in physically reducing component size as well as improving aeration and moisture.

Currently, there are 140 communities or programs in Maine that have banned leaf and yard wastes from their collections/disposal facilities. Only 80 communities or programs specifically offer composting opportunities to their residents. Curbside collection of leaves by Maine municipalities is not as common a public service offering as it used to be.

The DEP regulations for these leaf and yard composting facilities are simple and easy to follow, which should encourage many communities to pursue this course of action in reducing solid waste disposal.

Composting costs usually do not include land acquisitions since community compost sites are typically on existing municipally-owned land. The quality of the finished product varies depending on the types of material accepted and how vigorously the material is sorted and cleaned prior to windrowing.

Costs of operation range from $10 to $25 per cubic yard depending on:

- distance of composting site from Public Works facilities
- composting site management
- volume of compostable material on site
- type of equipment used
- frequency of turning.

Often, the finished compost is offered free of charge to residents. There are some programs which, because of the quality of the material, are able to charge nominal fees.

A major cost in these programs is the delivery of the compostable materials to the site. If that can be borne by the generator, program costs are reduced. There is still the need to have a person on-site, however, to assist in quality control of the delivered materials.

d. Incineration

As noted earlier, nearly 40% of the 1,339,352 tons of municipal solid waste generated in 1995 was disposed of at incinerators. This volume reduction method also generates a portion of the state's electricity -- approximately 3%. Incineration will be addressed in more detail in sections IV & V.

Two different systems are used by these four waste-to-energy incinerators:

- Refuse-Derived Fuel (RDF) -- Maine Energy in Biddeford and Penobscot Energy Recovery Company in Orrington (PERC)
- Mass Burn -- Regional Waste Systems in South Portland (RWS) and Mid Maine Waste Action Corporation in Auburn (MMWAC).

The RDF facilities use a process whereby non-burnables in the municipal solid waste are removed prior to incineration. Those non-burnables, often called front end process residue (FEPR), plus the resulting ash, require disposal at a landfill. FEPR has been disposed of in MSW landfills to facilitate closure through achievement of final grades. The Mass Burn facilities burn all the municipal solid waste, with the exception of large objects that are removed at the site (couches, hot water heaters, etc.). As a result, the ash contains both the remains of the non-burnables and burnables. Tipping fees at these facilities are expected to remain fairly consistent. As of September, 1997, they were:

- Maine Energy - $40 to $43 per ton, depending on source, deliverer

- PERC - $45 per ton

- RWS - $49 per ton

- MMWAC - $42 to $52 per ton, depending on generator source

Actual tipping fees may vary due to type of membership (full or associate) a community may have with an incinerator or whether the trash is being acquired on the spot market. In addition, some of the facilities have instituted additional annual fees or passed on bonded indebtedness to their municipalities in order to maintain competitive tip fees.

e. Landfilling

Landfilling is at the bottom of the waste management hierarchy, now accounting for only about 12% of Maine's MSW management[1]. There are eight remaining municipally-operated landfills in Maine that accept MSW. Landfill capacity is addressed in more detail in sections IV & V.

Disposal fees at the eight remaining municipal facilities range from $3.50 to $64 per ton. The average cost is closer to the high end of this range; only one facility charges the lower fee. These costs typically reflect only acquisition and operational expenses, not future costs for closure and monitoring of an exhausted landfill.

---

[1] This figure does not include front end process residue.

B. Municipal Solid Waste: bulky only
1. generated, recycled, disposed

Bulky waste materials include tires, construction and demolition debris, brown goods, furnishings, yard and wood waste, and any other large items. There is no current information on the contribution of bulky waste to the entire MSW stream. However, 290,950 tons of bulky waste were generated in 1991 -- 23% of the total MSW stream. This figure has probably not changed significantly. Like MSW generation, changes in bulky generation are likely to parallel changes in the economy. In 1991, 48% of bulky waste was recycled and 52% was disposed. This relatively high recycling rate is largely attributable to the nearly complete recycling of metals, which comprised 32% of the bulky waste stream.

CDD

The generation of CDD is closely tied to the commercial development and housing market and, therefore, to the level of economic growth. A certain volume of this waste stream is always produced, due to building maintenance activities and unforeseen incidents (fire and storm damages).

A major problem in Maine is collecting accurate data on:

- CDD composition/quantity
- seasonal variations
- disposal options (including recycling/reuse of portions of stream)
- disposal space available.

In 1991, the CDD recycling rate was estimated at 56% (42,000 tons generated; 23,650 tons recycled). This rate is dramatically higher than the current recycling rate for CDD materials. In 1995, the recycling rate dropped to 19% (96,113 tons generated; 18,311 tons recycled). This nearly two-third reduction in the recycling rate is largely a result of improvements in the state's ability to measure CDD through the municipal reporting process and a slight increase in CDD generation since 1991. In addition, many old dumps with minimal or nonexistent measurement system still accepted CDD in 1991. The new commercial facilities, which now accept a larger share of CDD, keep significantly better records.

The 19% CDD recycling rate brings down Maine's overall MSW recycling rate. This influence is reflected in the differing recycling rates recorded by Maine and the Environmental Protection Agency (EPA). Maine's current MSW definition includes CDD. Thus, the MSW generation and recycling statistics incorporate the low CDD figures. The EPA proposed approach to measuring recycling, on the other hand, defines and measures MSW and CDD as separate categories of waste. According to Maine's MSW definition, the recycling rate is 41%; by EPA's definition, the recycling rate is 44%. A comparison of methodologies is described in Appendix A.

2. source, type, amount

There is no new information on the composition of Maine's bulky waste stream. However, it is likely that it has not changed significantly since the 1993 plan. **Figure 4** provides bulky waste composition information from 1991.

CDD

Figure 5 shows that wood waste comprises an average of 27.4% (by weight) of the construction and demolition wastes disposed of and asphalt/concrete/brick/dirt makes up an average of 23.3%. These two components comprise just over half of the disposed CDD wastes. When the drywall (13.4%) and roofing (12%) are added in, over three-quarters of the CDD, if kept separate, have the potential to be managed through existing technologies and used as raw materials in specific manufacturing processes. With paper (2.7%) and metal (8.8%) currently recoverable or recyclable, the percentage of CDD that may actually require disposal is just under 12%. These data may be helpful as the state more closely examines its CDD waste stream, as well as useful in developing markets for the utilization of those 'wastes'.

3. management methods and costs

There is limited current information on bulky waste generation and management. However, since the 1993 Plan, there have not been significant changes in bulky waste management practices for the majority of materials. At that time, 48% of bulky wastes were recycled. The most significant contribution to the relatively high recycling rate is metals, which comprise 32% of the bulky waste stream. Almost all metals are eventually recycled.

CDD processing and disposal costs

In Maine, CDD measurement is included in annual municipal solid waste reports. CDD, by definition, is debris resulting from construction, remodeling, repair and demolition of structures and does not include asbestos and other special wastes. The composition of this waste stream may be varied and complex; handling and disposal options are becoming more limited and expensive. For these reasons, communities are looking for alternative disposal methods.

There are nearly 30 licensed disposal facilities for CDD across the state, approximately two- thirds of which are municipally owned and operated. The remainder are commercial operations or company-owned facilities. Out-of-state disposal sites are used, especially by communities and businesses close to state and province borders.

Disposal rates vary and may be based on cubic yards delivered, size of truck, or tonnage delivered. Fees currently charged range from $5 per cubic yard to $85 per ton. A typical fee would be $50 to $65 a ton for material delivered to newer facilities.

COMPOSITION OF BULKY MSW
1991

percent by weight
290,950 Tons Total

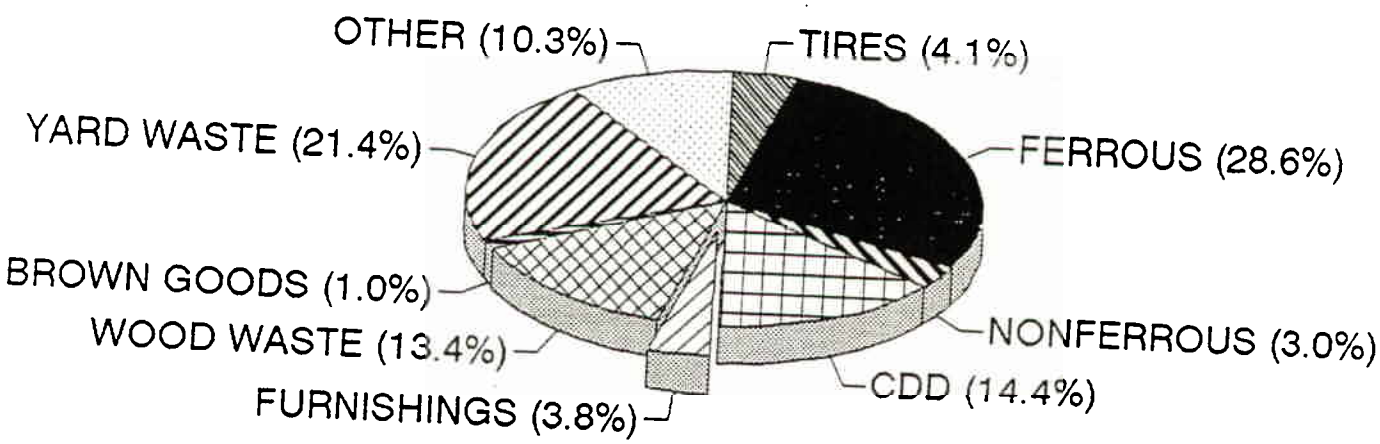
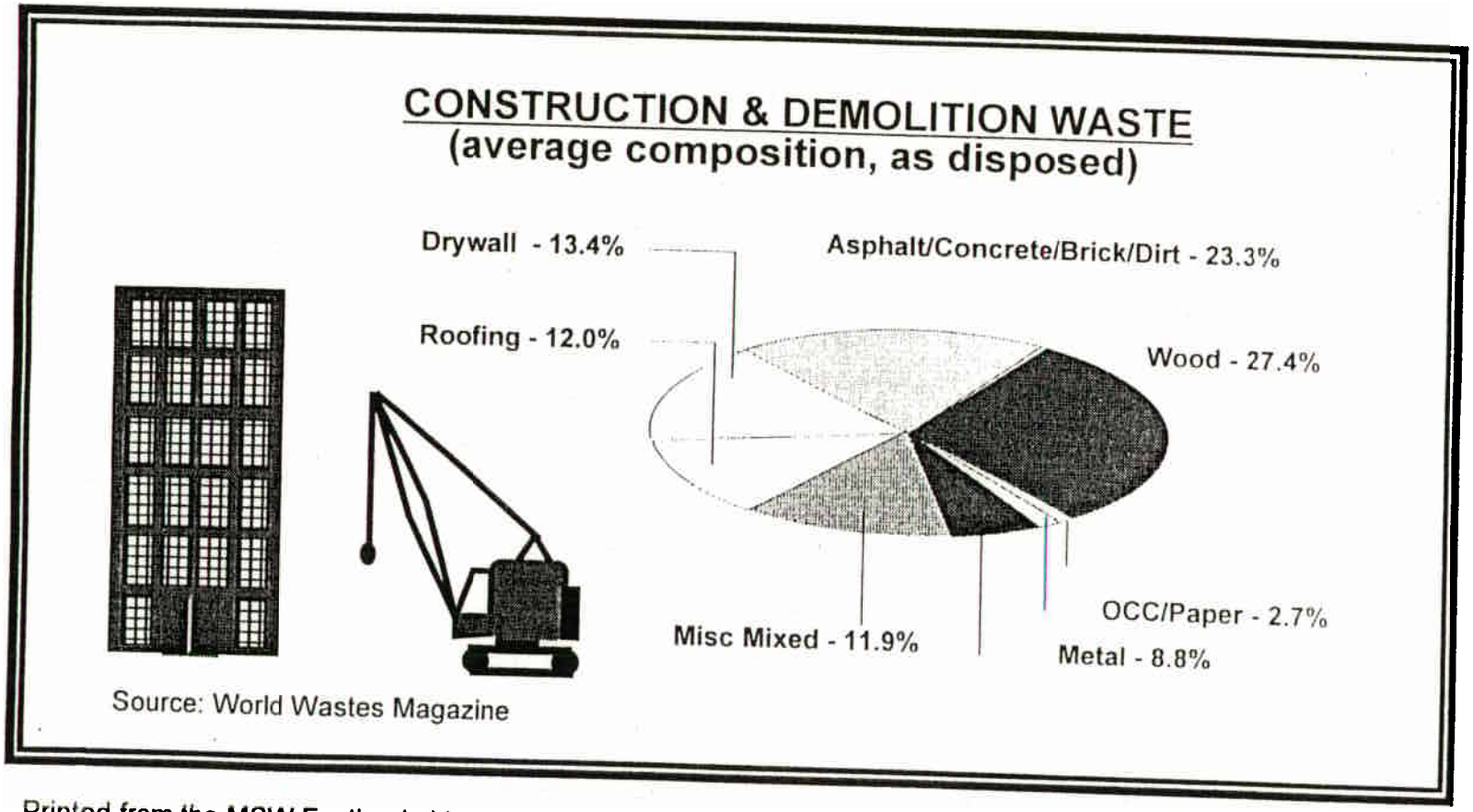


Figure 4



Printed from the MSW Factbook, Ver. 4.0, Office of Solid Waste, USEPA, Washington, DC, 1997.

