
STATE OF VERMONT

REVISED

SOLID WASTE MANAGEMENT PLAN

Agency of Natural Resources
Department of Environmental Conservation

Adopted:

8/31/01

Date



Scott Johnstone, Agency Secretary

Effective Date: November 1, 2001

*In Appreciation of Every Vermont Citizen and Business
Who has Taken The Time and Made the Effort to
Reduce
Reuse
and
Recycle*

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STATE OF VERMONT REVISED SOLID WASTE MANAGEMENT PLAN

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Glossary of Terms ¹

Agency means the Vermont Agency of Natural Resources.

Biosolids commonly referred to as sludge, are primarily an organic material recovered from the wastewater treatment process.

Composting means the aerobic decomposition of organic material in a controlled manner.

Conditionally Exempt Generator (CEG) means a generator of hazardous waste which is conditionally exempted from certain provisions of the Vermont Hazardous Waste Management Regulations.

Construction and Demolition Waste (C&D) means waste derived from the construction or demolition of buildings, roadways or structures.

Diversion Rate means the measurement of waste diverted (by composting, reuse, and recycling) compared to the sum of waste diverted and waste disposed (landfilled and incinerated). Or expressed as an equation:

$$\text{Diversion Rate (\%)} = \frac{\text{tons diverted}}{\text{tons diverted} + \text{disposed}} \times 100 = \frac{\text{tons of waste reused} + \text{composted} + \text{recycled}}{\text{tons} + \text{reused} + \text{composted} + \text{recycled} + \text{landfilled} + \text{incinerated}} \times 100$$

Household Hazardous Waste (HHW) is a broad term used to signify the automotive fluids and batteries, household chemicals, and electrical products with hazardous components that are disposed by households. The Solid Waste Rules define HHW

¹ This Glossary of Terms does not provide legal definitions of terms. Instead, the intent is to provide consistent definitions of key words used in this Plan so that all readers have the same understanding of these terms as used in the context of this Plan.

as waste that would be subject to regulation as hazardous waste if it were not from households.

Municipal Solid Waste (MSW) means household, commercial, institutional, and industrial solid waste generated in a given area.

Per Capita Disposal Rate means the average amount of waste disposed (landfilled or incinerated) per person for a given year. Or expressed as an equation:

$$\text{Per Capita Disposal Rate} = \frac{\text{(total tons landfilled + total tons incinerated) per year in a given town or district}}{\text{total population of that town or district (may be adjusted for seasonal population)}}$$

Recycling as defined in the Solid Waste Management Rules means the process of utilizing solid waste for the production of raw materials or products, but does not include processing solid waste to produce energy or fuel products.

Recycling Rate is the quantity of material recycled compared to the sum of recycled and disposed material. Or, expressed as a formula:

$$\text{Recycling Rate (\%)} = \frac{\text{tons of waste recycled}}{\text{tons of waste recycled + tons of waste disposed}} \times 100$$

Septage means solids and liquids pumped from septic tanks or cesspools during cleaning.

Solid Waste (SW) is any discarded "garbage, refuse, septage, sludge from a waste treatment plant, water supply plant, or pollution control facility." It also includes other discarded solid, liquid, or gaseous materials from industrial, commercial, mining, and agricultural operations, as well as from community activities. Certain materials are specifically exempted from the solid waste definition including animal

manure and absorbent bedding used for soil enrichment, and “point sources” subject to Water Pollution Control permits.

Special Wastes are identified in the Solid Waste Management Rules as categories of solid waste that the Agency Secretary designates because they pose special environmental, health or safety concerns or have certain characteristics (e.g., size, composition) that cause problems in handling or management. Currently, the Secretary has designated asbestos waste, infectious waste (medical waste), hazardous waste from conditionally exempt generators, and liquids and liquid containers as special wastes in the Rules. Other wastes that may require special handling include tires, household hazardous waste, industrial sludges, bulky wastes, and large appliances.

Waste Prevention means the design, manufacture, purchase, or use of materials (such as products or packaging) to reduce the amount and toxicity of waste generated.

INTRODUCTION

Vermont law (10 V.S.A. § 6604) requires the Secretary of the Agency of Natural Resources (Agency) to publish and adopt a solid waste management plan, and to revise the plan once every five years. A comprehensive plan developed using 1987 data, and published by the Secretary in 1989, has guided the State since the passage of the comprehensive solid waste legislation known as "Act 78."

During 1998, the Agency began work on this document, a major revision to the 1989 Plan. This Revised Plan summarizes significant changes and progress since the 1989 Plan; the Revised Plan examines the critical issues in solid waste management today, and presents a concise action plan for the next five years. The Revised Plan is based on the experience of the past ten years, recommendations of the Act 78 Study Committee (January 1997), and substantial input from Agency staff and the public.

Public input included a telephone survey of 500 Vermont residents (Citizen Survey), a separate telephone survey of 80 municipal representatives (Municipal Survey), 10 public meetings held across the State, an all day forum on critical issues and action plans, two formal public hearings, and an open comment period on the final draft plan. This document also benefitted from comments received on earlier drafts from DEC staff and interested parties including districts and municipalities, other state agencies, the solid waste industry, environmental groups and the general public. See Appendix C for more information about the public process that was used.

Solid waste is defined broadly in state law and encompasses a wide range of wastes. Thus, the scope of this Plan is broad and diverse and affects many different types of

wastes and many different participants including citizens, businesses, industry, institutions, nonprofit organizations, and local, regional and state government. It is the Agency's hope that this Plan provides useful information and a reasonable framework for implementing environmentally and economically sound waste management.

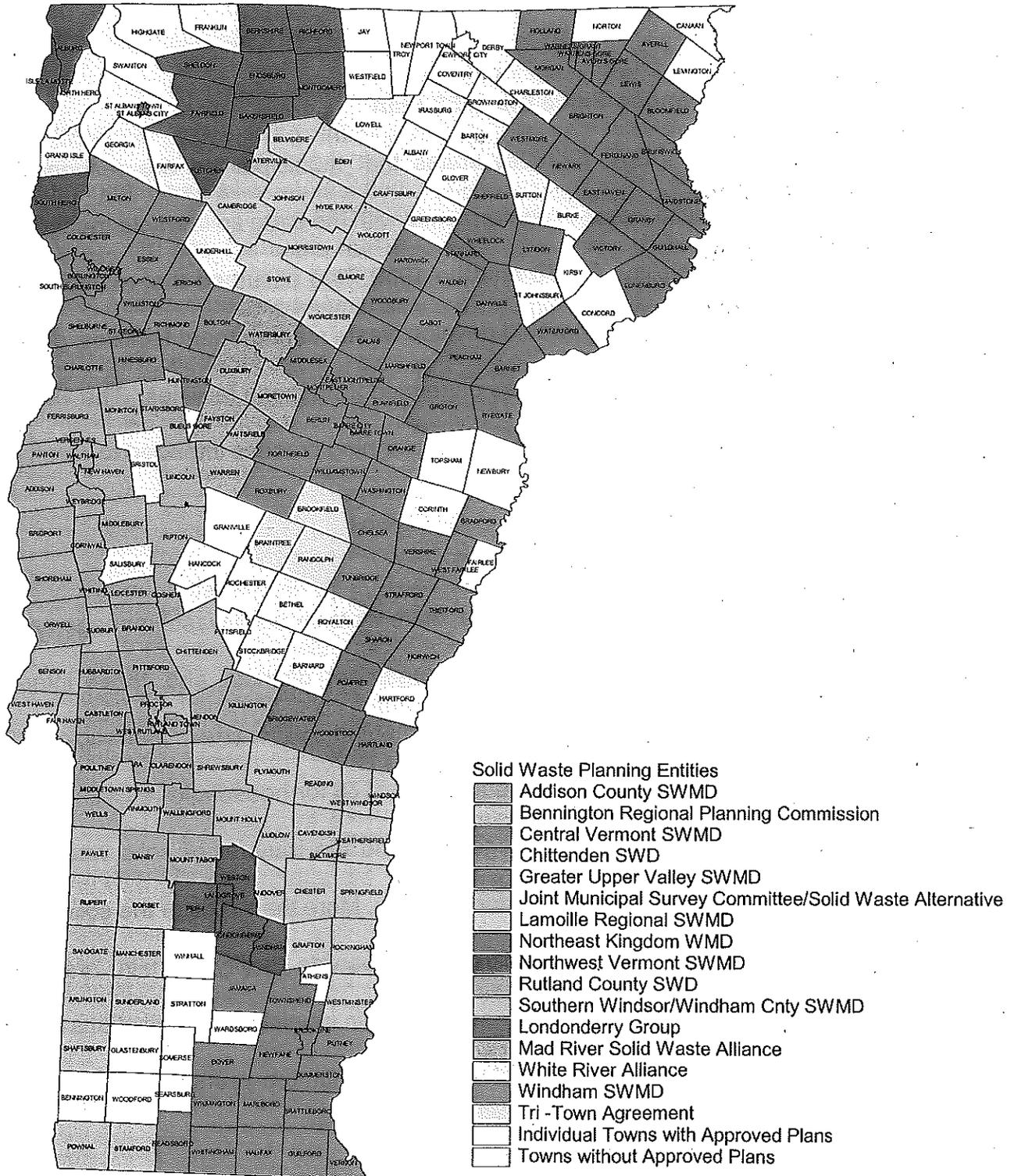
Fundamental Changes Since the 1989 Plan

Vermont law (24 V.S.A. §2202a) states that municipalities are responsible for the management of solid waste in conformance with the state solid waste management plan. Given this responsibility, Act 78 and the 1989 Plan assumed that municipalities, either individually or cooperatively, would develop waste management facilities, direct waste to those facilities and control revenues generated from those facilities. The 1989 Plan then outlined, as required in Act 78, a regional planning process intended to result in regional integrated solid waste systems.

By the time the 1989 Plan was adopted, there were six solid waste management districts. Today there are ten solid waste management districts and three inter-municipal organizations that are active in the management of solid waste in their regions (Figure 1). Much of the infrastructure developed since Act 78 for household recycling, composting, household hazardous waste management and the transfer of solid waste to regional landfills was the result of public sector activities. More than 70% of the solid waste facility certifications currently issued, exclusive of biosolids facility permits, are to municipal entities. This public sector activity has resulted in municipal organizations that are more organized and knowledgeable about solid waste than ten years ago.

FIGURE 1:

State of Vermont Approved Solid Waste Implementation Plans

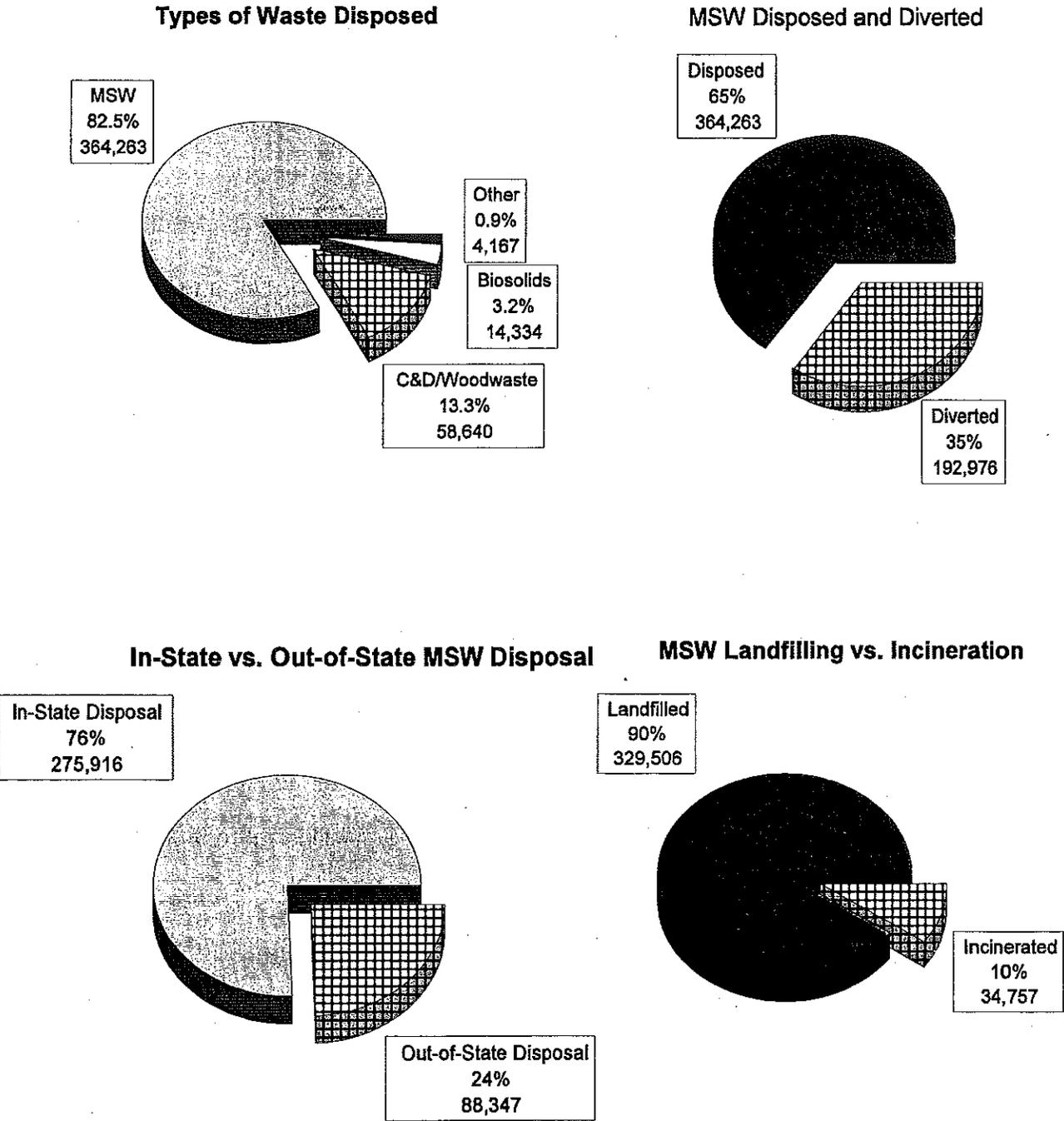


Many municipalities were affected by the May 1994 U.S. Supreme Court decision in *C & A Carbone, Inc. v. Town of Clarkstown*, 511 U.S. 383 (1994), which severely restricted the ability of municipalities to require that wastes generated in the municipality be delivered to municipal facilities. The lack of "flow control" meant that municipalities (including districts) could no longer be assured of the revenue from tipping fees necessary to finance municipal facilities. The Carbone decision also enabled private enterprise to more freely control the flow of waste and expand collection infrastructure.