Figure 5

A few facilities accept CDD and then process the material into various components. Fees for materials delivered vary from $0 per ton to over $80 per ton, depending on material and facility. Concrete, bricks, shingles, clean wood, painted/contaminated wood are some of the items pulled from the disposal flow. Some actual materials and fees are:

Asphalt pavement	$0 to $10 per ton
Asphalt roofing	$32 to $50 per ton
Sheet rock	$32 to $45 per ton
Wood wastes (clean)	$25 to $35 per ton
Mixed CDD	$50 to $82 per ton

IV. WASTE REDUCTION AND RECYCLING ASSESSMENT

A. Waste Reduction

Waste reduction, also known as waste minimization or source reduction, rests at the top of the solid waste management hierarchy adopted by the State. As defined by Maine law, waste reduction means an action that reduces waste at the point of generation. The reuse and/or diversion of materials from the waste stream is not considered a form of waste reduction. In addition, while toxics reduction is an important goal, it is not considered a part of the definition of waste reduction. Information on toxics reduction efforts is included in Appendix B.

Waste reduction is a preferred method for the management of the solid waste stream. As a result of waste reduction measures, less waste needs to be managed through recycling, composting, incineration or land disposal. Reduction also creates less demand on nonrenewable resources and reduces potential for environmental harm.

There are two basic opportunities to reduce waste:

1) Modify or respond to the consumer's preferences or demands, such as changing from polystyrene food containers to coated paper containers in the `quick service' food industry.

Education and economic incentives are the two primary driving forces behind adoption of waste reduction activities, whether it be at the household, retail or commercial level of waste generation. These are just a few examples of how programs are working in Maine:

- ✓ Households are often provided waste reduction strategies (such as recycling and backyard composting tips) by businesses and communities to decrease waste generation rates.

- ✓ Businesses throughout the state encourage waste reduction efforts throughout their stores and help educate consumers in their promotions.

- ✓ Some businesses also offer a financial incentive to the customer who supplies their own bag for items purchased. Maine's two largest retail grocers (Shaws and Hannaford's) have offered this alternative for their customers since the early 1990's.

2) Technological advances in production processes which reduce waste generation.

Typically, these kinds of waste reduction efforts are referred to as *pollution prevention*, defined as the use of processes, practices, or products that reduce or eliminate the generation of pollutants and wastes or that protect natural resources through conservation or more efficient use.

Because permitting new landfills or expanding current landfills is becoming an increasingly expensive process, there is a constant incentive for industries with their own landfills to preserve capacity by reducing the amount of industrial waste requiring disposal.

Quantifying results

One of the major challenges to waste reduction programs is determining the actual effect that the combined waste reduction measures have had on decreasing the volume of solid waste requiring management. Typically, a benchmark volume or weight of solid waste is established and all activities following that date reference that value. This format is based upon the premise that the generation of solid waste will continue at the same, original rate. However, any changes (up or down) in the volume of solid waste generated may be the result of other external forces, such as changes in consumer preferences or the economy, and not due to waste reduction actions. It is difficult to assign value to an action where the cause cannot be identified.

Source Reduction Goal

The state continues to have the goal of reducing MSW generation by 10% based on 1988 generation levels. In examining MSW generation from 1988 to 1995, it appears that while there was a nearly 10% reduction from 1988 to 1991, generation since has increased steadily, expanding to an amount which is only 2% lower than the 1988 level. The question remains: 'have changes in waste generation been a result of directed actions or have they been the result of changes in population and economic activity?' In evaluating the latter factors, an analysis of economic and demographic statistics reveals that the economic downturn of the early 1990's and subsequent improvement parallel recent trends in waste generation. It seems more likely that economic factors, rather than waste reduction efforts, were the driving force behind reduction in generation of the early 1990's.

The MSW waste reduction goal of 10% is not a mandate, but a policy guide with the potential to serve as a planning tool for prolonging existing disposal capacity; currently, there are no regulatory incentives or costs for not reaching this goal. In the event of a disposal crisis, source reduction may be one of the key management techniques available to enhance the utilization of capacity. Such a crisis might prompt a waste reduction goal to be elevated from a policy guide to a regulatory tool.

In addition, because special wastes play such a large role in capacity analysis and utilization, the state may also choose to evaluate the practical application of and level of government and private sector support for establishing a waste reduction goal for special waste

Appendix C includes descriptions of two Maine programs which focus on waste reduction

Recommendations for State Roles

- Establish an official state waste reduction goal as set forth by 38MRSA 2132-2.
- Expand current information and education efforts that promote waste reduction activities at local, regional and State levels.
- Continue pollution prevention assistance programs administered through DEP.

B. Statewide Recycling Rate

As noted earlier, Maine reached a 41% statewide MSW recycling rate in 1995. While this rate represents a laudable achievement, it should be noted that recycling efforts during the later part of 1994 through the summer of 1995 benefited from an extremely strong product demand and marketplace, resulting in unprecedented high values for processed recyclables (principally paper items). Consequently, the recycling increase reflected in the state's 1995 rate may not be an accurate indicator of the extent to which recycling may be expected to increase in any given future year. The next measurement (to be done in 1998 for the year 1997) will include, in addition to the municipal recycling program efforts, a measurement of the commercial sector's recycling efforts. This calculation will assist in determining the true progress of the state in reaching its goal of recycling 50% of its municipal solid waste. A process for evaluating the State's progress to date, and the costs and benefits associated with reaching the 50% mark is outlined in Appendix E.

MSW Definition

One factor in evaluating the state's prospects for reaching the 50% goal is what waste streams are counted as MSW. Currently, the definition of municipal solid waste includes some waste streams, such as construction and demolition debris, and does not include others, such as industrial wastes or wastewater treatment plant sludges. As programs within the state begin to recycle and compost larger shares of their waste streams, pushing the boundaries of what has been thought to be the 'recycling limits', the office may consider revisiting the definition and its scope in order to more completely address solid waste management efforts within the state and to recognize achievements that may fall outside the current definition.

Strategies

If the state is to reach the goal of recycling 50% of the MSW stream, a variety of approaches and management techniques will need to be implemented. First, traditional recycling at the municipal level will require continued attention and technical assistance from the state in order to improve the quantity and quality of materials collected. While the state's primary goal is to work with municipalities, it will continue to explore opportunities to link business recycling programs to municipal programs where mutually beneficial arrangements can be established. Second, composting must manage a greater portion of the organics stream at the household, municipal and commercial level. Finally, a greater portion of the construction and demo debris (CDD) must be kept out of landfills by exploring and fostering cost effective management alternatives. The next sections examine these strategies in more depth.

1. Recycling
a. improving municipal programs

Strategies to increase recycling within existing municipal programs are the responsibility of communities and inter-local recycling associations. Successful solid waste management programs must be customized

to respond to demographic and other characteristics of the community. The effectiveness of recycling can be measured by:

- calculating the amount of reduction and cost savings that results from less waste disposed;
- using information developed from data collection efforts to better target education programs and organize the solid waste management program more efficiently.

One of the easiest ways to increase the percentage of materials recycled in a municipal residential program is to encourage participation in the program. This may be done through a concerted information and education program directed at the residents and through the schools to the community's youth. The goal is to achieve a behavioral change in how people view solid waste -- to begin seeing it as a resource and not just as garbage.

Once the program and markets are established, and collection and processing are in place, incentives are needed for the residents to separate the recyclables from their trash and make them available to the recycling program.

Support in developing and expanding municipal recycling programs is available not only from the State Planning Office, but is provided by the various Regional Planning Commissions, Councils of Government, and Economic Development Commissions throughout the State. Technical assistance and focus group meetings, as well as ongoing program support furnished by these groups, has been very helpful to many communities in designing and helping establish recycling, waste reduction and composting programs. Additional support has been supplied by the Maine Resource Recovery Association (MRRA), the Wastecap Program (administered by CTT) and recycling brokers and solid waste haulers.

Increasing Capture Rates

Some of the more successful strategies for encouraging increased participation in recycling include:

1) increase ongoing education and public awareness of the value of recycling, especially in schools through use of the "Pathways for a Sustainable Future" curriculum;

2) encourage participation through peer pressure (block leaders, special containers in curbside programs, and public education campaigns);

3) collect trash for disposal and recyclables on the same day (curbside trash and recyclables collection programs);

4) simplify necessary preparation of recyclables;

5) provide rewards/recognition to residents for their efforts;

6) institute a 'pay-as-you-throw' program for trash collection/disposal. This may increase the flow of recyclables from the trash to the recycling bin (the 'pay-as-you-throw' is described in Appendix D);

7) elevate program participation from voluntary to mandatory;

8) work to standardize specifications of recyclables to allow for consistency of processing among programs and over time.

Expanding the Recycling Program

Another way to increase the recycling tonnage from residents is to increase the type and number of recyclables accepted by the program. This may require:

- renewing support from municipal officials;
- identification of new or different recyclable markets;
- modification or increased capital investment in collection and processing equipment;
- creating a better-directed education campaign.

The decision to include a new material into the program should be based upon an analysis of community willingness to participate, potential volumes, and market strength. A dialogue with neighboring programs, buyers and brokers, as well as an overview of the particular recyclables coming from the community are useful tools for successfully integrating new recyclables into the program. Appendix E provides a list of recyclables currently collected by municipalities.

Recycling Commercial Wastes

The State goal of recycling 50% of its municipal solid waste cannot be met solely through the development and implementation of residential recycling programs. Since commercially generated solid waste constitutes over half of the State's MSW produced annually, the value and importance of commercial recycling needs to be acknowledged.

The original solid waste management legislation (Title 38 paragraph 2138) requires businesses with fifteen or more employees at one site to recycle office paper and corrugated cardboard. Enacted at the same time, Title 38 paragraph 2137 directs each state agency and each campus of the University of Maine System to establish and implement recycling and waste reduction programs similar to the business program.

Data Collection

Because commercial entities generate over half the MSW, improving business recycling programs is critical. As a part of this, it is also important that municipalities be able to collect recycling data from local businesses in order to account for their efforts. However, it is often difficult for these data to be gathered by municipal recycling directors due to time constraints and incomplete records of what the businesses have recycled. Another difficulty is that not all municipal recycling programs accept recyclables from businesses, which may result in a reluctance for businesses to offer their recycling program data to the municipality. In those instances where small business recycling programs may be linked into municipal programs, the state can assist by providing technical and informational support upon request by the community.

Linking business and municipal programs

Many commercial firms are cooperating with municipal recycling programs throughout the State. Those partnerships will benefit from ongoing promotion and recognition.

Businesses with significant amounts of recyclables may be operating their own recycling and recovery programs. For many years, businesses recycled those 'waste' materials that made economic sense to them, usually the higher grades of paper and corrugated cardboard.

Some recyclables generated by businesses are not typically accepted at municipally-operated recycling programs. For small business recycling programs to be viable, they must be able to take advantage of economies of scale by working with other entities. In those instances, perhaps a consortium of local businesses (such as the Chamber of Commerce) could furnish the necessary recycling program to address particular collection and marketing concerns. Alternatively, a local recycling program could establish a relationship with a consortium of businesses and offer collection and marketing services. The state may be able to play a role by helping connect organizations with common recycling interests and needs.

Communication and Markets

Two important issues in increasing business recycling are communication and marketing. Effective communication between the generator and recyclers (usually the local recycling program) and communication between the State and municipal recycling program is essential. Businesses will typically cooperate in establishing recycling separation programs but often are unsure of what is needed or what to do. Even if the local program is unable to assist a business in handling their recyclables, the program should be able to direct questions from the business to appropriate entities.

Marketing is the other critical success factor in a business recycling program. As with municipal programs, the success of a business program is closely linked to its ability to move the recyclables and, secondly, receive adequate revenue to offset costs.

In addition to private sector recycling and solid waste firms, there are organizations, such as the Maine Resource Recovery Association and various Councils of Government in the State, as well as a number of trade associations, such as the Maine Landscape and Nurseryman's Association, the Maine Chamber of Business Alliance and the Associated Constructors of Maine Inc., which regularly promote and sponsor various recycling separation programs within their membership and the business community at large.

b. focusing on specific waste streams

Paper

Paper constitutes the largest single component in the municipal solid waste stream. However, paper is not a single type or grade of item but a varied mixture of groundwood - - coated and uncoated, kraft and paperboard items. Historically, paper has been recycled in a fairly consistent fashion with many mills able to incorporate used paper into their processes. As paper has increased in availability and consistency for mills, and with the growing willingness of consumers to accept and purchase paper items made from recycled fibers, the mills have responded to these incentives to expand their recyclable paper use .

Maine is fortunate to have a variety of papermills within the State that are not only able to use collected recyclable paper products in their manufacture of new paper but have also been aggressive in accommodating additional paper streams as they become available and as technological advances have been realized.

Paper streams that are currently being accepted and processed by papermills in Maine include:

- kraft paper (including corrugated cardboard cartons and grocery bags);
- newsprint;
- magazines;
- office papers;
- mixed papers.

Typical final products include: newsprint, paperboard tubes, toilet and tissue papers, pulp substitutes, disposable dinnerware, and fruit boxes. Other businesses in Maine are taking newsprint and creating lightweight packaging material and building insulation from the fiber.

Currently, Maine is exporting some of its recyclable paper out-of-state while other New England states are exporting their paper to Maine. Because of limited markets in Maine, office paper and newspaper may be shipped to mills in Massachusetts, New Jersey, New York or elsewhere. Much of the

corrugated cardboard is shipped into Canada and may find itself on a container ship destined for Europe, the Pacific Rim countries or another foreign consumer.

As noted earlier, increasing paper recycling has great potential for moving the state towards its goal. Maine is particularly well-positioned in its marketing of paper products because of close proximity to papermills which accept paper. Maine's papermills, because they are able to utilize many of the paper grades collected by municipal recycling programs, are nearby markets for municipalities. This has had a major positive effect on the value of paper recycling for Maine municipalities. Some of the papermills have broadened and expanded their acceptable paper specifications or have made a commitment to purchase Maine-processed recyclables. Specific paper waste streams which offer notable opportunities for improvements are newsprint, magazines, corrugated cardboard, sorted office paper (SOP), and mixed paper.