Despite a substantial investment in time and money by local and state officials, municipalities have also found it difficult to site, permit, and finance new lined landfills since 1989. In 1989, there were 50 municipal landfills and 14 privately owned landfills in Vermont. Many of these landfills have since been closed, due in part to more stringent environmental requirements. Today, there are only three small unlined municipal landfills (each limited to accepting less than 1000 tons of solid waste per year), and one privately owned construction and demolition waste landfill. The remainder of the waste disposed of in Vermont is delivered to two privately owned and operated lined landfills in Moretown and Coventry. Vermont also exports waste to other states for disposal; in 1999, 24% of Vermont municipal solid waste was disposed of out-of-state. These and other statistics describing Vermont's solid waste management in 1999 are illustrated in Figure 2.

There has been significant privatization of solid waste management in Vermont and substantial consolidation of the solid waste industry. In 1987, there were an estimated 500 licensed haulers. Today, there are 277 licensed haulers. More importantly, a few large solid waste management companies control the majority of the landfill capacity and operate most of the collection and transport infrastructure. While municipalities are still responsible for solid waste management, most utilize private sector services and/or facilities to meet this responsibility.

FIGURE 2: Snapshot of Vermont Solid Waste Management, 1999



All quantities shown are in tons.

In summary, since 1989 there has been significant and continued consolidation of the solid waste industry. Today, there is a much larger private sector role in waste management than was envisioned in the 1989 Plan, as well as a more organized and professional municipal and district waste management infrastructure. These fundamental changes form the basis for the following premises of this Revised Plan:

- Municipalities still have statutory responsibility for the management of solid waste in accordance with the state solid waste plan. They must continue to plan and implement measures to ensure the operation of an integrated solid waste management system that promotes waste reduction, reuse and recycling, and environmentally sound disposal. To carry out these responsibilities, municipalities must retain the authority to raise sufficient revenues to pay for necessary services, contract for or franchise necessary services, and provide municipal services.
- The private sector will continue to consolidate to take advantage of the economies of scale inherent in solid waste management. The private sector will provide the majority of the collection, transport, processing, and disposal services required in Vermont.
- Vermonters want environmentally responsible and economically competitive solid waste services. The Agency, municipalities, and the private sector must have a role in ensuring that environmentally responsible and economically competitive solid waste services are available, including programs that are beneficial but not profitable, such as waste reduction education and household hazardous waste collection.

This Revised Plan describes the state, municipal, and private sector responsibilities in a series of Critical Issues and Action Steps outlined in Section II. Section I provides the background for these Critical Issues and Actions Steps, summarizes progress and problems since 1989, and outlines the current system of solid waste management in Vermont.

SECTION I:
PROGRESS SINCE THE 1989 PLAN AND CURRENT MANAGEMENT
OF SOLID WASTE IN VERMONT

REDUCING WASTE GENERATION

Act 78 specified that the Agency assign the highest priority to “the greatest feasible reduction in the amount of waste generated.” As a consequence, the 1989 Plan included a detailed discussion of factors affecting waste generation, and proposed a strategy to achieve the greatest feasible waste reduction, while recognizing the real difficulties associated with measuring and quantifying waste prevention.

The 1989 strategy recognized that reducing waste generation required social change over which municipalities and state government have little control. The 1989 Plan also stated that “without increases in the costs of energy and virgin materials, the State’s ability to affect waste generation may be limited.”

While there have been increases in the real costs of some virgin materials, energy costs have fallen in real terms since 1989. As a consequence, while there have been numerous municipal and state efforts over the past ten years to educate consumers and businesses about the benefits of reducing waste generation (see below), the impacts are difficult to quantify, especially given the continued pressure in our society to consume more goods and services. Most of the factors contributing to increasing waste generation in 1989 remain today, despite state and municipal efforts to promote waste reduction.

In spite of these factors, progress has been made in reducing waste generation. The U.S. EPA publishes a report each year which attempts to measure solid waste generation using macroeconomic data. According to the "Characterization of Municipal Solid Waste in the United States: 1998 Update", per capita waste generation has leveled off since 1990. This is significant given the increases in per capita waste generation of approximately 2 percent per year over the previous ten years. The primary initiatives to reduce waste generation in Vermont since 1989 are summarized below.

Consumer Education

Some of the consumer related source reduction initiatives undertaken by the Agency, solid waste districts and municipalities since the 1989 Plan include:

- *HHW Retail Shelf Labeling*

In 1991, the Agency implemented a retail store household hazardous product shelf labeling program to promote the use of less toxic household products. Simplified in 1995, the program provides approximately 2,000 retailers with consumer brochures and shelf labeling materials. The associated "Don't Hazard a Guess" media campaign, implemented in 1994, consisted of paid radio, TV, and print advertisements, and public service announcements.

- *Home Composting*

Towns, solid waste districts, and alliances have sold backyard compost bins, held composting workshops, and distributed brochures on building bins and composting techniques.

- *Source Reduction Education*

The Agency and Solid Waste Districts have participated in and promoted national initiatives such as the "Use Less Stuff" Day and the "Rewrap" pilot project to educate consumers

about reducing waste generation. The Agency also developed and distributed the Environmental Shopper brochure series.

- *Financial Assistance*

The Agency has provided financial support for source reduction youth education programs through the Association of Vermont Recyclers, the Vermont Institute for Natural Science, and other local education entities including schools, towns and solid waste districts.

Business Assistance

While reducing household waste generation requires fundamental changes in society, businesses and institutions respond rapidly to economic incentives. Businesses can achieve significant cost savings by reducing the amount and/or toxicity of wastes generated. Waste reduction and pollution prevention activities carried out since 1989 include:

- *Waste Cap Program*

A state-supported Vermont Waste Cap program offered free waste reduction assessments to Vermont businesses between 1990 and 1993.

- *Retired Engineers Assistance Program (REAP)*

Starting in 1992, on-site waste reduction opportunity assessments for hazardous and solid waste were offered through REAP. To date more than 100 business assessments have been conducted. This program is now coordinated through the Vermont Small Business Development Center in Randolph.

- *Business Environmental Partnership*

A Business Environmental Partnership program was developed by the Agency to recognize businesses that meet established environmental standards, including source reduction and

pollution prevention. The program started as a pilot project with printers and vehicle service providers, and in 1997 expanded its focus to include hotels.

- *Pollution Prevention Workshops*

The Agency hosts sector-specific workshops related to pollution prevention and environmental compliance including workshops for printers, dry cleaners, vehicle service providers and wood products manufacturers. More than 35 workshops have been sponsored since 1992.

State and Local Government Initiatives

- *User Fees*

The 1989 Plan required all local and district solid waste plans to include provisions for user fees. Many haulers and operators of transfer stations and landfills now use unit-based pricing. These "pay-as-you-throw" or "pay-per-bag" programs can provide an effective economic incentive to reduce waste generation, recycle, and otherwise divert waste from landfills and incinerators. The implementation of user fees can also raise concerns about increased illegal dumping and burning, which has led to the development of new prevention and enforcement programs.

- *Toxics in Packaging*

In 1990, the Legislature enacted legislation that limited the use of heavy metals in packaging in Vermont. The Agency continues to work closely with the other Northeastern states to coordinate this program through the Toxics in Packaging Clearinghouse of the Council of State Governments.

REDUCING WASTE GENERATION

In 1996, the CHITTENDEN SOLID WASTE DISTRICT (CSWD) developed an Environmental Shopping Display to educate consumers about waste reduction strategies. The Display helps consumers choose products with minimal packaging as well as less toxic alternatives to hazardous products. The Environmental Shopping Display has visited each of the four Hannaford Food and Drug stores in Chittenden County for 3-4 weeks at a time. The display has also appeared at various community shows, including the Home and Garden Show, the 50+ Expo, and IBM's Earth Day Exhibit.

With help from the Norwich Solid Waste Committee, Marion Cross Elementary School students eliminated the need to buy wrapping paper. They sewed holiday fabric into gift-giving bags and sold them as a fund-raising project. The bags can be used each Christmas, reducing the need for paper gift-wrap year after year.

REUSE, RECYCLING, AND COMPOSTING

Districts and municipalities began working in 1989 to develop a detailed database on the generation of residential, commercial, and industrial waste. This database was used to identify waste reduction and recycling opportunities, and to estimate waste generation and recycling rates. It also provides a basis for comparison with current recycling rates.

The Agency estimated that in 1987 approximately 42,000 tons of material were diverted for recycling and composting (exclusive of biosolids). This represented approximately 12 percent of the estimated total solid waste generation. By 1994, almost four times as much waste was diverted (164,800 tons) for reuse, recycling, and composting; this represented

approximately 35 percent of total estimated municipal waste generation. In 1999, the total tons diverted increased to more than 190,000 tons, but the estimated diversion rate remained about 35%, in part due to the availability of more accurate disposal data compared to 1994 (see Figure 1.1 and Table 1.1). Much of the increase in diversion since 1989 can be attributed to Vermont's public and private investment in reuse, recycling, and composting stimulated by Act 78.

FIGURE 1.1

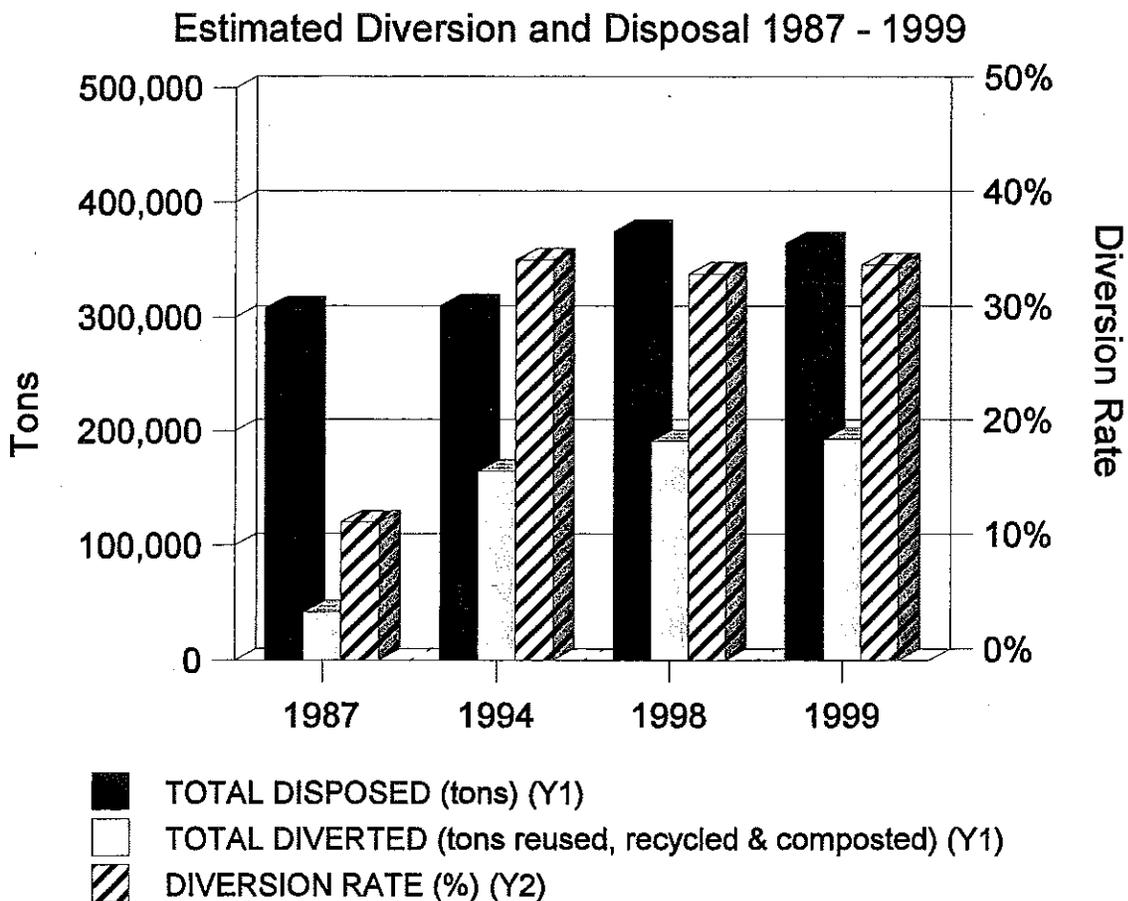


TABLE 1.1 Estimated Reuse, Recycling and Composting, 1987 -1999

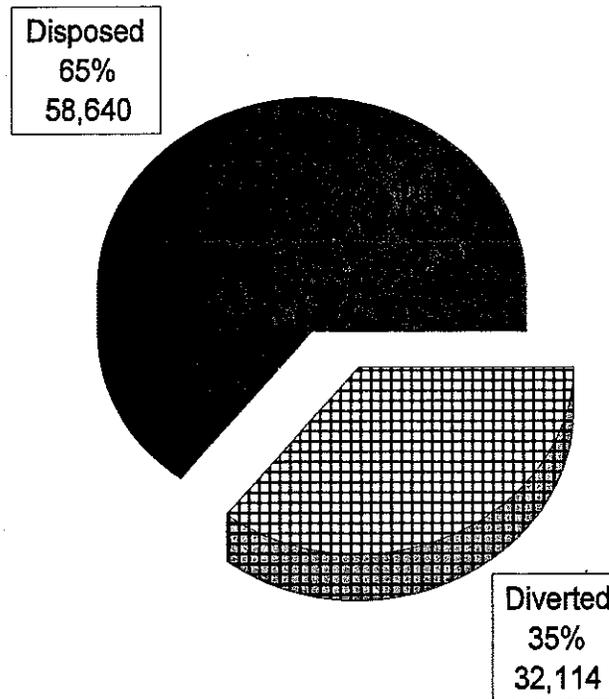
TYPE OF DIVERSION	QUANTITY (tons)			
	1987	1994	1998	1999
Recycling Processors and Transfer Stations ⁽¹⁾		61,560	83,116	85,112
Metals Processors ⁽²⁾		42,780	42,780 ⁽³⁾	42,780 ⁽³⁾
Economic Recycling ⁽⁴⁾		32,160	32,160 ⁽³⁾	32,160 ⁽³⁾
Bottle Returns Reused & Recycled		15,850	20,100 ⁽⁵⁾	20,100 ⁽⁵⁾
Organics Composting ⁽⁶⁾		12,220	12,858	12,504
Reuse Activities		260	260 ⁽³⁾	320 ⁽⁷⁾
TOTAL DIVERTED	42,000⁽⁶⁾	164,830	191,274	192,976
TOTAL DISPOSED	308,000	309,970⁽⁹⁾	374,820⁽¹⁰⁾	364,263⁽¹⁰⁾
TOTAL MSW DIVERTED+ DISPOSED⁽¹¹⁾	350,000	474,800	566,094	557,239
Estimated MSW Diversion Rate	12%	35%	33.8%⁽¹²⁾	34.6%⁽¹²⁾

- (1) Primarily paper products and plastic, metal and glass containers from residents and small business.
- (2) Primarily appliances and other scrap metals.
- (3) 1994 data.
- (4) Recycling activities carried out by commercial and industrial activities documented in limited survey (1994).
- (5) 1996 data.
- (6) Includes certified compost facilities, exempt facilities & estimated backyard composting. Backyard composting estimate is based on 1994 estimate of 6100 tons, plus 998 additional tons for 1998 (estimated from an additional 5320 bins sold since 1994 handling an average of 375 lbs. of organics/year), plus 300 additional tons for 1999 (estimated from an additional 1600 bins sold in 1999 handling an average of 375 lbs. of organics/year).
- (7) 1994 data plus 1999-2000 VBMX tonnage.
- (8) Includes beverage containers, cardboard, newspapers and mixed office paper.
- (9) Includes a 1994 estimate of 31,566 tons illegally disposed and under-reported, consisting of an estimated 16,461 tons illegally burned and 15,105 tons under-reported/illegal dump sites/commercial burn/litter.
- (10) 1998 and 1999 total disposed is based on reports of actual tonnages as submitted by facilities and haulers and does not include any estimates of illegal disposal as was included in the 1994 estimate (see note #9)
- (11) "MSW Disposed" includes tonnage reported as MSW or "mixed waste"; mixed waste includes a small quantity of construction/demolition debris.
- (12) Several factors are believed to contribute to the slightly lower diversion rate shown for 1998 and 1999 as compared to 1994: 1998 and 1999 disposal data is more accurate due to more facilities utilizing scales and better reporting; the 1994 total disposed, only 1% more than the 1987 total disposed, is believed to be artificially low; the lack of 1998 or 1999 data on economic recycling, bottle returns, and metal processors is also a factor.

SOURCES: 1987 data: *State of Vermont Solid Waste Management Plan*. VT DEC. February 1, 1989.
 1994 data: *Results of Recycling, Composting and Reuse Survey conducted for the Vermont DEC, Environmental Assistance Division*. DSM Environmental Services, Inc. 1995.
 1996 data: *Analysis of Vermont's Existing and Proposed Beverage Container Deposit Programs*. Northbridge Environmental Management Consultants. January 13, 1998.
 1998 and 1999 data: Vermont Department of Environmental Conservation Solid Waste Program. November 1, 1999 and December 20, 2000.

In 1999, the Agency began to estimate the amount of construction and demolition debris diverted from disposal through acceptable uses. Approximately 35% of the construction and demolition waste received by solid waste management facilities was diverted from disposal through acceptable uses (Figure 1.2). Additionally, unquantified amounts are also diverted from disposal when materials are separated for reuse or recycling during construction or demolition projects.

FIGURE 1.2 Construction/Demolition Debris
Estimated Tons Disposed and Diverted, 1999



Reuse

Businesses, solid waste districts, and the Agency have promoted various reuse programs for discarded materials (See REUSE sidebar). The Association of Vermont Recyclers developed a database of over 900 Vermont reuse businesses. While diversion through these activities is not easily tracked, these programs keep useful resources out of the waste stream.

Recycling

Currently, there are over 200 recycling, reuse, and composting collection sites throughout the state providing increased convenience to residents over the relatively few (approximately 38) recycling collection sites operating in 1989. Over the past 10 years, the public and private sectors have focused on developing a collection and processing infrastructure for recyclables. However, most of the materials collected and processed for recycling in Vermont continue to be sent to out-of-state markets. As a result, the Agency has also worked to develop local and regional end markets for recyclables.

Composting

In the 1989 Plan, the solid waste stream was estimated to be 60-70% organic wastes by weight. In addition, virtually all of the biosolids produced in Vermont could be composted. The solid waste districts considered (non-biosolids) composting facilities during development of their plans; however, the economics were not favorable for centralized facilities. Instead, efforts have focused on backyard and on-farm composting, and about 20 transfer stations also accept leaf and yard waste for composting. Since 1989 one large composting facility and seven on-farm facilities have started accepting food waste, and more facilities are being planned. Between 1997 and 1999, the Agency awarded fifteen grants to set up seven new food compost projects in order to help create a composting infrastructure for food waste collected for off-site composting.

REUSE

- The State started the **Vermont Business Materials Exchange (VBMX)** in 1993 to help manufacturers and businesses exchange materials they would otherwise dispose, and find used materials at lower costs. Through the VBMX a construction company found users for over 2,000 sheets of dry wall (200 tons), saving the company over \$15,000 in avoided disposal fees alone. A mail-order honey company was able to find used shipping boxes to mail its products, and a greenhouse found plastic buckets it needed for planting its trees. The VBMX publishes a catalogue quarterly, provides a toll-free hotline, maintains a web site and an electronic listserve and publishes a full-page ad each month in *Vermont Business Magazine*.
- Beginning in 1996, the **Addison County Solid Waste District** has held an annual book drive in conjunction with SAVOIR (South African Venture to Organize and Inspire Reading). Appropriate books are boxed and shipped to communities in southern Africa which have very limited or no access to books. Books not appropriate for Africa are recycled by Middlebury College. In 1998, the District collected and shipped 4.5 tons of books to Africa.
- To help keep useful items out of the landfill, **THE CHITTENDEN SOLID WASTE DISTRICT (CSWD)** began establishing *ReUse Zones* at its drop-off centers in 1998. Specially designed *ReUse Zone* sheds operate at the Essex, Milton, Richmond, South Burlington and Williston drop-off centers. Customers place usable items they no longer want in the sheds instead of the dumpsters. Operations Manager Lee Tuure says "The ReUse Zone has been a tremendous success, not only as a waste reduction strategy but in terms of customer popularity. People really enjoy rescuing items from landfill disposal and, of course, getting something for free."
- In April 1991 the **LAMOILLE REGIONAL SOLID WASTE MANAGEMENT DISTRICT** won the U.S. EPA Administrator's Award as the Regional Finalist for a Furniture Drop and Swap. After three years of successful collections, District staff authored a *How-To Manual* using their program as a model. The Guide was distributed nationally, as well as in Australia.
- Private for-profit and non-profit businesses divert numerous reusable materials from disposal while creating jobs and adding value to discarded materials. Some of these businesses include **Recycle North** (Burlington) which sells used household goods and building materials and the **ReStore** (Montpelier) which sells clean manufacturing and business discards.

Consumer and Business Education and Assistance

- *Consumer Education*

The Agency educates consumers through a toll-free information hotline, media campaigns such as "Recycle Now, Vermont", "Merry Mulch" and the Environmental Defense Fund "Buy Recycled" campaign, publication of a statewide recycling center collection directory, and promotion of national initiatives such as "America Recycles Day". Over 500 hotline calls are responded to annually.

- *Information Clearinghouse*

The Agency serves as an information clearinghouse on composting, reuse and recycling markets, through its "*Reuse and Recycling Markets Directory*", a "*Construction Site Reuse and Recycling Guide*" and a compost list serve and web page.

- *Grants for Education*

Many grant programs have been implemented over the past ten years for consumer and youth education projects, such as development of curriculum guides, and promoting in-school recycling and composting projects.

- *Vermont Business Materials Exchange (VBMX)*

The Agency started the VBMX in 1993 to help manufacturers and businesses find uses for materials they no longer need, and find used materials at lower costs. Since its inception, over 500 exchanges have been documented. (See REUSE Sidebar).

- *Financial Assistance for Recycling Market Development*

The Agency has provided grant funds to evaluate new markets for materials with limited market opportunities in Vermont including tires, plastics (including agricultural film), and textiles.

- *ANR Compost Center*

In January 1997, the Agency started the ANR Compost Center to help focus attention on and publicize composting programs. The Center's goal is to enhance and increase source-separated organic composting programs and compost use in Vermont. The Center's projects include the backyard composting managers program training class, a backyard composting education kit, and compost use demonstration projects on highways and golf courses.

FOOD WASTE COMPOSTING

The *Intervale Compost Project (ICP)* is a unique partnership between the nonprofit *Intervale Foundation* and the CHITTENDEN SOLID WASTE DISTRICT. The ICP has been involved in large-scale composting since 1988. In 1993, the ICP received the first commercial-scale food waste composting permit in Vermont.

Feedstock for the operation comes from restaurants, grocery stores, hospitals, food manufacturers, and other sources. While some of the compost it produces is used to restore soil in the Intervale, most of it is sold to the public. In 1999 the ICP composted over 11,000 tons of organic wastes, producing more than 7500 cubic yards of finished compost. The ICP received the Northeast Resource Recovery Association's Business Recycling Program Award in 1995.

- *Vermont Plastics Advisory Group*

Since 1997, the Plastics Advisory Group, made up of members from the private and public sector, has pursued strategies to develop in-state plastics markets. Efforts have included increased public sector procurement of recycled plastic products, attempts to develop

markets for mixed plastic resins, and identification of barriers to using post-consumer resins in manufacturing.

- *Construction and Demolition (C&D) Wastes*

The Agency formed an advisory committee in 1996 to look for opportunities to increase diversion of C&D debris. Activities have included small grant awards for C&D waste reduction, publication of a C&D waste reuse and recycling directory, and a study of reuse and recycling opportunities for asphalt shingles and gypsum drywall.

State and Local Government Initiatives

- *Use of Recycled Materials*

Municipalities and state agencies have used recycled materials in a variety of projects. For example, the Town of Arlington used tire chips for drainage behind a 400-foot long timber bin retaining wall, the Town of Georgia used tire chips as subbase material for a town road, and Little River State Park in Waterbury is testing the performance of tire chips for use as percolation bed media in a septic system. Plastic lumber made from post-consumer plastic is being used in picnic tables at Vermont rest areas, as a boardwalk at a Vermont natural area, and as guardrail offset blocks.

- *Clean State Program*

Vermont's Clean State Council implements programs to institutionalize resource conservation in state government. The strategies include requiring all computers to have the EPA Energy Star rating, all copy jobs to be duplexed, and the purchase of non-toxic or less toxic cleaning and maintenance supplies. The State promotes the use of recycled products to political subdivisions including institutions, municipalities, and solid waste districts. The Clean State Council is also working to make durable diningware available in all state cafeterias in order to reduce the use of disposables; durable diningware is now

available in the cafeteria serving the Waterbury state office complex. A future initiative for the Clean State Council is environmental management of the state vehicle fleet.