Newsprint/magazines/corrugated cardboard/SOP

Expanded recycling programs in the State could increase recovery of newsprint, magazines and corrugated cardboard from residential and commercial consumers, especially since these materials have fairly stable markets. For example, the Bowater mill in East Millinocket has the ability to consume over 130,000 tons of recyclable newsprint and magazine fiber per year but is receiving less than 20% of those tons from Maine recycling programs. As a result, Bowater must truck the lion's share of the fiber from beyond Maine's borders to their mill. Bowater has made a commitment to work with newsprint and similar groundwood products recycling programs of Maine communities. With this support, Maine has the opportunity to significantly expand collection programs for newsprint and similar groundwood products.

Other mills in Maine, including Gardiner Paperboard Corp. (Gardiner), Chinet (Waterville), Auburn Fiber (Auburn) have been encouraging community and business paper recycling programs for years. Tree Free (Augusta) and Kimberly-Clark (Winslow), which had also participated in promoting recycling programs, may be closing permanently pending changes in ownership; if so, these facilities will also no longer provide outlets for paper from municipal programs. International Paper, at their Lisbon plant, processes collected paper into sound deadening and gypsum board liners.

Mixed Paper

Mixed paper, collected by municipal programs and recycled in the past by paperboard mills, constitutes a large percentage of the paper stream (over 40%) which translates into 14% of the municipal solid waste stream. Within the paper industry, the category of paper we call mixed is actually labeled 'waste paper', which provides an indication of the quality of paper anticipated by the mills. The primary concern of mills in repulping mixed paper is the variety of paper grade stocks included in the mixed paper category. In Maine it is common to find juice and milk cartons included with mixed paper. Yet a recent trial at the Gardiner Paperboard facility did not show problems with those items being pulped with 'paper'.

Traditional uses for mixed paper by the pulp and paper industry have been paperboard, low grade paper ('construction paper', etc.) and kraft paper processes (as a substitute for corrugated cardboard cartons). The majority of mills receiving this paper grade are located out of state. Recently, mixed paper has been added to the blend of fiber in the production of newsprint and telephone directory stock on a limited basis.

Alternative strategies for utilizing mixed paper have been tried. In 1990, the Town of Bowdoinham, with support from the State, undertook a short-term small scale composting project with mixed paper, food and leaf and yard waste which was successful. A recent attempt in Maine to provide a market for mixed paper in a large-scale composting operation, developed when the markets for mixed paper as recyclable paper stock were uncertain, has been placed on hold.

Increased demand for products made from mixed paper as well as technological advances will be necessary for the mixed paper market to become stronger. Because mixed paper has historically faced weak, fluctuating markets, its recycling potential has not been fully realized. However, its importance to state recycling efforts could be substantial. As markets for mixed paper expand geographically from Massachusetts to as far away as the Pacific Rim countries, municipal programs for mixed paper recycling may become viable.

2. Composting

Composting remains a critical management method if Maine is to achieve the 50% recycling goal. In order to capture this organic waste stream, and assist communities in reducing solid waste disposal costs, continued education and support for the backyard composter is required, as well as a reduction in the volume of organics generated by institutional/restaurant operations. Composting operations in some cases can be run with existing equipment and municipal personnel. Communities may also partner with farmers to reduce costs and assist farm operations. By raising public awareness of the value of organics contained within solid waste, and by showing business generators the financial benefit of removing that heavy fraction from their trash, the volume of available compostables should increase.

a. Backyard Composting

Backyard composting brings many benefits. For example, it has been identified in a number of studies as the most cost-effective form of composting. Because the composted portion of the waste stream never enters the waste management system, all processing and disposal costs are avoided. In addition, the homeowner is provided with a valuable soil. Finally, the remaining MSW which goes to waste-to-energy incinerators will burn more efficiently and, as a result, have higher btu value.

For these reasons, promoting backyard composting should continue to be a priority of the state. Currently, the Master Composter program, as noted in the composting section, is providing education and assistance to municipalities. The state will continue to support backyard composting projects. The only drawback to backyard composting is the difficulty in measuring results. Because these wastes never enter the system, quantifying changes is problematic.

b. Source-separated, Centralized Composting Operations

There are a variety of centralized composting programs within Maine that have the potential for gains. These include: municipal leaf and yard composting operations; food waste composting (often done in conjunction with a municipal program); wastewater treatment plant sludge composting (often with a bulking agent such as wood chips); and composting of different streams of organics together at one site, such as wastewater treatment plant sludge, papermill sludge, sawdust, and other materials or agricultural/processing by-products and sawdust. These various operations typically require a permit from the Maine Department of Environmental Protection.

Municipal programs that focus on leaf and yard materials often have done so as a service to their residents, or because the community has banned these items from the collection service/disposal facility operated by the community. In many cases, municipalities have the equipment and space to perform this operation.

There is opportunity to increase the composting of food wastes, presently estimated to be less than 5 % of the generated tonnage of food wastes in Maine. Food wastes composting could be added to many of the municipal leaf and yard composting projects, however, this would require a more attentive

management program. Within Maine, there are success stories for these types of projects. For example, the City of Lewiston did a pilot food waste composting trial, collecting residential as well as commercial food wastes, and composted the collected food with yard waste and bark mulch.

Opportunity also exists through composting other organic portions of the waste stream, including treatment plant sludges, papermill sludges, front end process residues (FEPR), and papers, such as mixed paper. Interest in these waste streams will increase and become more acceptable as disposal options both decrease in availability and costs for disposal increase. In addition, a market demand for finished products from these materials would assist in their improved utilization.

The Maine Compost Team has been able to help start a number of composting projects by connecting generators with processors and end-users, as well as providing the necessary technical assistance.

3. MSW bulky waste (Tires & Construction & Demo Debris)

There are two bulky waste materials which offer opportunities for increased recycling and beneficial use: construction and demolition debris (CDD) and tires.

CDD

By focusing on CDD as a separate waste stream, and improving municipal reports to include quantification of that material, plans can be developed to address handling of CDD in a more environmentally-conscious manner.

A number of efforts, both public and private, have been initiated to handle these wastes. The City of Portland, through its Riverside Facility, Commercial Paving, through their Commercial Recycling Systems division, and KTI Bio Fuels in Lewiston are accepting CDD materials and preparing them for reuse applications. Other municipal CDD handling facilities are operating in Casco and Kittery.

Examples of CDD recycling and beneficial use include:

- concrete and bricks are crushed and the resulting aggregate used in new products;
- asphalt roofing shingles are blended into bituminous asphalt materials;
- wood is separated and chipped for use as boiler feed stock;
- asphalt pavement is removed and crushed into a 'reclaim' paving material.

Acceptance of these relatively new uses is sometimes slow but progress has been made, especially in use of paving material by towns and contractors.

An important part of successfully processing CDD is the existence of markets willing and available to use the final products. The market opportunities for these reprocessed and recycled materials, however, are limited. Efforts are underway to open and expand potential markets (i.e. for roofing and sheetrock) but demand for some of the larger volume products, such as wood waste, is low. Wood wastes commonly are incinerated to generate steam and electricity. Electrical generators have fulfilled their own needs and are not prepared to accept additional streams of wood chips. Another issue with wood chips is the level of acceptable contamination. This varies from consumer to consumer and may be a major hurdle for the waste wood processor, because of the variation in raw material quality.

Tires

Tires have historically been a waste item which is difficult to dispose of. Novel uses for worn out tires have been tried (roofing, shingles, flower beds) but the majority of spent tires are found accumulating in unsupervised piles throughout the state, becoming fire and health hazards.

There is currently one scrap tire processing facility in the State. Alternatively, tires are:

- hauled to tire processing facilities out of state;
- chipped into boiler stock and burned as Tire Derived Fuel (TDF) at large paper mill boilers;
- ground up and utilized as fill material in road construction and landfill closures [the largest project to date is the Maine Turnpike Authority Jetport Interchange];
- sliced and used in making floor and door mats.

Many communities are contracting scrap tire removal to a out-of-state vendor for use as boiler fuel.

Estimates indicate that there are about 40 million scrap tires in various stockpiles in Maine that require removal. The existing infrastructure for tire management can handle the current generation of tires; the problem stems from its inability to handle stockpiled tires. Maine DEP is the lead state agency overseeing the remediation of these tire piles. Funding obtained from state bonds has been allocated to clean up existing tire dumps.

It should remain a top state priority to continue to explore other viable management options for tires. Currently, the burning of tires for energy is the primary management method; however, because of potentially cheaper energy sources which may come with the construction of the natural gas pipeline and new DEP air regulations which could require facilities that burn tires to install expensive scrubber systems, this practice may become restricted in the future.

Recommendations for State Roles

1. recycling

- Provide ongoing technical assistance to municipal recycling and composting programs throughout the State:
  - focus assistance on communities/population centers not achieving reasonable progress toward 50% goal
  - leverage state resources with existing programs and groups
  - encourage municipalities to link small commercial generators into their programs
  - enhance opportunities to exchange information and advance recycling measurement techniques to local solid waste and recycling programs for improving service levels and program effectiveness.

- Provide ongoing technical and financial support for the "Pathways to a Sustainable Future" curriculum, developed with state assistance, for use in Maine schools on the teaching of waste management and recycling options.

- Serve as a clearinghouse on recycling markets; in conjunction with other state agencies, identify potential markets and assist in their development where appropriate.

- Sponsor training and certification programs to improve the quality of recyclables prepared by municipal programs.

- The State Planning Office will review the current definition of the Municipal Solid Waste (for the purposes of calculating of the statewide recycling rate) and consider the possibility of expanding or revising the various streams included in that definition.

- Where the state (State Planning Office) determines that reasonably available markets for recyclables do not exist, it should, as required by statute (38 MRSA section 2132), allow designated materials to be used as fuel. (Appendix F)

2. composting

- Direct available grant funds to communities to encourage the implementation of appropriate solid waste management activities, with preference given to:
  - advancing composting of organics
  - cooperative regional waste management opportunities.

- Work with municipalities to manage leaf and yard waste as a separate waste stream: encourage backyard and municipal composting programs; consider a statewide ban on leaf and yard waste sent to disposal facilities.

CDD & tires

- Direct available grant funds to communities to encourage the implementation of appropriate solid waste management activities, with preference given to:
  - recycling/beneficial use of CDD
  - cooperative regional waste management opportunities.

- The state will work to help establish communication links between generators, processors, and end-users of CDD materials to maximize reuse opportunities.

- Expand opportunities for use of tires; one such use is as a material in road construction and reconstruction projects within state.

- Encourage communities and regional groups to examine management and disposal options for CDD to identify reuse, recycling and beneficial use possibilities.

- Promote and develop market opportunities for use of sheetrock, shingles and other waste containing asphalt in paving applications.

- Work with towns, Maine Dept. of Transportation (MDOT) and other state agencies to beneficially use waste materials in road construction and maintenance where permitted.

- Investigate uses of acceptable CDD materials by industrial consumers within Maine and New England.

- As long as the use of waste wood (including demo debris) is considered a beneficial use, the state should:
  - encourage municipalities to sort and store waste wood properly for more effective processing.
  - encourage municipalities to have their wood processed for energy producing facilities which operate with air emission controls.

V. DISPOSAL CAPACITY

A. Existing and Potential Disposal Capacity

1. *MSW -- nonbulky*

A recent survey of MSW landfills indicated that among the 8 MSW landfills, there are approximately 1,280,000 tons of available capacity. If projections are reassessed according to actual fill rates for MSW landfills (90,000 tons) and known capacity, Maine has MSW landfill capacity (including CDD disposed of at MSW landfills) sufficient until **2012**. Appendix H illustrates the rate at which MSW landfill capacity will be used up.

Incineration capacity: current and predicted capacity utilization

In 1993, it was predicted that incinerators would need to compete for waste and, as a result, prices would be kept down. Currently, incinerators can attract sufficient waste to meet their waste needs for $40 to $60/ton. On a state level, the demand and supply of waste have leveled off, resulting in stable tipping fees to communities for the moment.

Facility[1]	Current tipping fee - per ton	Daily process capacity (tons/day)	Annual process capacity (tons/year)	% Process capacity utilized (1995)--
Maine Energy	40 - 43	1,000	250,000	95%
PERC	45	1,100	270,000	93%
RWS	58	550	170,000	105%
MMWAC	42	200	70,000	110%
Total State Capacity	avg.: 47	**2,850**	**760,000**	**98%**

The four incinerators were operating at 98% process capacity in 1995. This high level of capacity utilization would seem to indicate that the municipalities and incinerators have been able to arrive at mutually beneficial financial arrangements. The removal of flow control has forced all four facilities to charge comparable tipping fees (currently $40 - $55/ton). As a result, each facility has been adequately serving the MSW disposal needs of its particular region. Aside from short-term shutdowns, all of the incinerators have operated reliably since 1993. No new facilities are projected for the near future.

There are, however, some differences among facilities in terms of the amount of waste each receives in relation to its ability to process it. At least two of the facilities are receiving more MSW than they can process per day. One has reported consistently accepting 2 times as much waste as can be incinerated. While these facilities have been able to honor all the municipal commitments and not turned any communities away, alternative arrangements have been made such as:

[1] All numbers were provided by the facilities.

- shipping waste to Turnkey landfill in Rochester, NH, which has a 4000 ton/day capacity with a $40 tipping fee;
- baling and burying waste until winter when there is typically a shortage of waste.

One facility has needed to fulfill its waste requirements with MSW from the out-of-state spot market. Approximately 44% of MSW it received in 1995 came from out of state. To avoid shortfalls, facility operators have begun to work together to move waste to where it is needed. In this way, Maine can handle its own waste more efficiently and limit its need to import out-of-state waste at reduced prices. In addition, by reducing imports for incineration, this reduces the need for landfilling incineration byproducts (front end process residue and MSW ash) derived from out-of-state waste.