- *Recycled Product Procurement*

Since 1988, the State Purchasing Division of the Department of Buildings and General Services has been working to increase the purchase of products made with recycled materials, as required by state law. Vermont law allows the Purchasing Division to spend up to 5% more for recycled content products. Recycled product purchases reached a new high in 1997, with over \$6 million out of a total purchasing budget of over \$50 million. The goal of the State purchasing 40% recycled products has been achieved or surpassed for those products in which recycled content is available. These product categories include paper products, computer and office equipment, metal signs, and automotive products.

- *Regional Recycling Initiatives*

The Agency collaborates with the Northeast Recycling Council (NERC) to promote recycling market development in this region. NERC, made up of representatives from ten Northeastern states, has worked to increase recycled content in the newspaper and yellow pages publishing industries, hosted three recycling business investment forums and manages an electronic listserve for environmentally preferable products. NERC also measured the economic benefits of recycling in the region and found that over 1,700 jobs and over \$90,000 in added-value were provided through Vermont recycling businesses in 1994.²

² *Value Added to Recyclable Materials in the Northeast.* Northeast Recycling Council, prepared by Roy F. Weston, Inc. May 8, 1994.

Private Sector Initiatives

- The private sector plays a significant role in Vermont recycling and has made significant investments in recycling since 1989. The recycling services provided by the private sector include curbside collection of recyclables, collection of commercial, industrial and municipal recyclables, operation of materials recovery facilities (MRFs) and composting facilities, processing of recyclables, and acting as brokers for recyclables. Private sector firms are also contracted to operate some municipally owned recycling facilities.

LANDFILLS, LEACHATE, SOLID WASTE TRANSFER AND DISPOSAL

By closing unlined landfills throughout Vermont, a significant reduction in the discharge of leachate into the environment has occurred. In 1987, there were 64 landfills accepting municipal solid wastes (14 privately owned and 50 municipally owned) and eight special waste landfills in Vermont. All of these landfills, except one, were unlined. Today, only three of the 64 unlined municipal solid waste landfills are still operating; each landfill receives less than 1,000 tons of waste per year. Only one of the special waste landfills is still operating. The rest have all been closed and capped with a minimum of two feet of earthen material, reducing the volume of leachate discharged into Vermont's ground and surface water by more than 150 million gallons annually. ³

With the closure of so many unlined local landfills in the early 1990's there was a need to replace these landfills with transfer stations for the transfer of solid waste to regional disposal facilities in Vermont or in other states. Since 1987, the number of transfer stations

³ Water balance comparison for 60 unlined landfills - preclosure (operating) vs. post closure. Assumes that the final cover system for each landfill consists of a two foot layer of earthen material with a permeability of 1×10^{-5} cm/sec.

has increased from 41 to 89. These transfer stations provide accessible waste drop-off points for citizens and solid waste haulers. In recent years many transfer stations, in addition to accepting municipal solid waste, have also provided for the drop-off of recyclables, bulky wastes, special wastes and construction/demolition debris.

Since 1987, new solid waste landfills constructed in Vermont are required to be double-lined with primary and secondary leachate collection systems to collect leachate for treatment at wastewater treatment facilities. Table 1.2 presents a summary of the landfills (unlined and lined) that have been permitted and operated since 1989, some of which have reached capacity and have been closed.

There are currently five municipal solid waste landfills operating in Vermont (two lined and three unlined). The new lined landfills are located on properties where unlined landfills had previously operated. Since 1989, three municipally owned lined landfills have reached capacity and been closed. While four more municipally owned lined landfills have been sited and permitted under the Solid Waste Management Rules (Greater Upper Valley District, Northwest District, Lamoille District and Town of Randolph), none of these landfills have yet been constructed. One district (Chittenden) is proceeding with property condemnation and intends to apply for a lined landfill permit if successful.

Despite the limited number of lined landfills located in Vermont, 78% of the state's solid waste was disposed of in Vermont in 1999, and the remaining 22% was disposed of out-of-state (See Table 1.3). At current rates of fill, the two permitted lined landfills will reach capacity in about seven years - or sooner if all of Vermont's waste (including municipal

solid waste, construction/demolition debris, woodwaste, biosolids and other wastes) were disposed of in-state.

In addition to lined solid waste landfills, unlined landfills have been developed for other waste streams. Two unlined landfills, one in Bennington and one in Hartford (now closed), received certification from the Agency to dispose of construction and demolition (C&D) debris. An unlined industrial waste landfill was certified for the disposal of paper sludge in Putney, although to date it has not been constructed.

TABLE 1.2
Landfills Permitted and Operated Since 1989
(Status as of January 2001)

Lined Regional Municipal Solid Waste Landfills:				
<u>Name</u>	<u>Location</u>	<u>Dates of Operation</u>	<u>Total Permitted Capacity (tons)</u>	<u>Remaining Permitted Capacity (tons)</u>
Waste USA ^(A) , Phase I, II & III	Coventry	1992 - Present	2,334,000	1,990,000
WSI ^(B) , Cell II	Moretown	1999 - Present	900,000	680,000
WSI, Cell I	Moretown	1993 - 1999	120,000	closed
City of Burlington	Colchester	1990 - 1992	50,000	closed
Chittenden Solid Waste District	Williston	1993 - 1995	200,000	closed
Town of Randolph	Randolph	1993 - 1997	190,000	closed
Total Remaining Capacity (tons)				2,670,000
<i>(A) owned by New England Waste Services, Inc. (a subsidiary of Casella Waste Systems, Inc.)</i>				
<i>(B) Waste Systems International, Inc.</i>				
Unlined Construction & Demolition Debris and Industrial Waste Landfills:				
<u>Name</u>	<u>Location</u>	<u>Dates of Operation</u>	<u>Total Permitted Capacity (tons)</u>	<u>Remaining Permitted Capacity (tons)</u>
Burgess Brothers, Inc. (C&D)	Bennington	1995 - Present	70,000	13,000
Town of Hartford (C&D)	Hartford	1994 - 1998	30,000	closed
Putney Paper (Paper Sludge)	Putney	1984 - 1996	na	closed
Vermont Castings (Foundry Sand)	Randolph	1982 - 1997	na	closed
Total Remaining Capacity (tons)				13,000
Unlined Municipal Solid Waste Landfills (1000 ton limit per year):				
<u>Name</u>	<u>Location</u>	<u>Dates of Operation</u>	<u>Estimated Year of Closure</u>	
Town of Bristol	Bristol	Prior to 1989 - Present	2020	
Town of Shaftsbury	Shaftsbury	Prior to 1989 - Present	2044	
Town of Salisbury	Salisbury	Prior to 1989 - Present	2009	
Town of Pawlet	Pawlet	Prior to 1989 -1999	closed	

TABLE 1.3

Estimated Quantities of Vermont Waste Disposed In and Out of State in 1999

DESTINATION	TYPE OF WASTE					
	MSW (tons)	C&D/Wood (tons)	Other ⁽¹⁾ (tons)	Total (tons)	% Disposed	Waste Used in Landfill ⁽²⁾ (tons)
In-state						
Landfill	275,916	47,249 ⁽³⁾	2,941	326,106	76%	21,016
Incineration ⁽⁴⁾	0	6,617	0	6,617	2%	0
Subtotal	275,916	53,866	2,941	332,723	78%	21,016
Out-of-State						
Landfill	53,590	4,579	1,226	59,395	14%	5,807
Incineration ⁽⁵⁾	34,757	195	0	34,952	8%	0
Subtotal	88,347	4,774	1,226	94,347	22%	5,807
Total	364,263	58,640	4,167	427,070		26,823

- (1) Defined as asbestos waste, bulky waste, dead animals, industrial waste, petroleum contaminated soil, medical waste and "other" waste. Does not include 2,861 tons of biosolids disposed in Vermont landfills during 1999.
- (2) Waste used in landfills - Petroleum contaminated soils (1552 tons), foundry sand (4337 tons), biosolids (7803 tons) and paper sludge (4827) used as alternative cover material. Ground C&D (2497 tons) used as road base material at Vermont landfills and as alternative cover material (4820 tons) at an out of state landfill.
- 3) Does not include 637 tons of C&D from Massachusetts disposed at the Burgess landfill.
- 4) 6226 tons of clean wood waste was collected by the Chittenden Solid Waste District and chipped and burned for energy recovery at the McNeil generating plant. 391 tons of clean wood was reported to have been burned at transfer station sites.
- (5) Does not include 6,226 tons of incinerator ash disposed at the NH/VT Solid Waste Project Ash Landfill attributed to VT waste burnt at the Wheelabrator Claremont Incinerator.

SOURCE: Vermont Solid Waste Program, November 9, 2000.

ILLEGAL DISPOSAL

Since the 1989 Plan, many illegal dump sites have been closed or cleaned up. However, illegal dumping continues to be a problem in Vermont, especially for difficult to manage wastes such as white goods, construction/demolition debris, and tires. While fewer large scale illegal dumps exist today than in the 1980's, smaller illegal dump sites are still found throughout the state.

The environmental and public health threats from illegal dumping vary greatly based on site conditions, the location of receptors, and proximity to surface and groundwater drinking water sources. Illegal burial can also create economic problems when a property is sold to an unaware new owner. The Agency policy regarding illegally buried wastes is for the waste to be removed and disposed of at a facility certified to accept those materials.

Illegal burning, including backyard burning, also continues to be a problem. The Agency conservatively estimated 18,000 households illegally burned some 14,000 tons of trash in 1997. The actual amount likely exceeds this estimate. While the amount of illegal burning occurring in Vermont is troubling, the problem is the resulting air emissions and its impact on human health and the environment. An EPA study on emissions from burn barrels concluded that, on a per pound basis, volatile organic compounds and carbon monoxide were emitted from burn barrels at levels 23 to 114 times higher than the compliance standard for incinerators. In addition, metal emissions from burn barrels were four times higher for mercury and 46 times higher for chromium than levels from well controlled incinerators.⁴ Burn barrels also emit more dioxins and furans per pound of trash burned

⁴ *Emission Characteristics of Burn Barrels*. U.S. Environmental Protection Agency, prepared by Two Rivers Regional Council of Public Officials, Quincy, Illinois and Patrick Engineering, Inc. June 1994.

than a typical municipal solid waste incinerator. Researchers found that 37 households burning their trash in burn barrels emit as much total dioxins and furans per day as a 200 ton-per-day incinerator serving 100,000 people.⁵

Another problem created by both illegal dumping and burning is that since the violator is avoiding disposal costs, others who are paying to properly manage their wastes are put at a competitive disadvantage. While awareness of environmental threats posed by illegal burning and dumping has increased, more needs to be done to reduce the incidence of both illegal burning and dumping.

The Agency has increased enforcement on incidents of illegal dumping and open burning. In 1999, 15 complaints of illegal dumping and 15 complaints of open burning resulted in formal enforcement action; 70 additional cases were resolved through voluntary compliance. However, backyard burn barrels and roadside dumping are still commonplace, and the Agency does not have the enforcement resources to investigate all reports of illegal disposal. More enforcement is needed to further reduce illegal burning and dumping of solid waste. In some areas, the adoption and enforcement of solid waste district or local ordinances has successfully complemented Agency enforcement, particularly for backyard burn barrels and incidents of roadside dumping.

BIOSOLIDS AND SEPTAGE MANAGEMENT

Wastewater from approximately 47% of the state's population is treated at wastewater treatment facilities (WWTFs). Septic systems serve the remaining 53% of the state's

⁵ *Emissions of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from the Open Burning of Household Waste in Barrels.* Paul Lemieux et al. Environmental Science and Technology. February 2000.

population. Using national estimates, each person on average generates about 50 dry pounds of biosolids per year (equivalent to 2500 pounds at 2% solids). The 1987 Vermont Septage and Sludge Management Plan estimated that each person using a septic system generates about 70 gallons of septage per year.

Biosolids

The success of Vermont's efforts to remove nutrients and oxygen-consuming solids from its surface waters through wastewater treatment has led to the generation of approximately 85 million gallons of biosolids (at 2% solids) in 1998. The quantity of biosolids has increased in the last decade due primarily to improvements in treatment, with many facilities increasing the amount of phosphorus removed from wastewater and all facilities now producing secondary or better effluent. A smaller portion of the increase is due to the increase in population.

Biosolids can be managed by beneficial use or disposal. Beneficial use includes land application or further treatment to produce compost or similar products. Disposal includes incineration or dewatering followed by landfilling. In 1987, nearly all of the biosolids being generated were land applied, but only a few of these land application operations had Agency certification. By 1997, only 40% of biosolids were beneficially reused, with the remaining 60% disposed of by landfilling or incineration. However, in 1998 several wastewater treatment facilities ceased landfilling or incinerating biosolids. For example, the Chittenden Solid Waste District is no longer landfilling their biosolids and is instead sending them to a composting facility in Quebec. These recent changes in biosolids management have increased the amount of biosolids beneficially used to approximately 74% of the amount generated in 1999 (Table 1.4 and Figure 1.3). Another recent change in biosolids

management is an increase in the amount of biosolids that are exported from Vermont; about half of the biosolids generated in 1999 were managed out-of-state (Table 1.4 and Figure 1.3).