FEPR

One waste stream which is likely to have an impact on landfill capacity is front end process residue (FEPR). FEPR is the waste and byproducts including but not limited to glass, grit, fine organic matter, and other solid waste removed from the MSW waste stream prior to incineration to increase its btu value. Maine Energy and Penobscot Energy Recovery Company (PERC) generate approximately of 90,000 tons of FEPR per year. For the next year, this material will be disposed of at the Waterville landfill to facilitate closure through achievement of final grades. While opportunities such as composting are being explored, it is expected that this material will need to continue to be landfilled. Regulations are being developed for appropriate disposal methods. Currently, FEPR is considered MSW, and, under current rules, cannot be co-mingled with special waste.

2. MSW -- bulky

Municipal

Total municipal CDD capacity is over 400,000 tons. Some municipalities have much longer landfill life expectancies than others. They range from 5 years to over 40 years; the majority have between 10 and 30 years. Total state CDD municipal capacity will be adequate until about 2008 to 2010.

Commercial

Waste Management Inc. (WMI) Crossroads landfill recently received its license for a 12 year expansion. Assuming Sawyer Environmental Recovery Facility (SERF) receives its license for a 20 year expansion, state CDD capacity will be adequate into the foreseeable future. However, as municipal CDD landfills reach capacity, tipping fees and transportation costs will rise. Consequently, finding cost-effective alternative management methods is likely to become a higher priority for CDD managers and generators. Currently, CDD represents about 12% of total commercial landfill use annually.

Recommendations for State Roles

- The SPO should offer to serve as an information clearinghouse for solid waste facilities for the purpose of encouraging cost-effective disposal for Maine's municipalities.

B. Projected Demand for Disposal Capacity

Several facts are likely to provide reliable indications of projected demand for landfill disposal capacity. For all three categories of waste (MSW, CDD, and special waste) these are: changes in generation; changes in recycling; and current and projected use of disposal facilities. However, each waste stream has a unique set of obstacles impeding accurate predictions. These include the ability to measure each waste stream, sound projections of future generation levels, and rates of reuse technologies. This section will analyze information about each waste stream and develop a framework for projecting demand for disposal capacity needs.

1. MSW: nonbulky

Landfill use rates

The 1996 Landfill Task Force Report[1], which analyzed projected demand for landfill space over the next ten years, assumed a 3% per year increase in landfill use over the next 10 years. While waste generation has increased just 1% to 2% per year since 1991, this rate has not resulted in increased demand for landfill space. Because incineration and recycling now account for 80% of the management of waste generated (up from 65% in 1991), the need for MSW landfilling is expected to continue to decrease. In 1996, landfilling managed 13% of MSW, down from 30% in 1991.

In addition, the report assumed an initial demand of 460,000 cubic yards/year (or 230,000 tons/year). Actual data collected for 1995 indicates a fill rate of about 335,000 cubic yards/year (or 150,000 tons/year). This rate is 35% lower than projected. When we exclude CDD generation which is reused or sent to CDD or commercial landfills, the actual fill rate in MSW landfills drops to around 90,000 tons per year.

Changes in MSW generation

In the 1993 plan, it was projected that solid waste generation would remain constant, or possibly decline slightly over the next five years, due to changes in business practices. This projection was partially based on the 9.5% decline in generation from 1988 to 1991. Unfortunately, the state observed a 7.5% *increase* in generation from 1991 to 1995. This growth trend parallels changes in the state's economic activity. The lack of historical waste generation data prevents us from identifying the major social and economic forces driving the growth of waste volumes, making standard projection techniques useless. However, there appears to be at least a loose correlation between real economic growth[2] and solid waste generation. If this relationship continues over the near-term future, then (based on SPO's real economic growth projections of about 2% per year through 2001) we can expect solid waste generation to increase at 2% to 3% per year over the next three or four years.

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[1] This report came out of a series of meetings of the Task Force on Solid Waste Landfills, which was convened to address Carpenter Ridge, the permitted, undeveloped state-owned special waste landfill, the impact of the ban on new commercial landfills, and an analysis of the amount of solid waste that is imported and exported.

[2] adjusted for inflation

Changes in the recycling rate

Recycling has clearly taken on a greater role in Maine's solid waste management programs. As noted earlier, the recycling rate increased from 33% to 41% over a five year period. This translates to a total increase of 200,000 tons/year of recyclables over 1991 and results in a reduced need to incinerate and landfill.

2. MSW: bulky

Because the generation of CDD is closely tied to commercial development and the health of the housing market, volume and composition is highly dependent on the direction of the economy. If Maine's economy improves as is currently projected, the need for alternative disposal options will increase. In addition, as CDD landfills become full and begin closure programs, as the Tri-Community/Ft. Fairfield facility has done, disposal fees are likely to increase. The increase in fees provides an opportunity to promote alternative strategies, such as the beneficial use of a variety of bulky materials.

Landfill

Maine buries at landfills approximately 70,000 tons/year of CDD. Of this 70,000 tons, about 35,000 tons/year goes to CDD municipal landfills (50%), 25,000 tons goes to commercial landfills (36%), and less than 10,000 tons ends up in MSW landfills (14%). Even though a number of CDD municipal landfills have limited or no measuring methods, the totals and distributions are relatively accurate.

Incineration

A portion of the wood segment of the CDD waste stream is currently being used as fuel in the waste-to-energy facilities, papermills and co-generation plants. However, markets are limited, particularly for contaminated wood debris. Even clean wood only commands between $8-15/ton. In addition, the cost of processing -- separating and chipping -- wood debris is high relative to its revenue potential.

KTI Bio Fuels in Lewiston is the only large scale processor of bulky waste and CDD wood in the state. Currently, almost all of its chipped wood goes to PERC. Incinerators' need for this material, however, is inconsistent. In addition, while this material is mostly generated in the summer, it is needed principally in the winter months when MSW generation is lower. Material storage becomes an additional problem and expense.

Several test burns of painted wood indicate that the material can be beneficially used as a fuel source while meeting air emission standards. However, due to high heavy metal content, ash from burning contaminated wood has a limited ability to be landspread -- the least expensive management method. As a result, it is expected that while burning contaminated wood at these types of facilities may be one useful management technique, it will most likely be limited.

A final issue to consider is the method that municipalities, particularly those without CDD landfills, are using to manage this material. Because of the higher cost of processing this material for reuse as fuel, many municipalities are open burning. Recent legislation has allowed municipalities to count burning of materials (in facilities with emissions controls) as recycling if there are no viable recycling markets currently available for these materials. While open burning of wood waste is, in most instances, practiced legally, the impact on air quality is a matter of concern. Furthermore, ash will still have to be landfilled which poses another problem in areas only served by incinerators due to higher transportation costs.

VI. MANAGEMENT OF MSW WITHIN MAINE'S GEOGRAPHIC AREAS

Maine waste management law establishes municipalities as the primary decision-makers with respect to municipal solid waste management decisions. Within the context of federal and state law, municipalities choose which other municipalities to cooperate with, how much commercially generated solid waste they will handle directly, and what combination of management options to use.

The state plan encourages natural affiliations and regional solid waste management and recycling associations that are based on mutually acceptable interlocal agreements that municipalities initiate. Solid waste management and recycling areas or programs noted in this section of the plan are not state designations of regions. Rather the geographies noted encompass the solid waste management and recycling programs which share common recycling or disposal facilities, or share common service area needs. (Refer to Appendix G) for the listing of municipalities which typically submit their annual municipal solid waste management and recycling reports to the State Planning Office as a group.) By 1996, 95 percent of Maine's population had access to municipal recycling programs.[1] More Maine households are recycling today than ever before. Participation in municipal recycle programs has increased from 72% in 1992 to an estimated 90% in 1996. This primarily is the result of expanded recycling programs since 1993 and greater public awareness.

Solutions based on changing economies of scale or technologies are the characteristics common to each of the programs described in the following summaries.

1. Aroostook County:

By 1996, 78,000 persons (98% of the county population) had access to recycling programs. Municipalities near the international border with Canada are disposing of their MSW to facilities in New Brunswick.

Presque Isle operates a secure landfill and recycling center that serves its needs and those of eight area communities. Tri-Community landfill (Fort Fairfield) serves as a regional MSW disposal facility for 20 or more municipalities and several plantations. The landfill has been expanded to a 230,000 ton disposal capacity for a 10-12 year life span. In 1993, activities were initiated to secure MEDEP permitting and licensing for landfill construction and operation of a regional MSW disposal facility designed to serve 12 to 20 communities in the greater Houlton area (Hammond Plantation) in the southern portion of Aroostook County. By 1995, the solid waste district formed to oversee the development of the facility received approval and site development permits from the MEDEP.

There are twelve MSW transfer stations located within the county. Most are municipal operations, however, a private operator oversees the operation of the Houlton area's transfer station.

2. Washington County

[1] Maine's unorganized territories are not required to submit annual solid waste management and recycling reports to the State Planning Office. Population statistics are derived from 1990 U.S. Census information.

For 1996, approximately 80% of the county's population (27,650 persons) had access to municipal recycling programs. Municipalities near the international border with Canada are investigating the opportunities available for disposing of their MSW at facilities in New Brunswick; at least one municipality has already taken this approach for managing the disposal of its MSW. This action is influenced in part because of the combined tip fee and transportation costs for MSW disposal at the PERC facility.

There are 10 MSW transfer stations located in the county. In 1995, the Pleasant River Solid Waste Disposal District was formed to help coordinate solid waste management and recycling services for seven coastal communities.

The commercial sector has increased its use of composting in the management of blueberry and fish processing wastes produced within the county. In 1996, a commercial composting operation began processing organic material for purposes of retail sale within the horticultural and garden center marketplace, as a high quality soil amendment.

There remains a need for one or more bulky waste processing and disposal facilities for the county.

3. Mid Maine (Hancock, Penobscot, Piscataquis, Waldo, and Somerset counties)

According to the 1996 municipal solid waste management and recycling reports, 236,875 persons (80% of the combined county population) had access to municipal recycling programs.

Within the five county area, there are seven licensed, publicly-operated demolition debris landfills, two privately owned and operated licensed special waste landfills, two publicly-owned, licensed special waste landfills (Anson-Madison Sanitary District, Hartland), three publicly-operated, licensed solid waste landfills, and 46 MSW transfer stations which have come on-line since 1993.

Seventeen recycling processing centers are located within the five county area. These centers have been able to increase the number of municipal programs accessing their services and have also increased the volume of materials processed for recycling.

Since the 1992 legislative initiative calling for the closure of municipal landfills that do not meet health, environment, and safety standards, there has been an increase in the number of communities using the PERC waste-to-energy facility for their MSW disposal. Most all of the municipalities described by this geographic area send their MSW to PERC.

4. Central Maine (Kennebec, Knox, Lincoln, and Sagadahoc counties)

According to the 1996 municipal reports, 215,915 persons (99%) had access to municipal recycling programs.

In 1996, fifty-seven communities within the four county area used waste-to-energy facilities; 49 used Mid MaineWaste Action Corp. (MMWAC) in Auburn and PERC in Orrington, eight used Maine Energy in Biddeford. Eight communities used the Augusta Hatch Hill landfill for their MSW disposal needs; three used the commercial landfill in Norridgewock and three used Bath's landfill for their MSW disposal. Augusta's Hatch Hill landfill will be reaching capacity within the next three to five years. Augusta and the eight communities served by the Hatch Hill will need to consider whether to develop plans to conserve existing space or find alternative disposal options for when capacity is reached.

There remains a need for one or more bulky waste processing and disposal facilities. Currently there are two commercial landfills, Sawyer Environmental Recovery Facility (SERF) in Hampden and Waste Management Inc's (WMI) Crossroads facility in Norridgewock, that serve as the primary disposal sites for bulky wastes. Some communities use the KTI facility in Lewiston for bulky waste processing as well.

5. Western Maine (Oxford, Franklin counties)

According to the 1996 municipal reports, 79,130 persons (96%) had access to municipal recycling programs within the two county area.

There are four recycling processing centers now available for municipal programs.

Twenty-eight communities use waste-to-energy facilities, MMWAC in Auburn or Maine Energy in Biddeford; 11 used WMI's Crossroads Landfill in Norridgewock, and 10 communities exported their MSW to a New Hampshire facility.

One or more bulky waste processing and disposal facilities continue to be needed. Currently, the KTI facility in Lewiston processes much of the bulky wastes generated from within this geographic area.

6. Southern Maine (York, Cumberland, Androscoggin)

From the 1996 municipal annual reports, 502,443 persons (97%) had access to municipal recycling programs within the three county area.

There are eight recycling processing centers now available for municipal programs within this geographic area.

Exploration of disposal options for front end-end process residue is needed.

A bulky waste processing facility began operating in 1996 in Portland. This has greatly improved the availability of options for managing these materials, However, there still remains a need for bulky waste processing within the region. Some bulky waste materials are exported to New Hampshire facilities for processing and disposal.

The costs of MSW management services, especially given the continued attention to reducing municipal budget levels of MSW management expenditures, will require state and local governments to identify opportunities for achieving efficiencies and improved performance of the waste management and recycling infrastructure.

However, even with increasing levels of participation by households in recycling, there always remains the challenge of not only reducing the amount of waste generated but improving the recovery rates for recyclable materials at the municipal levels.

SPECIAL WASTE

Special Waste is defined in Maine law as "solid waste, generated by sources other than domestic or typical commercial establishments, that exists in such an unusual quantity or in such chemical or physical state, or any combination thereof, that it may disrupt or impair effective waste management or threaten public health, human safety or the environment and requires special handling, transportation and disposal procedures." For a list of solid wastes classified as special waste, refer to the definitions section. Municipal Solid Waste (MSW) and Special Waste are mutually exclusive.

VII. WASTE CHARACTERIZATION AND MANAGEMENT

A. Paper Industry

The paper industry plays a major role in many aspects of Maine life, including solid waste generation and management. Because of this prominent role in the state, an industry-wide solid waste survey was undertaken in order to fully understand the contribution of the paper industry to the generation and management of Maine's solid waste. This section examines the industry's solid waste in detail, and analyzes changes and trends since the last compilation of this data in 1991.

1. generation

Methodology

In computing solid waste generation statistics for the industry, an important distinction was made between *generation* and *management* -- the total amount of waste generated by the industry is different from the amount of waste it manages. As a result, different statistics were calculated to capture these distinctions. If all the waste materials in all forms which require management are added together, total generation for the industry was 1,377,430 tons for 1997 (all solid wastes are measured in wet tons). This figure is slightly lower than the total generation calculated for 1991 -- 1,432,282 tons.

This figure, however, double counts materials by adding the same materials before and after incineration. To remove the double counting effect, only waste in its original form was counted towards total generation -- specifically, *ash* from the incineration of solid waste (primarily sludge) was removed from the equation. Ash from the incineration of fuels, however, was included in total generation. With this definition, total solid waste generation for the industry in 1997 was 1,321,821 tons.

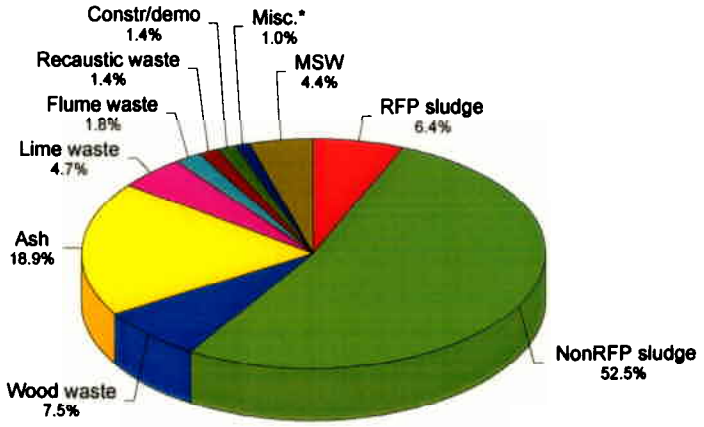
It should also be noted that all wood wastes burned in boilers were considered a fuel source, not a solid waste. In many cases, if these wood wastes were not available as fuel, other fuel sources would be purchased as replacements. For this reason, it made sense to count this material as fuel.
Of the 1,377,430 tons managed in 1997, approximately 16% was either beneficially used, composted or land applied; 26% was volume reduced through incineration with energy recovery; and 54% was disposed (landfilled or sent to an in-state disposal facility). The remaining 4% was sent out-of-state or recycled.

2. source, type, amount

While some comparison can be made between 1991 and 1997 solid waste composition data, it is limited by differences in waste categories. The composition of the paper industry's solid waste appears to have undergone some noteable changes since 1991. The generation of all papermill sludge[1] decreased from 958,466 tons in 1991 to 811,442 tons in 1997. Because of the difficulties in determining exact conversion rates from cubic yards to wet tons, a 5%- 10% margin of error should be assumed. However, changes in production and production processes might account for this nearly 150,000 ton decrease in sludge generation. In 1997, sludge accounted for approximately 59% of all paper industry waste whereas in 1991 it represented almost 66% of their waste stream.

Paper Industry Solid Waste Composition - 1997

Figure 6



* includes slaker rejects, bead/sand blast grit,polyethylene,used oil,oily waste,asbestos,sand/cement

In addition, ash
generation increased from 197,289 tons in 1991 to 260,388 tons in 1997. This increase is directly related to the increase in the use of incineration as a management technique. Finally, the sludge portion of the waste stream was broken down into sludge generated from paper produced with virgin materials (Non Recycled Fiber Paper sludge -- "NonRFP") and sludge generated from paper produced with

[1] "Papermill Sludge" refers to *all* types of sludges generated at papermills; this includes both sewage sludge and sludge generated from papermaking processes.

recycled materials ("RFP sludge"). By making this distinction, we can better quantify the volume of paper produced and waste generated from secondary materials.

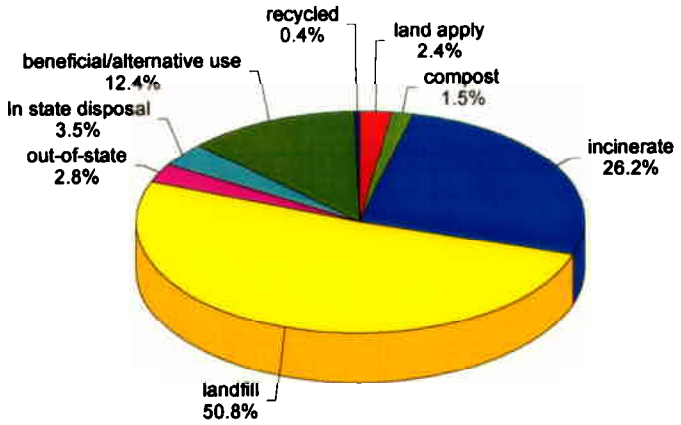
It should be recognized that the paper industry in Maine plays an important role in managing waste paper, which is collected through the efforts of municipal recycling programs. The waste paper would otherwise end up in the municipal solid waste stream. Recycling of waste paper results in significant volume of residual waste comprised primarily of rejected fiber and ink, which generally accumulates as sludge during the wastewater treatment process. In **Figure 6**, this material is represented as "RFP sludge" and comprised 6.4% of the paper industry solid waste stream in 1997. Approximately, 25-30% by volume of waste paper furnished to the recycling process is lost as waste. This waste percentage is higher than other types of papermaking; therefore, waste paper recycling can increase the amount of solid waste generated by the paper industry.

3. management methods

There have been a number of significant changes in the industry's solid waste management. The major changes include increases in incineration of sludge as a volume reduction strategy; increases in the beneficial use of all solid wastes; and reductions in landfilling and land application. The breakdown in management methods is illustrated in **Figure 7.**

Figure 7

Paper Industry Solid Waste Management - 1997



Landfill

Landfilling accounted for the disposition of about 51 % of the entire industry solid waste stream. This represents an 18% drop from 1991. One of the major reasons for this shift is the increased reliance on the volume reduction of sludge through incineration. In 1997, 43% of sludge was incinerated -- up from 27% in 1991. Conversely, landfilling of sludge dropped from 62% in 1991 to 48% in 1997. For a variety of economic and environmental reasons, many mills have made it a priority to reduce their reliance on landfilling.

Currently, 9 of the 19 mills have their own landfills. The other mills use other in-state and out-of-state disposal facilities to manage at least a portion of their special waste. Those companies using in-state disposal facilities use a combination of the 2 commercial facilities, Browning Ferris Industries, Inc. (BFI) Organics (land application and sludge/ash composting), landfill closure and landfill daily cover projects, and municipal waste water treatment plants.

Incineration

As noted earlier, many mills are relying more heavily on incineration as a waste management method. Incineration plays two important roles for mills: it provides an important source of energy and reduces the volume of waste. In 1997, 43% of sludge and 26% of the entire industry waste stream was managed through incineration. In addition, 9 of the 19 mills used their boilers in this capacity. By managing sludge through incineration, most mills can reduce the weight of their sludge by between 75% and 95%. The volume reduction impact for the industry is significant. In 1997, incineration reduced the waste requiring management from 1,337,430 tons to 1,013,699 tons -- a reduction of 323,731 tons. One large mill, which has been landfilling almost all of its special waste, plans to build a boiler to incinerate all of its sludge.

As noted earlier, wood by-products[1] burned for fuel were not counted as solid waste. However, in examining materials in this category, approximately 2,056,000 tons of wood by-products were burned for fuel in mill boilers. One mill alone burned over a million tons. The survey did not request information on energy production from mill boilers.

Composting

Both sludge and ash have the potential to be composted. Composting has increased slightly as a management method -- in 1997, about 6% of ash was composted compared to 4% in 1991. In some cases, sludge and ash (sl/ash) are combined; this material can either be composted or land applied.

Land application

[1] includes biomass, wood pallets, wood chips, bark and other clean wood wastes.

As mentioned earlier, land application, which managed 8% of the industry's waste stream in 1991, managed less than 3% in 1997. Reasons for this reduced use of land spreading include more restrictions on land available for land application and, in some cases, higher costs relative to on-site management methods.

Beneficial Use and other alternative uses

One of the areas where there has been significant gain is in beneficial use and related activities. In 1997, beneficial use and other uses accounted for about 12% of the industry's waste stream. This is a sharp increase from the 2% of wastes included in the "reuse/recycling" category from 1991. This comparison is not perfect because of differing definitions of categories; however, it illustrates an increased interest by environmental managers in the economic and environmental value of such opportunities.

The statistics on the breakdown of beneficial uses are approximations; however, they provide a good overall picture of alternative management methods. About 50% of waste in this category included waste used as landscape material (typically mulch-type materials) -- primarily wood and flume waste. About 16% was used as landfill daily cover or used in conjunction with a landfill closure. Lime waste and ash in cement products (utilized by Dragon Products) accounted for 13%. Other uses included: use as a bulking agent for sludge disposal (11%); road bed and structural fill (6%); recycled (3%); and pre-load area material (1%).

One paper company has established an innovative beneficial use partnership that maximizes environmental and economic efficiency. The paper mill purchases lime (calcium carbonate) from a company in Quebec which is used to control sulfur dioxide emissions. After delivering lime to the mill, trucks would ordinarily return home empty to Quebec. However, a landfill near the lime supplier has found use as a substitute for cement for the paper mill fly ash generated at the mill. As a result, the mill loads fly ash in the trucks used for lime delivery and sends the material back as a "back haul". Both companies benefit due to the efficiency of the "back haul" of ash to the landfill. Other paper mills are exploring similar partnerships.

In a number of surveys, environmental managers expressed a strong interest in increasing beneficial uses where it is determined to be safe and cost-effective. One company, pending DEP approval, will start land spreading its lime mud. Others are exploring additional opportunities for the beneficial use of ash.

Tires

As a part of the state's strategy to eliminate tire piles, 2 mills accepted chipped tires as fuel for their boilers. All together, the mills burned 57, 385 tons of tires in 1997 -- approximately 8 million tires. Because of such efforts, the state is making significant progress in managing its discarded tires. Currently, Maine generates about 1.6 million tires per year.

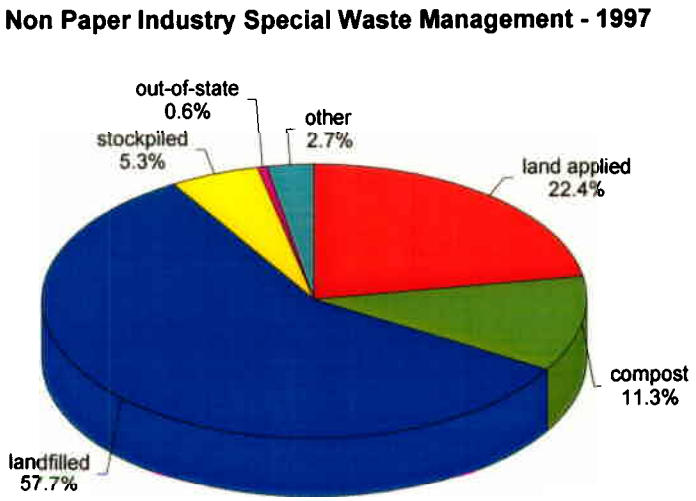
B. Non Paper Industry

1. generated, recycled, disposed

In 1997, 1,767,211 tons of special waste (including paper industry waste) were generated in Maine. The generation of non papermill special wastes was about 445, 390 tons, down from the 510,000 tons generated in 1991.

In 1997, 58% of all non paper industry special wastes were landfilled, while 22% were land applied, and 11% composted. The remaining 9% was stockpiled, sent out-of-state or not specified in the report. Biosolids (sewage sludge) and ash are the primary byproducts managed by methods other than landfilling (most oil contaminated soil is beneficially used; however, no figures are available on the amounts). For these byproducts, the rate of landspreading and composting is quite high -- 75%. **Figure 8** below breaks down 1997 special waste management methods into component categories.

Figure 8

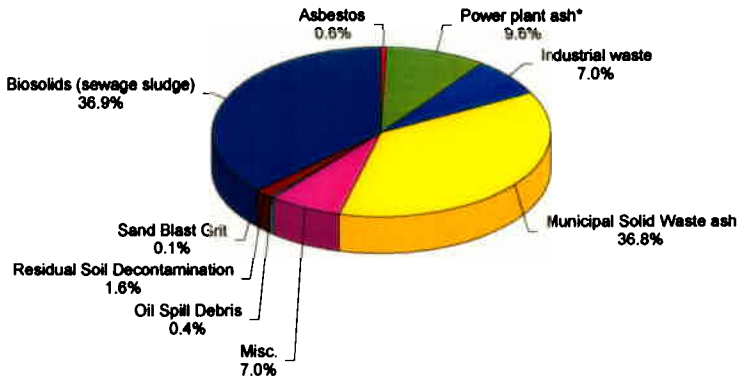


2. source, type, amount

Biosolids and MSW ash are the largest materials in the non-paper industry special waste stream, each comprising about 37% of the total. Power plant ash (10%) and industrial waste (7%) are third and fourth. While there are some variations since 1991, the proportions are essentially the same. **Figure 9** illustrates this breakdown.

Figure 9

Non Paper Industry Special Waste Composition - 1997



*includes coal/oil/wood ash

3. management methods

Certain special wastes, such as biosolids, ash and oil contaminated soil (OCS), (or oil spill debris), may be composted or beneficially used. For the purposes of this plan, landspreading is considered a beneficial use. Some current activities and future possibilities for composting and beneficial use include the following:

<u>Biosolids</u>

Biosolids result from the wastewater treatment process; publicly-owned wastewater treatment facilities are typically responsible for this function. In some cases, publicly-owned wastewater facilities manage wastewater from paper mills and other industrial companies, which during treatment contribute to the overall quantity of sewage sludge (biosolids). However, this plan is able to separate out paper mill wastewater from municipal wastewater because of information provided to the State Planning Office through its 1997 Paper Industry Solid Waste Generation and Management survey. It is important to differentiate between these two sources of sludge in order to more accurately assess generation and management trends.