TABLE 1.4
Estimated Quantities of Biosolids Managed In and Out of State in 1999

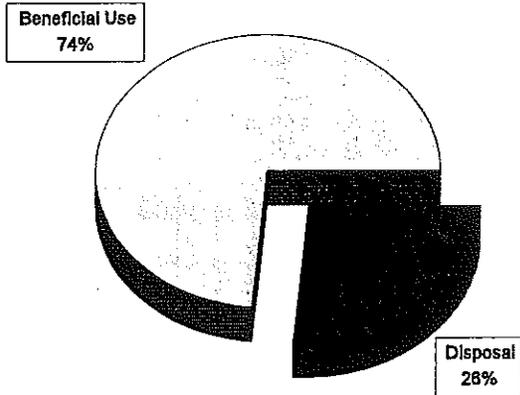
Management Option	In-State	Out-of-state	Total	Percent of Total	Percent Managed
	(wet tons at 15% solids) ⁽¹⁾				
Beneficial Uses:					
Land Application	12,600	1,307	13,907	25%	74%
Composted	4,560	21,820	26,380	48%	
Subtotal (Beneficial Use)	17,160	23,127	40,287		
Disposal:					
Landfill	11,200	574	11,774	22%	26%
Incineration	0	2,560	2,560	5%	
Subtotal (Disposal)	11,200	3,134	14,334		
Total:	28,360	26,261	54,621		100%
Percent Managed In & Out of State	52%	48%			

(1) All reported quantities have been converted to wet tons at 15% solids to allow meaningful comparisons. As a result, these tonnages may differ from the scalehouse tonnages reported by the receiving facilities.

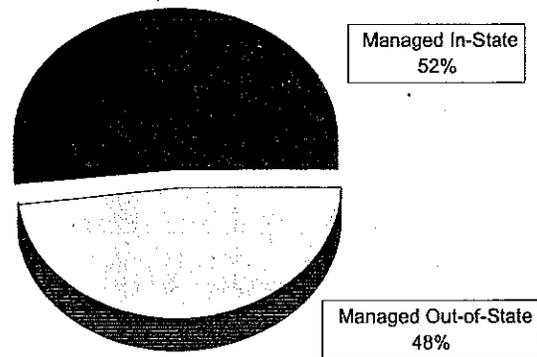
Source: Vermont DEC Residuals Management Section, January 2001.

FIGURE 1.3: Snapshot of Biosolids Management, 1999

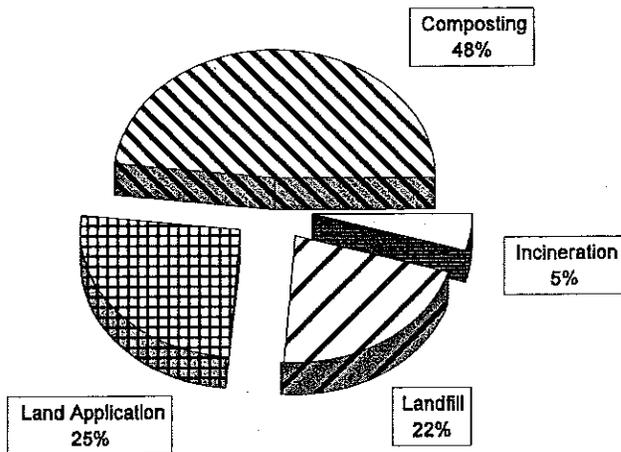
Beneficial Use vs. Disposal



In-State vs. Out-of-State Management



Management Details



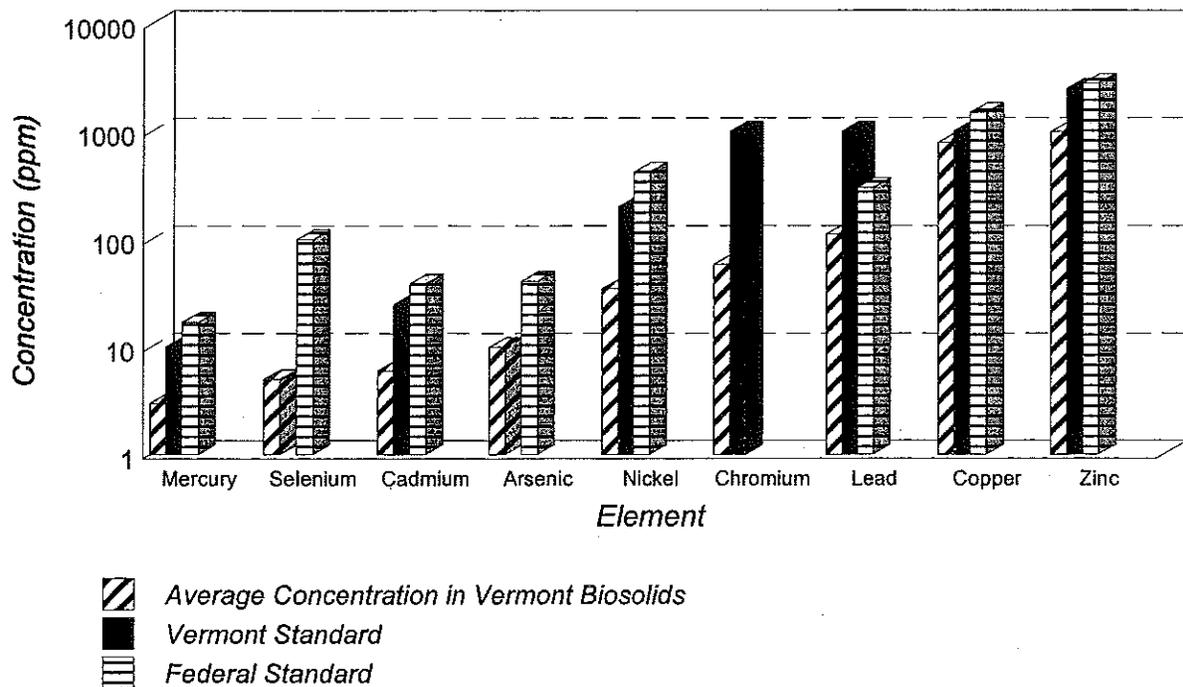
All 43 facilities that either land apply or compost biosolids or septage in Vermont are certified by the Agency. Regulatory oversight of these sites helps to ensure that potential runoff and odors are reduced, potential pathogens are treated and other potential site management issues are addressed. Monitoring data on the quality of Vermont biosolids has been collected over the years, providing good information on the concentrations of metals and other potential contaminants. Table 1.5 and Figure 1.4, which compare Vermont and Federal standards to concentrations typically found in Vermont biosolids, illustrate that in general, Vermont biosolids have a low metals content. With the increase in regulatory oversight of land application and composting since 1987, and the improvements in biosolids quality, beneficial reuse options are more environmentally sound than ever before.

TABLE 1.5
A Comparison of Vermont and Federal Biosolids Standards
to Concentrations ⁽¹⁾ Typical of Vermont Biosolids

Element	Vermont Standard	Federal Standard ⁽²⁾ "Table 3"	Average Concentration in Vermont Biosolids ⁽³⁾	Percentage of Most Restrictive Standard
Arsenic	N.S. ⁽⁴⁾	41	10.47 ⁽⁵⁾	25.5%
Cadmium	25	39	6.08 ⁽⁵⁾	24.3%
Chromium	1000	N.S.	58.69 ⁽⁵⁾	5.9%
Copper	1000	1500	783.80	78.4%
Lead	1000	300	112.14	37.4%
Mercury	10	17	2.58	25.8%
Nickel	200	420	34.82 ⁽⁵⁾	17.4%
Selenium	N.S.	100	5.07 ⁽⁵⁾	5.1%
Zinc	2500	2800	994.52	39.8%

(1) All concentrations are in units of milligrams per kilogram (mg/kg) on a dry weight basis. 1 mg/kg = 1 part per million
(2) Federal standard is from 40 CFR Part 503.13 - Table 3
(3) Vermont data are average concentrations detected in a 1997 study of Vermont biosolids quality
(4) N.S. = no standard established
(5) Analysis detection limit was higher than the actual concentration in more than 60% of the samples analyzed..

Figure 1.4: Comparison of Regulatory Limits to Concentrations Typical of Vermont Biosolids



PLEASE NOTE USE OF LOGARITHMIC SCALE

Septage

Septage is managed primarily by direct land application, or through treatment at wastewater treatment facilities, resulting in the production of biosolids. The biochemical oxygen demand (BOD) and solids content of septage is much higher than that of regular wastewater entering a WWTF and requires 30 to 70 times more treatment capacity than an equivalent volume of regular wastewater. In addition, due to the higher BOD and solids content of septage the treatment of septage at a WWTF results in the production of more biosolids than an equivalent volume of wastewater.

In 1985, 22% of the septage pumped out of tanks was transported to WWTFs and 78% was directly land applied. In 1999, more than 25 million gallons of septage was pumped

in Vermont; approximately 70% of it was treated at WWTFs and 30% was directly land applied. There is also a small quantity of dewatered septage that is either landfilled or transported out-of-state for composting.

Since septage management options are not evenly distributed within the state, some septage is transported great distances for land application or treatment. Currently, there are only eight certified land application facilities, with six of these facilities located within 10 miles of Interstate 89. The number and location of wastewater treatment facilities with the ability to take septage also results in significant hauling distances for septage from some areas. In 1994 the state funding program for municipal wastewater treatment plant upgrades was revised to help provide additional septage treatment capacity at certain wastewater treatment plants.

Composting Biosolids:

At the time the 1987 Vermont Septage and Sludge Management Plan was written, there were no biosolids composting facilities operating in Vermont.

During the late 1980's two municipalities, Springfield and Bennington, began constructing Vermont's first biosolids compost facilities. Since then the towns of Wilmington, Johnson, and Montpelier have received solid waste certifications to construct and operate biosolids compost facilities. (The Montpelier facility has not yet been constructed). The four operating facilities in Vermont compost a total of 775 dry tons of biosolids per year, or 11% of the amount of biosolids generated annually. Composting biosolids broadens the options for beneficial use of biosolids; because the pathogens are eliminated during the composting process, the product generated has more potential uses than conventional land applied biosolids.

Environmental Excellence Award

In 1997, Steve Prouty, of Prouty and Sons Septic Service was awarded a Governor's Award for Environmental Excellence in Pollution Prevention. Steve managed this family business as one of the most responsible septage land application projects in Vermont. He managed this beneficial use program without detriment to the environment and has even improved the groundwater quality in the area of the site. Once a site that was stripped of topsoil, the site now has a lush growth of nutrient-absorbing vegetation to recycle the septage spread on the field.

Opposition to land application of biosolids and septage has been steadily increasing due to public concern about potential risks to the environment and public health coupled with increasing suburbanization of the state. Since passage of Act 78, two advisory committees have studied the barriers to public acceptance of land application and beneficial use of biosolids and septage. They found that public concerns regarding health and environmental risks associated with biosolids and septage create a barrier to acceptance of biosolids, landspreading and composting. The committee also concluded that a lack of information on biosolids contributes to these concerns.

One trend that is beginning to change is who manages these wastes. Since 1989, the public sector has managed most biosolids generated at municipally owned wastewater treatment facilities, while the private sector has provided services for the pumping, hauling, and land application of septage. Today, the private sector is starting to manage municipal wastewater treatment plant biosolids as well as septage. Municipalities have not been actively involved in septage management in the same way that they have been for municipal solid waste or recycling.

MANAGEMENT OF HOUSEHOLD HAZARDOUS WASTE (HHW), CONDITIONALLY EXEMPT GENERATOR (CEG) WASTE, AND OTHER SPECIAL WASTES

By 1989 when the Vermont Solid Waste Management Plan was first adopted, significant efforts had already been made to prevent the landfilling or incineration of regulated industrial hazardous wastes. However, there had been only minimal efforts to prevent the landfilling or incineration of household hazardous wastes (HHW) and conditionally exempt generator (CEG) wastes from businesses. Since 1989, new programs have been developed to divert CEG waste and household hazardous waste from landfills and incinerators. Today, CEG waste must be sent to a hazardous waste facility, a solid waste facility specifically permitted to accept the waste, a beneficial use, reuse or recycling facility, or to an approved CEG waste collection event. So called "universal wastes", such as fluorescent bulbs, rechargeable batteries, and pesticides are a category of hazardous wastes which are now eligible for alternative handling and reduced regulatory requirements. In addition, certain household hazardous wastes are banned from landfills and separate collection programs for HHW are available to the majority of Vermonters.

Specialized management of these potentially hazardous wastes is a result of concerns about disposal of HHW/CEG wastes in landfills, where hazardous constituents may show up in landfill leachate. However, to date, leachate analytical data from Vermont's lined landfills indicates that the HHW and CEG waste that is landfilled in Vermont is not significantly affecting leachate quality. There is also cause for concern about improper disposal of HHW/CEG waste either down the drain or directly into the environment. A related issue is the potential threat posed by junkyards because the materials they handle (gasoline, oil, antifreeze, tires, etc.) can cause contamination of the air, water and soil. Since 1989, the Agency, municipalities, and solid waste districts have invested a significant amount of time and money to ensure proper management of household hazardous waste, CEG wastes and other special wastes.