There are two primary alternatives to landfilling for biosolids: land application (or landspreading) and composting. Landspreading is considered an agronomic use, which is defined as the "controlled land application of sludge or residuals at a rate commensurate with the nutritional needs of the crop to be grown and the assimilative capacity of the soil, usually requiring harvesting of the crop to compensate for

the added nutrients." Currently, MEDEP's Chapter 419 rules (Agronomic Utilization) are near completion; these rules will provide biosolids managers with guidelines on the technical requirements for safely land applying biosolids. In 1997, 76% of biosolids generated in Maine were managed through landspreading (46%) and composting (30%).

The land application of biosolids has consistently handled about half of this waste stream, providing a valuable resource for farmers and allowing municipalities to manage their biosolids in a highly cost effective manner. Recently, this practice has come under fire from residents and towns. The 1989 Solid Waste Law states that local ordinances cannot be more stringent than state law. Although this law recently has been reaffirmed by the Legislature for landspreading, 38MRSA 1305-9 now gives municipalities the ability to enforce the terms of sludge permits and licenses and also to suggest conditions for permits and licenses. Because of public concern with land application, it is likely that landspreading opportunities will continue to be restricted.

In addition, Maine's farm base is continuing to decrease thus less land is available upon which to spread biosolids. In high population growth areas, farmland continues to be replaced by residential development, which has put more residents in closer proximity to many landspreading sites. This has had the effect of bringing the landspreading of biosolids under closer public scrutiny. This issue is just one of many associated with land use sprawl. Local resident opposition stems from the following factors:

- Objection to the odors associated with biosolids;
- Concern about the perceived environmental and public health impacts from the activity.

Composting offers another environmentally-acceptable management method for handling biosolids. While high capital and transportation costs make this practice less economically attractive, the demand for composting may rise if landfilling is the only other option. Unfortunately, composting removes most of the nitrogen -- the primary ingredient which provides its value as an agronomic commodity. Currently, about one-third of biosolids is composted.

<u>MSW ash</u>

Currently all MSW ash is buried in special waste landfills, which include the two commercial facilities, and the Regional Waste Systems (RWS) and Lewiston landfills. It has been proposed that this material be processed into an aggregate for construction uses. Because the MSW burn process increases the concentration of chemicals remaining after incineration, there is a great deal of controversy about whether this use of ash is adequately safe to use in view of possible future exposures. Currently, there is a prohibition against beneficially using MSW ash; however, MEDEP intends to repeal this prohibition. Should this material be approved in beneficial use applications, a portion of MSW ash will not be landfilled, effectively freeing up valuable landfill capacity.

Oil Contaminated Soil (OCS)

Much of this material is already reused by some facilities as aggregate for asphalted road base and as a material in cement production. These reuse opportunities, in conjunction with a drop in generation, will further reduce the need to dispose of this material. The reduction in generation is due to the October 1, 1998, EPA deadline for removal of underground storage tanks. Facilities will be removing tanks prior to the deadline and remediating soils if necessary. In 1997, 7,195 tons of OCS were landfilled, up from 1,565 tons landfilled in 1995. A continued upward trend is not expected.

Coal/Oil ash

Right now, most of the coal/oil ash generated in Maine is landfilled. However, some coal/fly ash is used as an ingredient in concrete and asphalt. For example, in 1996, Dragon Products used 3500 tons of coal/fly ash in their production of cement. Another use of coal ash is as flowable fill in construction. Currently, all oil ash is landfilled, although it has the potential to be used in the production of asphalt.

Wood ash

Based upon information gathered for a 1990 report on 'Usable Waste Products for the Farm', approximately 8,598,000 cubic yards of wood by-products are produced annually in Maine. Of this volume, 26.5 %, or 2,278,500 cubic yards of bark and similar wood products are used primarily as fuel at mills.

Wood ash is also being explored as a material for other beneficial uses. For example, bottom ash from wood-fired boilers can be used as a substitute for gravel in the construction industry. In addition, SAPPI Fine Paper, North America is evaluating the potential to burn ash a second time to further reduce the volume.

Another source of wood ash results from the combustion of construction and demolition debris. Clean wood waste, when burned, results in ash that may be landspread. Contaminated wood waste, burned in the same boiler, however, may result in the ash becoming contaminated due to heavy metals content. When that occurs, the ash needs to be disposed of at a landfill rather than utilized through a landspreading program. Again, the apparent conflict within the solid waste hierarchy appears. Incineration/volume reduction is higher in the hierarchy than landfilling, yet the action results in landfilling material, as opposed to being beneficially used.

4. management costs

a. composting costs:

Publicly-owned biosolids composting and commercial composting are included in this section because they often employ similar practices. Many wastewater treatment plants either compost their own sludges or deliver that sludge to a commercial entity for composting. In 1997, landspreading continued

to be the most heavily utilized management practice, managing 46% of the state's sludge. Of the remaining sludge, approximately 30% was composted, 7% landfilled, and 17% was stockpiled, shipped out-of-state, or managed through lagoons.

Composting biosolids requires the use of amendments and bulking agents, which can be a significant cost. These carbonaceous amendments often are leaves, wood wastes, ashes, paper masking, and other wastes. By combining two waste streams, a useable product is created. Costs vary from operation to operation but the average biosolids composting facility cost ranges from $35 to $65 per ton for a finished product. A major cost can be additional materials required to create a successful composting environment, as well as the support equipment and facilities. Equipment needs include aeration systems, mixers, turning equipment, leachate collection systems, buildings and odor control systems.

b. landspreading costs:

Landspreading, as examined in this section, will focus on the land application of biosolids. Biosolids are usually spread using equipment moving across the fields; the liquid product is usually applied through piping or an irrigation system.

An accurate cost/benefit analysis of landspreading, in addition to labor, transportation and capital costs, should also include: financial benefits to farmers; management requirements (site soils, agricultural practices); licensing and public participation costs; and storage costs. A more in-depth analysis is needed to fully account for the costs of landspreading.

Some of the cost figures provided by biosolids managers include capital costs; others include only labor and transportation. Average cost data collected shows that landspreading costs range from $15 to $42 per ton. The costs rise as distance to spreading areas increases and when capital costs are included in the calculation.

c. landfill costs:

Two commercial landfills, Waste Management Inc. (WMI), Crossroads site in Norridgewock and Sawyer Environmental Recovery Facility (SERF) in Hampden, along with certain municipal landfills, accept the majority of non-paper industry special waste generated in-state (including incinerator ash and asbestos).

Landfill prices are in the range of $38 - $65 per ton at the two commercial sites. The State collects a fee from commercial disposal site owners for the volume of special wastes landfilled.

VIII. Disposal Capacity

A. Existing and Potential Disposal Capacity

Commercial

Commercial facilities provide 85% of the non-private special waste landfill capacity, although around 5% to 10% of their annual landfill use is for construction & demo debris (CDD) materials. With the licensed expansion of WMI Crossroads, Norridgewock and anticipated expansion for SERF, Hampden special waste capacity should be adequate until **2019**. One of the critical variables in this projection is how and where front end process residue (FEPR) from incinerators (approximately 90,000 tons/year) will be managed. This material, which is currently disposed of in conjunction with landfill closures, will need another outlet by the end of 1998. While FEPR is not a special waste, landfilling this material in one or both of the commercial landfills is a possible outcome. If this material is disposed of at the commercial facilities, expected commercial landfill life will be reduced by five years, to **2014**.

Municipal

Currently, there are eight municipal landfills permitted to accept special waste. These facilities, in addition to accepting MSW, are also used to dispose of MSW ash, biosolids, and industrial sludge. They are intended primarily for the specific use of local communities and industries. Therefore, it makes sense to analyze capacity for municipal special waste separately from the rest of the special waste stream.

With current use and permitted capacity, there will be adequate municipal special waste landfill capacity until 2032 (35 years). Only Regional Waste System's South Portland landfill (for their MSW ash) poses potential capacity problems -- in 2 to 6 years, it is expected to reach capacity.

Each special waste material presents unique problems and opportunities. Some possible waste areas of interest or concern are the following:

Biosolids

Biosolids, also referred to as sewage sludge, is generated by waste water treatment facilities. A number of municipalities also manage local paper company and other industrial sludges; these waste materials are sometimes included in the measurement (generation and management) of biosolids. However, it is important to differentiate these two sources of sludge in order to more accurately assess generation and management trends. Measurements will distinguish, whenever possible, between biosolids and papermill/industrial sludge. In 1997, 7% of biosolids were landfilled, up from 3% in 1995. As noted earlier, this increase is mostly due to a decrease in exports to New Hampshire along with a proportionate increase in Maine generated biosolids.

While the state will have adequate landfill space to handle more biosolids, landfilling is generally more expensive and accelerates the need to create more landfill capacity. With an increase in landfilling will most likely come a corresponding increase in the costs of biosolids management to towns. Because the costs of managing solid waste are already high, towns may find additional increases difficult.

Papermill waste

Although "beneficial use" is on the increase, landfills continue to be the most prevalent disposal option for the paper mills. Most papermill sludge is landfilled at generator-owned landfills; the rest goes to either the commercial landfills or to a municipal special waste landfill. In 1997, the industry landfilled approximately 740,000 tons. If some of the proposed waste process technologies are implemented, such as additional boiler capacity for waste incineration and more beneficial uses of waste, these could effectively extend the life of landfills.

Changes in either the generator-owned landfill space available for this material or the ability to beneficially use it will have a major impact on Maine's overall solid waste disposal capacity. The closure of even one generator-owned landfill facility could force additional disposal demands to be made on the commercial landfills, effectively reducing their expected life.

MSW ash

In 1993, it was predicted that MSW ash would increase over the 150,600 tons generated in 1991 as a result of Mid-Maine Waste Action Corporation (MMWAC) coming on line. In fact, MSW ash has consistently been above 155,000 tons, reaching a high of 173,000 tons in 1996. This amount dropped to about 164,000 tons in 1997. If the current waste management practices for MSW continue as is (incineration handles around 40% of Maine's MSW), ash generation will continue to increase, though relatively slowly and with some annual variations. However, incineration capacity is currently near 100%. Therefore, any growth in the generation of this material should be limited.

Currently all MSW ash is buried in special waste landfills -- the commercial facilities and the RWS and Lewiston landfill.

Oil Contaminated Soil (OCS)

OCS does not constitute a large portion of the special waste stream (less than 1% of special waste disposed). Furthermore, the sources of OCS are expected to continue to decline. The generation of this material had been about 14,000 to 15,000 tons per year in the early 90's as the underground storage tank (UST) removal program was in full swing to meet the October, 1998 deadline. Changes in the mandated state removal program have reduced the amount of contaminated soil produced. In addition, the 1998 deadline for removing USTs is drawing near. Reuse opportunities, in conjunction with a drop in generation, should further reduce the need to dispose of this material. However in 1997, 7,196 tons of OCS were landfilled, up from 1,564 tons in 1996.

Coal/Oil Ash

Generation of coal/oil ash is highly dependent upon the energy infrastructure and state energy policy. With the closing of Maine Yankee in 1996 has come a need to increase energy production from other sources. Much of this additional energy has been coming from coal/oil produced energy which has resulted in higher levels of ash. In 1991, Maine generated about 15,000 tons of this material. After a reduction in generation of this material to below 10,000 tons, it increased to almost 18,000 tons in 1996. However, in 1997, it then dropped to 7,660 tons which is similar to pre-1996 levels. This may indicate a readjustment in the industry to the closing of Maine Yankee.

Wood Ash

Due to utility deregulation and the renegotiation of existing electric contracts, many of the wood-to-energy facilities constructed in the early 1990's are no longer operating. However, many reopened in order to fill the energy void created by the Maine Yankee shutdown. Levels increased from 106,550 wet tons in 1994 to 118, 940 wet tons in 1997. Of the 118, 940 tons generated in 1997, 39% (46,942 tons) were landfilled.

Asbestos

In the early 90's, aggressive efforts were made to remove asbestos from buildings to reduce risks to public health. Much of this material was removed, all of which required disposal (around 15,000 cubic yards/year). In 1993, it was anticipated that removal and disposal of asbestos would remain stable or increase slightly. More recently it has been acknowledged that, if left undisturbed, the public health threat of asbestos is relatively low. Generation has dropped to around 5,000 cubic yards/year. Currently, there are no opportunities for reuse of asbestos.

Although generation of asbestos has dropped considerably since the early nineties, the need for disposal of asbestos contaminated materials has increased over the past few years. The generation of this waste material is most likely tied to commercial activity and the housing market. With the expected steady improvement in the economy will come a corresponding increase in asbestos waste material generation.

B. Projected Demand for Disposal Capacity

Up until 1996, disposal of special waste at municipal and commercial landfills had remained around 230,000 tons per year, 85% of which went to the two commercial facilities. However, in 1996, special waste disposal climbed to 310,000 tons. An important reason for this increase stems from a moratorium on the land application of biosolids enacted by New Hampshire which resulted in the importation of about 30,000 tons of biosolids into a Maine commercial landfill. Some portion of this increase in special waste disposal is expected to continue into the foreseeable future due to new legislation in New Hampshire which severely restricts the land application of biosolids. In 1997, total

special waste disposal in the state was about 284,000 tons. This total is consistent with the predicted amount.
Other events throughout New England may also have an impact on projected commercial landfill capacity. For example, many landfills in Massachusetts are closing and, as a result, special wastes going to those locations are likely to be headed north. While other New England states may absorb a portion of those wastes, Maine is likely to be the recipient of higher levels out-of-state CDD and special wastes. Any additional increases in out-of-state wastes coming to Maine will proportionally reduce projected commercial capacity.