Table 1.6 describes the current management options for HHW and special wastes in Vermont. Waste electrical products are receiving increased attention as a result of several factors:

- The landfill ban (effective in 1999) on labeled mercury-added products, such as thermostats and fluorescent lamps.
- The increasing number of computers entering the waste stream due to the rapid changes in computer technology coupled with falling prices. Computer monitors contain lead, and other computer components can contain hazardous materials.

Table 1.7 provides an estimate of HHW and other Special Waste generation in Vermont, by waste type. Household hazardous wastes make up less than ½ %, by weight, of Vermont's solid waste stream.⁶ Many of these materials are managed separately by Vermont solid waste districts and municipalities through regular household hazardous waste collection programs and one day collection events. Today, HHW collection days are available to 96% of the residents of the state. There are three "permanent" or "rover" collection programs which are available seven to twelve months of the year and serve 42% of the state's population. There were no such programs available prior to Act 78. However, many Vermonters surveyed about the convenience of HHW collection programs reported that they do not have convenient options for handling painting supplies (38%), waste pesticides (39%), and waste oil (32%).⁷

⁶ *Household Hazardous Waste: Steps to Safe Management*. U.S. Environmental Protection Agency, EPA/530-F-92-031. April 1993.

⁷ *Macro® Poll Results*. Vermont Dept. of Environmental Conservation. February 1998.

TABLE 1.6 Current Management Options For HHW/Special Wastes in Vermont

Automotive Wastes	
Waste oil	Collected at some solid waste transfer stations, recycling facilities, permanent hazardous waste collection facilities and HHW collection days. Limited private facility collections.
Oil filters	Collected at some permanent hazardous waste collection facilities and some recycling facilities. Limited private facility collections.
Tires	Collected at many private and public facilities.
Antifreeze	Collected at some recycling facilities, all HHW collection facilities and HHW collection days.
Lead Acid Batteries	Collected at private and public facilities.
Household Related Wastes	
Pesticides	Collected at HHW collection facilities and HHW collection days with funding from VT Department of Agriculture.
Paints and Related Wastes	Collected at HHW collection facilities and HHW collection days. Some ongoing 'paint only' collections.
Dry Cell Batteries	Collected at some retail stores, HHW collection facilities and events and some recycling facilities.
Household Chemicals	Collected at HHW collection facilities and events.
Waste Electrical Products	
Fluorescent lights/ballasts	Collected at some recycling facilities, HHW collection facilities and events, and by some private electrical supply wholesalers.
Thermostats	Collected at HHW collection facilities and events, some recycling facilities and through the Thermostat Recycling Corporation at participating plumbing, heating and electrical wholesalers.
Consumer Electronics	Ongoing and special collection events currently available at some districts, alliances, private and non-profit establishments.
White Goods	Collected at public & private facilities or curbside pickup by private haulers.
Other	
Medical Wastes	Pick up by private collection company. Some on-site treatment available.
Asbestos Wastes	Friable asbestos containing wastes exceeding 10 cubic yards may only go to facilities certified to accept this waste; less than 10 cy may go to certified municipal landfills.
Paper Sludge	Landfill, landfill alternative daily cover, compost out-of-state.
Foundry Sand	Landfill, landfill alternative daily cover.

TABLE 1.7
Estimated Annual Generation and Regulatory Status of HHW / Special Wastes in Vermont

Type	Estimated Generation	Landfill Banned ⁽¹⁾
Automotive Wastes		
Waste Oil	1.2 million gallons ^(A)	YES
Oil Filters	1.5 million filters ^(B)	NO
Tires	591,000 tires ^(C)	YES
Antifreeze	n/a	NO ⁽²⁾
Lead Acid Batteries	140,000 batteries ^(D)	YES
Household Wastes		
Pesticides	n/a ^(E)	NO ⁽³⁾
Paints and Related	232,100 gallons ^(F)	YES ⁽⁴⁾
Dry Cell Batteries	8 million batteries ^(G)	SOME ⁽⁵⁾
Household Chemicals	n/a	NO
Waste Electrical Products		
Fluorescent	1.2 million lamps ^(H)	YES ⁽⁶⁾
Thermostats	n/a	YES ⁽⁶⁾
TV's and Computers	40,000 items ^(I)	NO
Other Consumer Electronics	n/a	NO
White Goods	7,900 tons ^(J)	YES
Other		
Medical Wastes	250 tons ^(K)	YES ⁽⁷⁾
Asbestos	100,941 sq. ft. + ^(L)	YES ⁽⁸⁾
Paper Sludge	40,000 tons	NO
Foundry Sand	30,000 tons	NO

TABLE 1.7 (cont.) NOTES

n/a means data not available.

- (A) Based on the American Petroleum Institute estimate of 1.6 million gallons of motor oil sold in Vermont in 1997 x .75. This includes both oil that is changed by do-it yourselfers and by service stations, business fleets, etc.
- (B) Based on 2 oil filters/year for each of the 700,300 registered vehicles in VT (December 1999).
- (C) Based on EPA estimate of one tire per capita annually (*Markets for Scrap Tires*. U.S. Environmental Protection Agency. EPA/530-SW-90-0774A. October 1991).
- (D) Assumes 5 year battery lifetime and based on 700,300 registered vehicles in VT (December 1999).
- (E) No recent estimate is available on annual waste pesticide generation in Vermont; however the Vermont Agriculture Department estimates 18,000 lbs of pesticides were collected in FY 1999.
- (F) *Vermont Waste Paint Report*. Vermont Department of Environmental Conservation. 1992.
- (G) Based on an estimate of 3.5 billion batteries sold in the U.S. in 1992 (*Household Hazardous Waste: Use, Storage, Disposal Guide*. U.S. EPA Region 5 and Purdue University Research Foundation. 1996.)
- (H) The Manufacturers Association estimates that 2 fluorescent lamps are disposed per capita annually.
- (I) Based on manufacturers life cycle data.
- (J) Total tons of white goods are estimated from EPA national generation figures (*Characterization of Municipal Solid Waste in the United States: 1998 Update*. U.S. Environmental Protection Agency, prepared by Franklin Associates, Ltd. July 1999.). Only a small percentage of this material is hazardous.
- (K) Department of Environmental Conservation 1998 estimate based on information from hospitals.
- (L) Based on FFY 1998 asbestos abatement contractor notifications to Vermont Dept. of Health.

- (1) See Title 10 V.S.A. Section 6621a for landfill ban details.
- (2) All liquids are banned from landfill disposal as designated 'Special Wastes' under the Solid Waste Management Rules.
- (3) While not banned as a waste category, pesticides are not exempt from regulations in Vermont (6 VSA Chapter 87).
- (4) Latex and oil based paints, paint thinners and removers, stains and varnishes are all statutorily banned from Vermont landfills. The only exceptions are dried out latex, in quantities of less than one gallon, and latex from a waste stream that has an effective reuse program, as determined by the Secretary.
- (5) Nickel-cadmium and sealed lead acid batteries are banned from Vermont landfills. Other dry cell batteries are not.
- (6) While specific electrical products are not banned, the 1998 legislature passed a law (Act 151) banning all labeled "mercury-added" products from the solid waste stream. This included thermostats, switches, lamps and some batteries and took effect in 1999.
- (7) Untreated Infectious Wastes are banned from landfilling under Vermont's Solid Waste Management Rules.
- (8) Asbestos containing waste exceeding ten cubic yards may only go to facilities specifically certified to accept this waste. One exception is non-friable asbestos waste, which can be landfilled at certified facilities in accordance with operational standards.

SOLID WASTE PLANNING AND MUNICIPAL COOPERATION

Act 78 encouraged inter-municipal cooperation and regional solutions for solid waste management. Currently, 78% of the state's population is served by ten solid waste management districts (164 member towns), and three inter-municipal organizations (24 towns). These regional organizations have state-approved solid waste management plans. An additional 17 towns are covered by multi-town solid waste plans and have cooperated together in varying degrees for solid waste planning purposes. Another 32 towns have adopted individual solid waste plans. As of January 1, 2001, the Agency has approved solid waste management plans that cover 237 of the 255 Vermont municipalities and 98% of Vermonters.

Currently, 18 towns, townships, and gores in Vermont are not included in approved local or regional solid waste management plans. Municipalities without state approved solid waste implementation plans face three consequences under Vermont law:

- Solid waste from the municipality cannot be disposed of in Vermont landfills unless stringent performance standards are met;⁶
- The municipality is not eligible for solid waste management capital grants or most solid waste management assistance fund grants;⁷ and
- Existing or proposed solid waste facilities in the municipality cannot receive certification from the Agency.⁸

⁶ 10 V.S.A., Section 6605(b)(3)(B) requires removal of yard waste and 75% of recyclables, household hazardous waste and conditionally exempt generator waste from the waste stream.

⁷ 24 V.S.A. Section 2202a(c)(3).

⁸ 10 V.S.A. Section 6605(c).

STATE FUNDING OF PLANNING AND IMPLEMENTATION

Act 78 provided state funding for municipal and regional planning and implementation activities necessary to achieve the goals of the legislation. Table 1.8 provides a breakdown of the expenditures of state bond money on these activities over the past ten years.

TABLE 1.8
Breakdown of Grant Monies Disbursed to Regional Planning Entities,
Solid Waste Districts, and Municipalities from 1988 - January 1, 2001

Category	Code	Total Funds Disbursed	Percentage of Total
Implementation Projects ⁽¹⁾	IM & II	\$17,369,300	42%
Solid Waste Evaluation and Planning ⁽²⁾	PL	\$13,400,400	32%
Landfill Closure ⁽³⁾	CL	\$4,674,400	11%
Design and Permitting	PD	\$4,404,400	11%
Siting and Technical Work ⁽⁴⁾	PS	\$989,300	2%
Pilot Projects	PT	\$431,700	1%
Special Projects	SP	\$168,800	<1%
Total		\$41,438,300	100%

- (1) Monies awarded for facilities and equipment capital projects, including interim implementation grants awarded before local/district solid waste plan in place.
- (2) Includes planning activities, studies (e.g., economic feasibility, waste generation), management, education and initial landfill siting evaluations.
- (3) Monies awarded to properly close unlined landfills.
- (4) Final siting and technical evaluation of potential sites.

As of January 1, 2001, \$17,369,300 had been spent on implementation grants, making this the largest single use of state solid waste grant funds. Implementation grants were used to implement local and regional solid waste plans, including the construction and equipping of recycling and drop-off centers, transfer stations, hazardous waste collection depots, composting facilities, biosolids processing facilities, and other types of solid waste facilities. These grants also helped purchase equipment, such as segregated recycling containers

for many towns and districts. No new legislative appropriations have been made since 1997, so the Agency's ability to provide funding assistance for towns and districts to implement approved solid waste plans is very limited. Currently, there are no funds available for new recycling or composting projects; the remaining grant funds (less than \$75,000) were appropriated for use on landfill closure and hazardous waste capital projects only.

Table 1.8 indicates that approximately one third of the grant monies, \$13,400,400, was spent on solid waste planning activities. Planning funds were initially used to form and develop the solid waste districts. The districts (who were expected to act as the primary solid waste implementation entities) and the regional planning commissions then utilized planning grants to analyze current waste generation and to develop solid waste management implementation plans. Planning grants were used to develop waste reduction programs, recycling collection and processing programs, biosolids land application sites, composting facilities, conditionally exempt generator and household hazardous waste collection programs, and solid waste transfer and disposal systems. Planning grants were also used for development of landfill siting criteria and initial site screening.

The third largest category of solid waste grants was for landfill closures. Since 1989, \$4,674,400 has been spent on the closure of 28 municipal unlined landfills. Forty-two other landfills were closed during this time without funding assistance.

The majority of the \$989,300 in siting grants and the \$4,404,400 in design and permitting grants were spent on the siting, design and permitting of lined landfill facilities. A smaller portion of these grants were spent on composting and recycling projects. Since 1989, six municipal/district lined landfill projects have received Agency solid waste certifications; these include Greater Upper Valley Solid Waste District, Northwest Solid Waste District, Lamoille Regional Solid Waste District, Chittenden Solid Waste District, and the Town of Randolph (two sites). To date, only the Chittenden (Williston) and the Randolph Phase I

lined landfill have been constructed and operated. Other landfill siting grants were provided to evaluate other sites including Bristol, Mount Holly, Salisbury, Shrewsbury, Williston, East Montpelier, Dummerston, and Vernon.

A total of \$431,700 was used to fund 16 different pilot projects, including curbside collection of recyclables and used oil, recycling drop-off depots, and yard waste composting. Finally, \$168,800 was expended for four special legislated projects: Act 78 study committee, inter-regional unregulated hazardous waste study, inter-regional solid waste study, and a railroad transportation feasibility study.

SUMMARY

Much has been achieved since the adoption of Act 78 in 1987 and the State Solid Waste Management Plan in 1989. Most importantly:

- More than sixty unlined landfills have been closed and capped, reducing leachate discharged to Vermont's groundwater by over 150 million gallons annually.
- Vermont has cleaner rivers today because of improved removal of nutrient-rich solids by our wastewater treatment facilities, but this also generates more biosolids, which must be managed. In 1999, 74% of the biosolids generated in Vermont were landspread or composted, and 26% were landfilled or incinerated.
- The amount of potentially hazardous wastes going to landfills, incinerators, or directly into the environment has been reduced through education, landfill bans, and special collections.
- Local, state, and national efforts to reduce waste generation appear to have finally leveled off per capita waste generation rates, which had steadily increased over the past ten years.