Most municipal special waste landfills were developed to handle a particular waste material, typically sewage sludge or industrial wastes. With some materials, such as industrial and papermill sludges, changes in generation will be linked to particular business decisions and, economic growth generally. Because of anticipated economic growth, generation of these materials is likely to increase.

In addition, the high costs of disposal have prompted efforts to reduce the amount of industrial waste requiring disposal. Other wastes, such as MSW ash and biosolids are likely to remain stable, only increasing in small increments.

Recommendations for State Roles

- In conjunction with biosolids managers, the state should develop an analysis of the possibilities for composting expansion or other uses for this material.

- SPO will work with Legislature and other state and local agencies to:
  - promote landspreading, composting and other innovative practices as available and viable options for the management of biosolids.
  - encourage policies that address the impacts resulting from land use sprawl on the continuation of landspreading, composting and other innovative practices through its programs to address community & regional planning issues.
  - make available to the public an informational packet on the environmental and economic impacts of biosolids land application.

- Collect and analyze data on the generation, disposal and beneficial use of special waste.

IX. RECOMMENDATIONS AND NEXT STEPS

A. Summary of Recommendations for State Roles

1. Municipal Solid Waste

Waste Reduction

- Establish an official state waste reduction goal as required by 38MRSA 2132-2.

- Expand current information and education efforts that promote waste reduction activities at local, regional and State levels.

- Continue pollution prevention assistance programs administered through DEP.

Statewide Recycling Rate

a. recycling

- Provide ongoing technical assistance to municipal recycling and composting programs throughout the State:
  - focus assistance on communities/population centers not achieving reasonable progress toward 50% goal
  - leverage state resources with existing programs and groups
  - encourage municipalities to link small commercial generators into their programs
  - enhance opportunities to exchange information and advance recycling measurement techniques to local solid waste and recycling programs for improving service levels and program effectiveness.

- Provide ongoing technical and financial support for the "Pathways to a Sustainable Future" curriculum, developed with state assistance, for use in Maine schools on the teaching of waste management and recycling options.

- Serve as a clearinghouse on recycling markets; in conjunction with other state agencies, identify potential markets and assist in their development where appropriate.

- Sponsor training and certification programs to improve the quality of recyclables prepared by municipal programs.

- The State Planning Office will review the current definition of the Municipal Solid Waste (for the purposes of calculating of the statewide recycling rate) and consider the possibility of expanding or revising the various streams included in that definition.

- Where the state (State Planning Office) determines that reasonably available markets for recyclables do not exist, it should, as required by statute (38 MRSA section 2132), allow designated materials to be used as fuel. (Appendix F)

b. composting

- Direct available grant funds to communities to encourage the implementation of appropriate solid waste management activities, with preference given to:
  - advancing composting of organics
  - cooperative regional waste management opportunities.

- Work with municipalities to manage leaf and yard waste as a separate waste stream: encourage backyard and municipal composting programs; consider a statewide ban on leaf and yard waste sent to disposal facilities.

c. CDD & tires

- Direct available grant funds to communities to encourage the implementation of appropriate solid waste management activities, with preference given to:
  - recycling/beneficial use of CDD
  - cooperative regional waste management opportunities.

- The state will work to help establish communication links between generators, processors, and end-users of CDD materials to maximize reuse opportunities.

- Expand opportunities for use of tires; one such use is as a material in road construction and reconstruction projects within state.

- Encourage communities and regional groups to examine management and disposal options for CDD to identify reuse, recycling and beneficial use possibilities.

- Promote and develop market opportunities for use of sheetrock, shingles and other waste containing asphalt in paving applications.

- Work with towns, Maine Dept. of Transportation (MDOT) and other state agencies to beneficially use waste materials in road construction and maintenance where permitted.

- Investigate uses of acceptable CDD materials by industrial consumers within Maine and New England.

- As long as the use of waste wood (including demo debris) is considered a beneficial use, the state should:
  - encourage municipalities to sort and store waste wood properly for more effective processing.
  - encourage municipalities to have their wood processed for energy producing facilities which operate with air emission controls.

Disposal Capacity

- The SPO should offer to serve as an information clearinghouse for solid waste facilities for the purpose of encouraging cost-effective disposal for Maine's municipalities.

2. Special Waste

- In conjunction with biosolids managers, the state should develop an analysis of the possibilities for composting expansion or other uses for this material.

- SPO will work with Legislature and other state and local agencies to:
  - promote landspreading, composting and other innovative practices as available and viable options for the management of biosolids.
  - encourage policies that address the impacts resulting from land use sprawl on the continuation of landspreading, composting and other innovative practices through its programs to address community & regional planning issues.
  - make available to the public an informational packet on the environmental and economic impacts of biosolids land application.

- Collect and analyze data on the generation, disposal and beneficial use of special waste.

B. Future Policy Analysis and Development Needs

The purpose of this plan, as indicated in statute, has been to prepare an analysis of, and a plan for, the management, reduction and recycling of solid waste for the State. In researching and preparing this document, certain issue areas have emerged as potentially significant to the solid waste infrastructure in Maine. Some of the major issues identified for future policy analysis and development are:

Increased Statewide MSW Recycling: Recycling has been a successful method for managing Municipal Solid Waste in Maine. In order to maintain the waste management infrastructure that has been developed and anticipate waste management issues that its municipalities will soon face, the state should continue to evaluate areas which offer the greatest recycling opportunity. (e.g. CDD materials, promotion of regional efforts, and educational outreach).

Comprehensive Municipal Solid Waste Planning and Assistance: The State Planning Office has identified a need among municipalities for providing guidance and assistance on solid waste issues which go beyond recycling. Because many communities face a variety of interconnected waste management challenges, it makes sense for SPO to begin to comprehensively address solid waste by considering the full range of options and opportunities available to them.

Beneficial Use: Currently, DEP is working to establish rules and procedures for beneficial use. The agency's process involves calculation of the health and environmental risks associated with this substitution of waste for a raw material and establishing under what conditions the beneficial use of wastes is appropriate. To the extent that "waste materials" can be safely substituted for virgin materials or reused, the office may recommend the evaluation and/or implementation of specific innovative disposal and waste management technologies and practices.

Biosolids/sludge Management: Biosolids and other sludges make up a sizable portion of Maine's solid waste generation. This plan recommends that State energies continue to be environmentally beneficial and innovative waste management practices, such as landspreading and composting, remain available for the management of biosolids and other sludges.

C. State Planning Office work plan priorities for 1998

- State Planning Office prioritizes its work through its municipal grant process. Grants will be awarded to municipalities based on the following project guidelines:

1. Organic -- develop projects which focus on promoting back yard and municipal composting programs.

2. Construction & Demolition debris -- implement environmentally-sound management alternatives to landfilling.

3. Regional Solutions -- work with other local and regional entities to obtain improved economies of scale in programs.

- Other SPO projects and priorities for 1998 include:

1. Information clearinghouse -- develop Internet resources on recycling markets and programs, and other waste management information of use to municipalities.

2. Backyard burn -- work with the DEP air bureau, legislature, and municipalities to address the environmental and health concerns that back yard burn poses.

3. Training/certification program -- develop program for recycling center managers and employees.

4. Municipal recycling reports -- collect and report recycling and disposal information gathered from municipalities and regions.

5. Statewide recycling rate goal -- develop and implement a process for evaluating the state's progress towards reaching the 50% goal, as well as the resources and conditions required to reach this goal. A part of this process might include consideration of an adjustment to the goal in light of these resources and conditions.

6. Land application -- promote the continuation of this management practice for biosolids and papermill sludges to reduce the need for landfilling this resource.

X. APPENDIX

APPENDIX A

Determining statewide MSW generation and the recycling rate

The estimated statewide solid waste generation rate is calculated by adding together the total amount of waste disposed (incinerated, landfilled and exported), recycled, and reused. This information is derived from annual municipal solid waste reporting, the private sector Broker/End-User survey, annual reports of disposal facilities (landfills and incinerators), and neighboring state and provincial governments in the northeast region. While Maine municipalities are required to report MSW disposal and recycling data for their municipal and solid waste management association, there is currently no penalty for non-reporting. On the whole, municipalities have been cooperative in providing data via the Municipal Solid Waste Annual Reports; however, private sector cooperation has been less reliable.

Recycling rate

The recycling rate was derived by using recycling and disposal data in conjunction with the following formula:

$$\text{Recycling Rate} = \frac{\text{(recycling)}}{\text{(disposal + recycling + reuse)}} * 100$$

This process is not a precise measurement. Some data is incomplete, particularly for recycling activity in the private sector. Additionally, adjustments were made to try to eliminate duplicate counting when material moves from a broker to an instate end-user. Although there may be errors in the estimates for some individual materials, SPO estimates that the overall result is accurate to within a 5% margin of error.

Methodology: Maine versus US EPA in determining statewide recycling rate

The US EPA is working to define standards for measuring MSW recycling on a national basis. According to EPA proposed guidelines, construction and demolition debris (CDD) is treated as a category separate from MSW. However, Maine statute includes CDD in its MSW definition. These methodologies were applied to calculate each recycling rate (Appendix B). Using guidelines set forth by the US EPA results in a recycling rate of nearly 44%.

Maine now ranks among the top 10% of states ranked by percent of municipal solid waste recycled. This progress is the result of teamwork on the part of many organizations in the public and private sectors and demonstrates that recycling is a major part of the established waste management infrastructure.

APPENDIX B

Toxics in Packaging

Maine participated in the CONEG (Coalition of Northeastern Governors) Source Reduction Council which developed model legislation on `Toxics Use in Packaging'. The Source Reduction Council was an organization of the nine Northeastern Governors and representatives of industry and public interest groups. In 1990, Maine enacted legislation titled `Reduction of Toxics in Packaging' to decrease the amount of heavy metals found in packaging and packaging materials sold in the state. This legislation has been adopted by the other CONEG states as well as states outside of the Northeast.

This toxics packaging law prohibits the sale of any package or packaging material to which lead, cadmium, mercury, or hexavalent chromium has been intentionally introduced. Further, manufacturers and distributors of packaging and packaging materials were required to limit the total amount of incidentally present heavy metals to 600 parts per million by April 1, 1992; 250 parts per million by April 1, 1993; and 100 parts per million by April 1, 1994.

The state will continue to promote and encourage waste reduction through the wastecap and Office of Innovation and Assistance. However, because of limited state resources and no legislative directives in this area, it is unlikely that any new waste reduction educational outreach campaigns will be initiated in the near future. The state will work with municipalities to encourage adoption of pay-as-you-throw programs when appropriate and provide the technical assistance to implement them.

APPENDIX C

Two Maine programs are in place to promote source reduction activities:

WASTECAP

The Wastecap Program, sponsored by the Maine Chamber and Business Alliance, promotes and encourages waste reduction actions by business and industry. Wastecap assists businesses and industries by providing a free on-site waste stream assessment which aids the business in recognizing potential changes in purchasing, production and material handling that may reduce the volume, weight and/or toxicity of the solid waste being generated. Wastecap visits are made upon request by trained and experienced volunteers from businesses and public agencies who often have first hand knowledge of similar operations or processes. The Wastecap coordinator manages the program, including site visits and technical team member selections. Liaison is maintained with state agencies and programs to assist in identifying areas where there may be regulatory roadblocks to various types of waste reduction.

Since 1990, nearly 200 site visits by technical team members have been conducted at various commercial, industrial and institutional facilities around Maine. These source reduction visits have been completed at hospitals, food distributors, industrial operations, retail stores and other commercial and retail operations. Throughout and at the end of the visit, team members share with the company's representatives their observations, suggestions and recommendations. Emphasis is placed on solid wastes and not hazardous waste issues. Information gathered is confidential and remains within that firm.

Office of Innovation and Assistance

The Office of Innovation and Assistance, within the Maine Department of Environmental Protection, is where the office of Pollution Prevention is located. Pollution prevention is commonly understood as

- the use of processes, practices, or products that reduce or eliminate the generation of pollutants and wastes or that protect natural resources through conservation or more efficient use.

The Office of Innovation and Assistance assists in:

- coordinating pollution prevention activities with other agencies and entities within the state, region and nation;
- acting as a public contact and an information clearinghouse on pollution prevention issues;
- providing the technical assistance and training to educate the DEP staff, the public and regulated community about pollution prevention;

- implementing and tracking compliance with Maine's Toxics Use and Hazardous Waste Reduction Law;

- overseeing other activities designed to ensure that the value of pollution prevention is consistent and promoted throughout the Department and the State.

The Office's assistance to businesses includes: providing on-site technical or compliance reviews (as resources allow); gathering and disseminating information; evaluating a potential project's costs and savings; and training and planning aids. DEP works with the paper companies in going beyond compliance issues to include waste reduction activities.

APPENDIX D

Pay-as-you-throw' Trash Program

This type of source reduction program is driven by economic incentive. Under this program, the local community (or group of communities) changes the method for funding residential trash collection and disposal from a tax-based municipally-furnished system to a user-pays system.

The `pay-as-you-throw' or 'pay-by-the-bag' program is in place at over 50 communities in the State, with minor variations. Some of the programs are working successfully through a transfer station or drop-off facility while others work from a curbside program where residents place trash and/or recyclables at the edge of the road for collection.

A study conducted by the Margaret Chase Smith Institute indicates that a community's waste stream requiring disposal could be reduced 30 to 50 percent by adopting this type of fee system. For Maine's 496 communities, that represents between 230,000 and 340,000 tons of solid waste a year. Some of the benefits include the following:

- recycling activities tend to increase as residents realize direct cost savings;
- backyard composting becomes more common with the homeowner gaining valuable soil amendment materials;
- less waste generated by residents because they now pay directly for the disposal of items (and their packaging).

The study noted several drawbacks to this type of program:

Illegal dumping - short term (usually six months or so) increase in illegal dumping of trash alongside roads. This activity usually returns to `pre fee' levels as residents adjust to the system.

Return of the 'backyard burn barrel' - especially in rural areas, residents may return to backyard burning of paper, plastic and garbage in an effort to reduce volume and weight of trash. Air pollution and related issues can quickly arise. This issue is currently under study by DEP which will be reporting to the legislature in 1998.

Trash 'leaves' the town - residents may start taking their residential trash to work for disposal, dropping it off at a business dumpster, or using a commercial hauler to remove their trash so they do not have to recycle. The trash from that community is not, in those instances, actually being reduced. By adopting pay-per-bag programs throughout an entire region, these activities may be reduced since all communities would have the same program.

APPENDIX E

Statewide Recycling Goal Evaluation Process

During the next 24 months, the SPO will be evaluating the State's progress towards the 50% recycling goal which was established in 1989 by the State's legislature (MRSA 38-2132-1). We will study what, if any, revisions Maine should consider for the State's recycling goal. As part of this effort, the SPO will be reviewing the following issues, as well as others, in a comprehensive process.

As a part of the process of evaluating recycling in Maine, we must start by quantifying the tangible benefits that recycling produces. These benefits include:

- Utilizing resources that may have otherwise been disposed, while also reducing demand for raw materials from natural resources.

- Providing industry with commodities for their manufacturing process (paper is the largest).

- Reducing our dependence on the disposal infrastructure, thereby decreasing demand upon landfills and waste-to-energy facilities.

- Lessening the possibilities of toxics becoming potential pollutants (this possibility is increased through incineration and landfilling).

- Contributing to Maine's economic health by producing jobs in Maine.

Additional questions that need to be addressed include:

- What is the state's recycling status in relation to the 50% recycling goal?

- What has been the State's investment to date in the recycling infrastructure?
  - What has been the return on this investment to the State and its Municipalities? (e.g. financial, environmental, disposal capacity)

- Has recycling matured as a 'way of life' in Maine?
  - Has it become institutionalized for residents?
  - Have state and municipal efforts to recycle reached a plateau?

- What level of recycling is attainable?
  - What is needed to reach the next level of recycling?
  - What are the financial and behavioral requirements for getting to the next level?

- What are the benefits? (e.g. financial, environmental, disposal capacity)

- What impact might waste reduction practices have on the recycling goal?
  - On the environment?
  - How might these practices affect capacity?
  - How will these practices impact the need for additional capacity/new facilities?

These are some of the issues that will be considered as SPO begins studying the recycling goal and reviewing possible actions. SPO envisions an open process during this review and will be encouraging participation from various parties and legislators within the State to develop a mutually agreeable and attainable goal. This goal should reflect the progressive environmental and economic values that Maine has pioneered as demonstrated by its 'first in the country' bottle bill.

APPENDIX F

A Listing of Recyclables Included in Municipal Programs*

Paper

OCC = corrugated cardboard
NEWS = newspaper
MAG = magazines
TBKS = telephone books
RMP = residential mixed paper
OP = office paper
PCP = polycoated paper (juiceboxes and the like)

Plastics

HDPE = high density polyethylene plastic (#2 plastic containers)
PET = polyethylene teraphthelate plastic (#1 plastic containers)
PLAS = other plastics

Glass

GLSS = three colors of glass, either separate or mixed
GLCM = glass mixed w/ceramics, tempered glass

Metal

ALUM = aluminum goods
UBC = used beverage containers (aluminum)
MET = metal (light iron, scrap metal and the like)

Organic

CPOST = yard waste composting
BY = backyard composting program
FOOD = food composting, animal feed
OC = other compost

Automotive

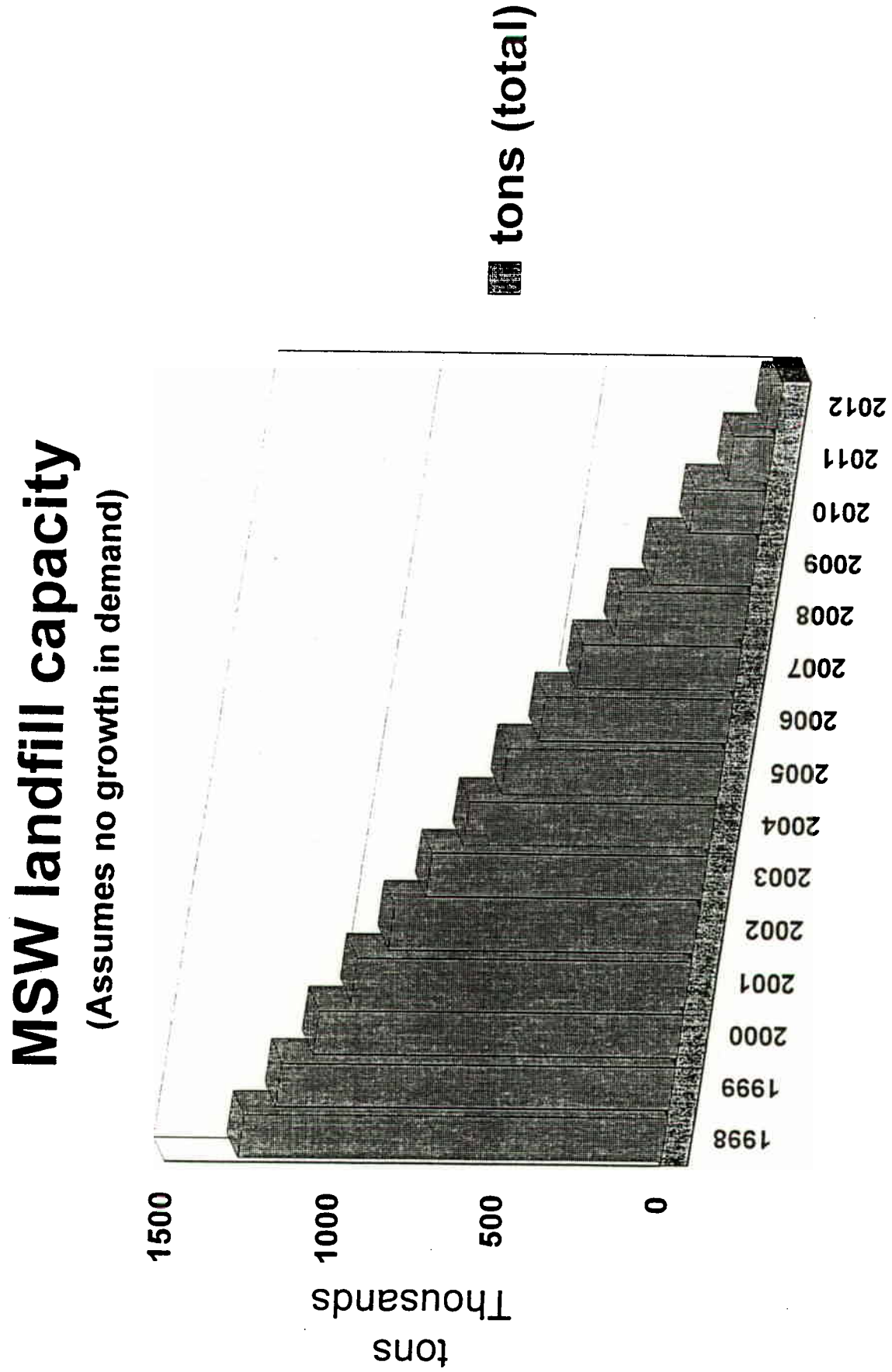
TIR = tires
BB = bargain barn/exchange center

* Abbreviations match the survey data requested from municipal recycling programs

APPENDIX G

Beneficial use is also found in 38 M.R.S.A. section 2132, where the beneficial use of waste is permitted, and in certain circumstances may constitute recycling, but only for the purposes of achieving the state goal of recycling 50% of the municipal solid waste generated each year.

This statute reads: "The use of waste paper, waste plastics, waste wood, including wood from demolition debris, used motor vehicle tires or corrugated cardboard as a fuel in industrial boilers or waste-to-energy facilities for the generation of heat, steam or electricity constitutes recycling only for the purposes of determining whether the goals in subsection 1 (50% recycling/ composting) are met and for determining municipal progress as provided in section 2133 (reasonable progress towards the 50% goal). In order for the use of waste under this subsection to constitute recycling, the office must determine that there is no reasonably available market in the State for recycling that waste and the wastes must be incinerated as a substitute for, or supplement to, fossil or biomass fuels incinerated in the industrial boiler or waste-to-energy facility."


MSW landfill capacity
(Assumes no growth in demand)
tons (total)
tons
Thousands
1500
1000
500
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

APPENDIX I

CITIES AND TOWNS REPORTING IN REGIONS 1996

AROOSTOOK VALLEY SOLID WASTE DISPOSAL DISTRICT
Ashland, Masardis, Garfield Plantation, Oxbow Plantation

BAILEYVILLE REGION
Baileyville, Alexander, Topsfield, Grand Lake Stream, Baring, Crawford, Waite, Talmadge

BOOTHBAY REGION
Boothbay, Boothbay Harbor, Edgecomb, Southport

BRISTOL REGION
Bristol, So. Bristol

BUCKFIELD REGION
Buckfield, Sumner

BUCKSPORT REGION
Bucksport, Orland

CAMDEN REGION
Camden, Hope, Lincolnville, Rockport

CARATUNK REGION
Caratunk, The Forks, West Forks

CENTRAL PENOBSCOT SOLID WASTE FACILITY
Corinth, Bradford, Charleston, Lamoine

COASTAL RECYCLING
Franklin, Gouldsboro, Hancock, Harrington, Sorrento, Sullivan, Winter Harbor, Cherryfield

DOVER-FOXCROFT REGION
Dover-Foxcroft, Atkinson, Sangerville, Sebec, Barnard, Bowerbank

FRENCHBORO REGION
Frenchboro, Long Island

GREENVILLE REGION
Greenville, Shirley, Beaver Cove, unorganized territories; Big Squaw, Little Squaw, Harford's Point

HARMONY REGION
Harmony, Wellington

HATCH HILL REGION
Augusta, Chelsea, Farmingdale, Gardiner, Hallowell, Manchester, Pittston, Randolph, Whitefield

HOULTON REGION
Houlton, Hodgdon, Ludlow, Linneus, Monticello, Oakfield

JACKMAN REGION
Jackman, Dennistown, Moose River

KINGFIELD REGION
Kingfield, New Portland, Lexington

LOVELL REGION
Lovell, Sweden, Stow

MACHIAS REGION
Machias, Whitneyville, Marshfield, Rogue Bluffs

MARION TOWNSHIP
Robbinston, Perry, Pembroke, Charlotte, Cooper, Meddybemps, Wesley, Northfield, Dennysville, Whiting, Cutler, East Machias

MEDWAY REGION
Medway, Woodville

MID- COAST RECYCLING
Camden, Rockport, Hope, Lincolnville

MID-MAINE SOLID WASTE ASSOCIATION
Dexter. Corinna, St. Albans, Exeter, Ripley

MONMOUTH REGION
Monmouth, Wales

MONSON REGION

Monson, Blanchard, Elliottsville

MOUNT DESERT REGION
Mount Desert, Somesville, Northeast Harbor, Otter Creak, Seal Harbor

NOBLEBORO REGION
Nobleboro, Jefferson, Bremen, Damariscotta, Newcastle

NORTHERN AROOSTOOK REGIONAL INCINERATOR FACILITY
Frenchville, Fort Kent, Madawaska, St. Agatha

NORTHERN KATHADIN VALLEY
Amity, Crystal, Dyer Brook, Hammond, Hersey, Island Falls, Merrill, Mt. Chase, New Limerick, Patten, Smyrna

NORTH OXFORD REGION
Byron, Dixfield, Mexico, Peru, Roxbury, Rumford

OXFORD REGION
Bethel, Brownfield, Canton, Denmark, Gilead, Greenwood, Hanover, Hartford, Hebron, Newry, Norway, Paris, Otisfield, Stoneham, Upton, Waterford, Woodstock, Lincoln Plantation

PHILLIPS REGION
Phillips, Avon, Madrid

PLEASANT RIVER SOLID WASTE DISPOSAL DISTRICT
Addison, Beals, Centerville, Columbia, Columbia Falls, Jonesboro, Jonesport

PRESQUE ISLE REGION
Presque Isle, Washburn, Perham, Chapman, Castle Hill, Mapleton, Wade, Squa Pan Lake

RANGELEY REGION
Rangeley, Stetson Township, Davistown, Redington, Township E, Dallas Plantation

READFIELD REGION
Readfield, Wayne

REGIONAL WASTE SYSTEMS
Baldwin, Bridgton, Cape Elizabeth, Casco, Cumberland, Falmouth, freeport, Gorham, Gray, Harrison, Hollis, Limington, Lyman, North Yarmouth, Ogunquit, Portland, Pownal, Scarborough, South Portland, Waterboro, Windham, Yarmouth

SHERMAN REGION
Sherman, Stacyville, Benedicta, Silver Ridge

THOMASTON REGION
Thomaston, Owl's Head, South Thomaston

TRI-COMMUNITY RECYCLING & SOLID WASTE
Caribou, Wallagrass, Limestone, Cary Plantation, Caswell, Stockholm, New Sweden, Easton, Westmanland, Woodland, Hamlin, Connor, Township 16 Range 4, Blaine, Eagle Lake, Nashville Plantation, New Canada, Portage lake, Allagash, Grand Isle, Township 15 Range 6, Township 15 Range 14, Winterville Plantatation, Cyr Plantation

TRI-COUNTY
Appleton, Liberty, Palermo, Somerville, Union, Washington

UNION RIVER JOINT SOLID WASTE MANAGMENT DISTRICT
Aurora, Amherst, Great Pond, Osborn, Waltham

WALDOBORO REGION
Waldoboro, Friendship, Cushing

WILTON REGION
Wilton, Washington Township, Perkins Township

WISCASSET REGION
Wiscasset, Woolwich, Westport, Alna