- Diversion of municipal solid waste through reuse, composting and recycling has increased from an estimated 12 percent of the waste stream in 1989 to about 35% in the last five years.

There have also been some fundamental changes since 1989 that have had a significant impact on how solid wastes are managed in Vermont. Most importantly, there has been a significant shift toward private sector control of the solid waste collection, transport, and disposal infrastructure. Coupled with this shift has been the continued consolidation of solid waste management companies, both nationally and in Vermont.

Finally, due both to the lack of success of some of the programs envisioned by Act 78 and the 1989 Plan, and to the evolving nature of solid waste management, there continue to be critical issues that need to be addressed. The most critical issues in solid waste management in Vermont today are:

1. There is a continuing long-term need to reduce waste through waste prevention, reuse and recycling. Preventing waste is the highest priority since it avoids both the environmental and economic costs of collecting, handling, transporting, sorting and processing reusables and recyclables. Markets for recyclables continue to be cyclical, with most markets located out-of-state. The revised statewide goal aims to reduce the per capita waste generation rate, and to divert 50% of Vermont's municipal solid waste from disposal by 2005.
2. Solid waste facilities must comply with today's more stringent environmental requirements in order to protect public health and the environment. There needs to be equity and consistency in the compliance program.
3. Illegal dumping and burning continue to be a problem, particularly for wastes such as tires, construction/demolition debris, and bulky wastes. Convenient and affordable drop-off sites, along with education and enforcement efforts are needed to reduce the incidence of illegal dumping and burning.

4. Better data collection is needed to measure changes in waste generation and composition and the ultimate disposition of wastes.
5. Limited in-state disposal capacity could leave Vermont vulnerable to increased disposal prices and transfer costs in the future.
6. Consolidation and vertical integration of the solid waste industry over the last ten years has been dramatic, concentrating the control of the flow of solid waste and limiting the choices available to some Vermonters. A competitive environment must be maintained in order to ensure competitive prices and services for solid waste management.
7. There has been a decline in the amount of biosolids which are managed beneficially for reuse in-state as opposed to being disposed of in landfills or incinerators and public acceptance of new land application and composting sites appears to be declining.
8. Household hazardous waste and conditionally exempt generator waste can threaten public health and the environment if not properly managed, and managing these wastes is expensive.
9. There is limited regulatory oversight and monitoring of automotive junkyards in Vermont, which may present a threat to surface and groundwater.
10. While privatization of solid waste services has increased significantly, municipalities are still responsible for managing solid waste. Towns, districts and alliances will have to revise their solid waste implementation plans to conform with this revised state plan, and there will be an increased emphasis on implementing plans and tracking progress on the local and state level.

Section II of the Revised Plan presents an Action Plan for each of these Critical Issues.

SECTION II:
CRITICAL ISSUES & ACTION PLANS

Recognizing the evolving nature of solid waste management, this Plan Revision proposes the following action plans to address the critical solid waste management issues currently facing Vermont. The ten critical issues were developed using input from Agency staff, solid waste managers, municipal officials, solid waste facility owners/operators, and Vermont businesses and citizens.

Each Critical Issue presented is stated in *italics* under the subject heading, followed by a brief explanation. For each Critical Issue a Goal is set, which defines how the Agency would like to progress towards addressing the Critical Issue. The Goal is followed by an Action Plan which defines the steps the Agency proposes to reach the identified Goal.

1. Reducing Waste through Waste Prevention, Reuse and Recycling

Reducing waste through waste prevention, reuse, recycling, and composting conserves natural resources, reduces environmental impacts, and can also have economic benefits.^{9,10,11} Waste prevention remains the highest priority for solid waste management in Vermont and must receive greater emphasis in the next 5 years.

Waste prevention, or source reduction, means consuming and throwing away less, reducing the amount and toxicity of waste generated. The most economical and environmentally sound way to “manage waste” is to avoid generating it in the first place. However, measuring progress in waste prevention is difficult, because the material never enters the waste management system. Other factors, such as the economy, can have a strong influence on product consumption and waste generation.

The waste diversion rate is an estimate of the percentage of waste diverted from disposal through reuse, recycling and composting. Substantial progress has been made toward achieving the 40% municipal solid waste diversion goal established in the 1989 Plan. In 1994, it was estimated that 35% of municipal solid waste generated in Vermont was diverted from disposal through reuse, composting and recycling.¹² A recalculation in 1999, with more accurate municipal solid waste disposal tonnages available, estimated a 34.6% municipal solid waste diversion rate.¹³ The potential exists to increase the diversion rate, especially by increasing waste prevention and diversion of organic materials.

⁹ *Greenhouse Gas Emissions from Management of Selected Materials in Municipal Solid Waste.* U.S. Environmental Protection Agency (EPA530-R-98-013). September 1998.

¹⁰ *Environmental Benefits of Recycling.* Northeast Recycling Council. September 1998.

¹¹ *Value Added to Recyclable Materials in the Northeast.* The Northeast Recycling Council, prepared by Roy F. Weston, Inc. May 1994.

¹² *Vermont's Solid Waste Diversion in 1994,* Vermont Dept. of Environmental Conservation.

¹³ DEC Solid Waste Program, December 20, 2000.

Citizen Survey Result:

While most people (74-78%) felt that they had convenient opportunities for recycling core materials, recycling still topped the list as the most important solid waste problem facing the state over the next five years. And when asked if they would be willing to pay more to increase recycling, 48% answered yes, and 47% answered no.

Goals:

- Prevent waste from being generated.
- Reduce the amount of waste disposed of by each Vermonter (per capita disposal rate).
- Increase Vermont's overall, state-wide municipal solid waste diversion rate to 50% by the year 2005.

The Agency estimates that to achieve the 50% municipal solid waste diversion rate goal, the amount of municipal solid waste diverted (through reuse, recycling or composting) would have to increase from approximately 193,000 tons in 1999 to over 300,000 tons in 2005. If state, district, and local programs focus solely on single family residential recycling, it is unlikely that this goal will be achieved. Success will require additional diversion of waste from all sources, including single-family residential, multi-family residential, commercial, institutional and industrial, as well as utilizing a variety of strategies tailored to the community.

In order for the state to achieve the state-wide municipal solid waste diversion goal of 50% by the year 2005, the Agency estimates that the average per capita disposal rate statewide will have to be reduced from 3.3 pounds per person per day to under 2.7 pounds per person per day, and the average per capita diversion rate will have to be increased from 1.8 pounds per person per day to 2.7 pounds per person per day.

¹⁴ *Macro® Poll Results.* Vermont Dept. of Environmental Conservation. February 1998.

Municipal Survey Result:

57% of the municipal officials agreed that the waste diversion goal should be increased to 50%; 28% of the respondents disagreed.

Action Plan:*1) Support and Research New and Innovative Waste Prevention Initiatives*

The Agency will establish a Waste Prevention Advisory Committee with representatives of municipalities, businesses, environmental groups, and consumers to assist the Agency in developing and evaluating waste prevention initiatives. The Committee will serve to advise the Agency on legislative proposals and grant programs to encourage waste prevention.

Initiatives proposed by the Agency for consideration by the Committee will include:

- Reduction of leaf, yard, and food waste disposal;
- Packaging reduction initiatives and strategies;
- Strategies to encourage reuse/repair businesses and programs;
- Tax incentives and other strategies to encourage businesses to implement waste prevention;
- Strategies to encourage reduction of toxic materials in the waste stream, including evaluation of the effectiveness of the existing shelf labeling program;
- Waste prevention educational programs and campaigns;
- Procurement practices that encourage waste prevention in the public and private sector; and
- Strategies (such as legislation, economic incentives, assistance, etc.) for optimizing unit-based-pricing throughout the state.

¹⁵ *Vermont Solid Waste Plan Survey Results*. Institute for Community Environmental Management at Antioch New England Graduate School. February 27, 1998

MUNICIPAL SURVEY RESULT:

90% of the municipal officials surveyed agreed that the State should promote reduction in the use of hazardous materials and proper management of hazardous waste by developing and promoting toxic use reduction.

74% agreed that the state should provide incentives to retailers to carry less toxic substances.

2) Support Consumer and Youth Education

The Agency will collaborate with other groups and agencies who are working to incorporate waste reduction, reuse and recycling issues into core education standards and curriculum on a statewide basis. The Agency will promote waste reduction campaigns such as the national "Use Less Stuff Day", "America Recycles Day" and "Buy Recycled" message. The Agency will continue to provide funding to promote youth and consumer waste prevention education. As resources allow, media campaigns to encourage waste reduction will be developed.

3) Provide Industrial, Commercial and Institutional Assistance Programs

The Agency will expand its pollution prevention and waste reduction assistance programs for businesses and institutions, emphasizing the potential cost savings. One assistance program the Agency will expand is the *Business Environmental Partnership*, a voluntary business assistance and recognition program that focuses on smaller businesses. The Business Environmental Partnership promotes reducing toxics and waste generation, increasing recycling, conserving energy and resources, and adopting environmental

¹⁶ *Vermont Solid Waste Plan Survey Results*. Institute for Community Environmental Management at Antioch New England Graduate School. February 27, 1998

standards. This program has significant potential to stimulate waste prevention and recycling on a voluntary basis and to make businesses and consumers more aware of reducing the environmental effects of goods and services. The program will be expanded beyond the Green Hotels program (www.vtgreenhotels.org) to address other business sectors. The State will seek to partner with other organizations, including trade associations and solid waste districts to make this a high visibility program.

4) Increase the Use of Unit-based Pricing for Waste Collection and Disposal

Studies have shown that waste disposal is reduced when households and businesses pay for these services based on the weight or volume of waste. The Agency's goal is to maximize unit-based pricing for public and private solid waste collection. Unit-based pricing will be advanced through technical assistance, the work of the Waste Prevention Advisory Committee, and the review and approval of local and district solid waste implementation plans. A concern that often accompanies the introduction of unit-based pricing is the possibility of increased illegal burning and dumping to avoid disposal fees. Increased state, regional and local efforts to prevent and enforce against illegal disposal will be utilized to address this concern (see critical issue #3, Reducing Illegal Disposal, Section 2 page 15).

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MUNICIPAL SURVEY RESULT:

63% of the municipal officials agreed that the State should require all public and private waste organizations to institute unit-based pricing, while 26% disagreed, and 11% had no opinion.

¹⁷ Vermont Solid Waste Plan Survey Results. Institute for Community Environmental Management at Antioch New England Graduate School. February 27, 1998

5) Clean State Program

The Vermont Clean State Council will continue to lead by example in developing initiatives to reduce waste generation by state government. The Council will continue to focus on areas such as paper use reduction, product reuse, and other opportunities for reducing the amount or toxicity of waste generated by the State.

6) Increase Collection and Processing Efficiency

The Agency will work with private haulers and municipalities to implement more efficient collection and processing systems. As funding allows, the Agency will develop grant programs to improve collection efficiency and to evaluate the economics of such systems. Two types of collections that could benefit from such an evaluation include co-collection of MSW and recyclables, and collection of organics.

7) Increase Diversion of Construction/Demolition Wastes (C&D)

The Agency will make estimates of the amount and composition of C&D waste reused, recycled, and disposed of. Working with stakeholders in the building trade, the Agency will work to develop the most effective strategies for reducing C&D waste generation in Vermont. The Agency will continue to work with the Department of Buildings and General Services to reduce C&D wastes in state government projects. Grant funds, if available, will be used to develop and promote waste diversion strategies for C&D. ANR will increase its outreach of current recycling opportunities through media including its web-site and builder association newsletters. The Agency will continue to evaluate local markets for C&D materials such as using ground asphalt shingles in recycled asphalt pavement/gravel or hot mix asphalt, using ground wallboard as a soil amendment and reusing salvaged materials for new uses.

8) Increase Diversion of Source Separated Organic Wastes

Approximately 25% of the municipal waste generated and disposed of is food waste and yard trimmings.¹⁸ The Agency believes that diversion of organic wastes through composting is a key to significantly increasing the diversion rate. Therefore, the ANR Compost Center will work on the following initiatives:

A. Increase Backyard and Off-Site Composting

The Agency will continue to support and promote backyard composting, including the funding of a Master Composter program. Since backyard composting is not possible for all households and businesses, the Agency will implement an incentive grant program to promote off-site composting options.

Citizen Survey Result:

When asked if they had convenient opportunities for food and yard waste composting, 61% said yes and 25% said no.

People generally were not willing to pay more to compost more (24% yes, 70% no).

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B. Increase Composting Programs for Businesses

Many businesses that generate food waste do not have sufficient opportunities to compost their waste. The Agency will continue to provide grants and technical assistance for start-up or expansion of compost facilities, collection programs, and equipment. New on-site assistance programs may also be established for grocery stores, restaurants, or food processors, to help businesses set up food waste separation and collection, train employees, and compost on-site.

¹⁸ *Characterization of Municipal Solid Waste in the United States: 1998 Update*. U.S. Environmental Protection Agency, prepared by Franklin Associates, Ltd. July 1999.

¹⁹ *Macro® Poll Results*. Vermont Dept. of Environmental Conservation. February 1998.

C. Initiate Composting Recognition Program

The Agency will establish a recognition program for businesses that follow environmental conservation in food waste management. Promotion of composting will be done through the Vermont Business Environmental Partnership program.

D. Increase Information and Education Resources Available

The ANR Compost Center will increase coordination and information exchange with compost research institutes. Using the Vermont Compost List Serve (electronic mailing/discussion list) and the Vermont Compost Network, the Center will continue to increase networking of composting participants and advocates. The Center will continue to expand its library, web page, and other resources.

E. Evaluate Landfill Ban on Leaf and Yardwaste

In order to reduce the amount of leaf and yard waste that is disposed of, and increase the amount composted, the Agency will consider a statewide landfill ban on leaf and yard waste. The results of the planned waste composition study will be used to help evaluate the potential impact of a landfill ban on yardwaste. Approximately 68 municipalities have adopted leaf and yard waste ordinances, including some landfill bans. Public input on prohibiting leaf and yardwaste from landfills statewide will be sought before the Agency proposes any statutory changes.

F. Reduce Barriers to Increased Composting

With Vermont's rural character, one of the greatest barriers to centralized food waste composting is the cost of transportation. An opportunity exists in some areas for farms that are experienced in composting their animal manures to take in small amounts of food waste from local stores and businesses, reducing hauling costs. Several small businesses could also share a small composting operation. The Agency will continue to look for opportunities to promote composting of source separated wastes with the minimum controls necessary to protect public health and the environment.

9) *Enhance End-Markets for Reusable, Recyclable and Compostable Materials*

Market development will continue to play a significant role in increasing the demand for recovered materials:

A. State Purchase of Recycled and Reused Materials

The Agency will work with municipalities and other state agencies including Transportation, State Buildings, and Purchasing to increase the purchase of recycled and composted materials, particularly for road and building projects, and to suggest changes to specifications in contracts that may allow for greater use of recovered materials.

B. Market Development Information and Vermont Business Materials Exchange

The Agency will continue to maintain a clearinghouse for market development information and will continue to fund the Vermont Business Materials Exchange, provided it continues to find new uses for industrial and commercial reusable wastes.

C. Assistance to Businesses for Using Reused and Recycled Materials

The Agency will help publicize existing sources for waste reduction business assistance including the Small Business Development Center, the Department of Economic Development, and the Vermont Sustainable Jobs Fund. The Agency will work with the Vermont Department of Economic Development to create incentives and assistance for emerging businesses that utilize reused and recycled materials. The Agency will seek to expand acceptable uses, where appropriate, for materials such as organics, tires, glass and some industrial byproducts. To the extent feasible, the Agency will also work with private manufacturing facilities, state agencies (including the Department of Economic Development and Agency of Transportation), and others to encourage the increased use of recovered materials.

D. Regional Recycling Market Development Coordination

The Agency will continue to work with the Northeast Recycling Council (NERC) to promote recycling market development on a regional basis. Previous successful NERC initiatives include work with the Yellow Pages Publishers Association and the Northeast Newspapers Publishers Association to use recycled content paper. NERC also offers assistance programs for recycling businesses, such as its business training workshops and recycling investment forums.

2. Ensuring Environmentally Sound Waste Management Facilities

There needs to be better and more consistent adherence to regulations and certifications by all solid waste facilities so that protection of public health and the environment can be assured.

Facility siting, operating, monitoring, reporting, closure and post closure requirements are set forth in statute, the Solid Waste Management Rules and facility certifications. However, compliance with these requirements is not adequately monitored for all types of solid waste facilities.

Of particular concern is ensuring proper monitoring and maintenance at closed landfills to prevent impacts to public health and safety, and the environment. Agency assessments conducted in the early 1990's found that unlined landfills throughout Vermont had caused degradation of ground water and surface water quality. Post-closure maintenance and monitoring is needed to minimize the risks to public health and the environment, and to ensure that necessary corrective actions are taken to protect public health and the environment. Of the 68 municipal solid waste and special waste landfills which have closed and capped since 1989, 16 are not covered by a regulatory document specifying post-closure maintenance and monitoring requirements. About 14 of these landfills do not currently perform post-closure maintenance and monitoring. Additionally, landfills that closed before 1989 were not subject to detailed closure regulations and may require additional attention to ensure that they are not causing environmental degradation.

Goals:

Ensure that all solid waste facilities operate in compliance with environmental requirements and do not have an adverse impact on public health or the environment. Ensure that all closed landfills are adequately maintained and monitored. Prevent the incineration or disposal of marketable recyclables. Ensure that landfill gas is managed at operating landfills.

Action Plan:

1) *Ensure that solid waste facilities have proper certification with appropriate environmental requirements.*

A. The Agency will continue to establish environmental requirements for all solid waste management facilities through implementation of the Solid Waste Management Rules and issuance of facility certifications.

B. The Agency will pursue post closure certification of all closed landfills which closed since 1989 that currently do not have specific monitoring and maintenance requirements.

C. The Agency will explore any needed legislative changes to ensure that landfills closed before 1989 are adequately capped and monitored.

2) *Ensure that solid waste facilities are operating in compliance with environmental requirements through compliance and enforcement activities.*

A. The Agency will conduct compliance evaluations of certified solid waste management facilities. Priority will be given to facilities with the greatest potential to adversely affect public health and the environment. This evaluation will include site inspections, and review of certification requirements and required submittals. The compliance evaluation will identify any areas of non-compliance which the facility must correct. Inspection and compliance activities will increase as resources allow. The State will pursue voluntary compliance and enforcement as appropriate.

B. For landfills, the Agency will continue to analyze the groundwater, surface water and leachate monitoring data submitted in order to assess the integrity and overall environmental impact of these facilities. Analyzing the data will also help determine the effectiveness of landfill cap design, the appropriateness of the sampling and monitoring requirements, and whether additional efforts are needed to detect, prevent or correct any impacts to groundwater or surface water.

3) *Prohibit the incineration or disposal of marketable recyclables.*

The Agency will pursue appropriate rule and policy changes to prevent the incineration or disposal of marketable recyclables, consistent with the planning requirements of 10 V.S.A. Section 6604. Solid waste facility and transporter licenses will include conditions preventing the incineration or disposal of marketable recyclables.

4) *Utilize non-regulatory and innovative approaches to solid waste management.*

The Agency will seek new opportunities to utilize non-regulatory approaches, including information and outreach, incentive-based programs, and targeted technical assistance. The Agency will also work cooperatively with solid waste managers, operators, and businesses toward implementation of environmentally sound innovations in solid waste management. The Agency anticipates that these innovations may include rail transport of solid waste to reduce truck impacts, proposals for acceptable alternative uses of waste materials, and new landfill technologies.

5) *Manage landfill gas.*

Methane is produced through the decomposition of organic materials in landfills. Methane is a potential source of fuel for the production of electricity and heat. The Agency will support landfill gas to energy projects in its planning and the regulatory processes if found to comply with environmental standards. Landfill operators will be asked to manage landfill gases and to evaluate the landfill gas-to-energy potential as part of environmentally sound landfill management.

3. Reducing Illegal Disposal

Illegal burning and dumping of solid waste threatens public health and the environment.

Since the 1989 Plan, many illegal dumps have been cleaned up. However, illegal dumping and backyard burning continue to be a problem in many Vermont communities. Although the extent of these activities is difficult to measure, the risks to public health and the environment are well documented.

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Municipal Result:

In response to whether the state should encourage proper disposal of solid waste through various means, 85% agreed the state should increase education on the health effects of illegal burning.

Goal:

Reduce the incidence of illegal burning and dumping.

Action Plan:

1) *Gather data on illegal disposal*

The Agency will assist Districts and towns, through grants or other programs, to evaluate the extent of illegal burning and dumping. The information obtained will be used to develop programs to reduce the incidence of illegal disposal.

2) *Develop Education and Enforcement Strategies*

The Addison County Solid Waste District and the Central Vermont Solid Waste Management District have had success in combating illegal dumping and burning as

²⁰ Vermont Solid Waste Plan Survey Results. Institute for Community Environmental Management at Antioch New England Graduate School. February 27, 1998

illustrated in the case studies below. Educating the public about health and environmental impacts from illegal burning and dumping can help eliminate these practices. Fining violators and publicizing enforcement actions will encourage other offenders to use legal disposal methods. The Agency will develop and implement statewide education and enforcement strategies to reduce illegal dumping and burning. As discussed further in Critical Issue #10 (Municipal and District Solid Waste Implementation Plans) the Agency will review district and town solid waste implementation plans to ensure they include educational, enforcement, or other strategies to reduce illegal dumping and burning.

3) Develop Convenient Drop-off Options

The Agency will work with towns, solid waste districts, and the private sector to make convenient and affordable drop-off (or other collection) options available, especially for special wastes which are hard to manage.

AN EXAMPLE OF ILLEGAL BURNING PREVENTION

The **ADDISON COUNTY SOLID WASTE DISTRICT** has a \$5,000 per year contract with the local sheriff's department to enforce a county-wide ordinance forbidding illegal burning and illegal disposal of solid waste. The ordinance, passed in March 1995, includes a graduated fine fee structure from \$35 - \$500 dollars per occurrence for violations.

Law enforcement officers immediately follow up on District leads and other complaints. Uniformed officers may ticket offenders if they catch them in the act. Education, however, also plays a large role in the program as officers explain the threats of illegal burning and dumping and provide information on legal disposal methods. The District also accepts burn barrels for recycling at no charge. Since initiating the program, the District has received and responded to 141 complaints about burning, and 82 warnings have been issued. The program has helped the District to take action on a very difficult issue for municipal officials.

AN EXAMPLE OF ILLEGAL DISPOSAL PREVENTION

The **CENTRAL VERMONT SOLID WASTE DISTRICT** took a comprehensive approach to illegal dumping when creating the *Adopt-a-Site* program. The *Adopt-a-Site* program embraces the District philosophy of first educating the public about proper waste management and only enforcing against those who knowingly choose illegal dumping.

This approach has been successful, with over 30 illegal dump sites cleaned and staying clean through the program. Since it began in 1997, *Adopt-a-Site* has involved more than 400 volunteers from at least 25 different local organizations and businesses in the clean up and maintenance of illegal dumpsites. Over 40 tons of solid waste, over 7,000 tires, and more than 100 gallons of household hazardous waste have been removed from these sites. An additional 30 sites have been identified for enrollment in the program.

The District is taking a similar approach with open burning. With financial support from the U.S. Department of Agriculture, the District convened a "stakeholders" workshop to discuss illegal burning and what strategies are most effective to eliminate it. While all stakeholders recognized the need for enforcement in some cases, the majority believe enforcement should come after substantive and substantial education. Phone interviews of all the fire wardens for each of the District's 22 member communities confirmed the soundness of this approach.

The District has since developed a comprehensive educational campaign on illegal burning, which began in the spring of 2001. Materials are being distributed throughout Central Vermont and are available for loan to other districts. The District will be evaluating the campaign's success in the future, and at that point will evaluate the need for enforcement strategies.

4) Provide Enforcement Assistance to Municipalities

The Agency will continue to pursue enforcement action on illegal dumping and burning. The strategy will be to maximize the impact of its enforcement resources by focusing on the most flagrant violations. However, the combined impact of smaller dump sites and widespread burn barrels is also significant. While additional resources would allow the Agency to pursue more cases, the Agency believes that an effective action plan will require additional enforcement beyond what the Agency alone can provide; regional, district, and local enforcement programs are also needed. The Agency will work to promote the adoption of town and district ordinances along with enforcement capabilities, and to provide incentives or grants to assist such programs.

4. Improving Solid Waste Data

Current data on solid waste generation, composition and disposal is critical for effective planning and evaluation of solid waste management strategies.

Limited resources have been devoted to data collection and analysis of solid waste generation, disposition, and composition over the past ten years. This makes it difficult to evaluate progress made toward waste reduction and recycling goals, to assess disposal capacity needs, and to determine where to direct future efforts in waste diversion.

Goal:

The Agency will develop better estimates of current solid waste generation and composition as a basis for measuring progress toward the goals of reducing the amount of waste generated per capita and diverting 50% of Vermont's municipal solid waste from disposal. Initiatives for recovering new waste stream components, or increasing the recovery rate of others, can also be evaluated with this information.

The Agency will track trends in the amount of waste disposed of and diverted. The Agency needs to improve the reliability of information on in-state and out-of-state disposal to ensure that all surcharges are collected, to accurately track how much out-of-state disposal is occurring, and to track solid waste disposal capacity needs and availability.

Action Plan:

1) Evaluate Waste Composition

As resources allow, the Agency will conduct a waste composition study or make funding available to private and public entities for waste composition studies with a focus on waste destined for disposal. Using information obtained regarding wastes currently being landfilled, solid waste managers can better evaluate potential waste diversion initiatives.

2) *Estimate Total Diversion and Total Disposal*

In order to better track statewide disposal and diversion rates, reporting of recycling, composting and disposal of Vermont waste will be improved. The Agency will improve its record keeping and data management capabilities to assure that the data is accessible and can be evaluated to generate useful state-wide information.

3) *Track the Per Capita Disposal Rate*

The Agency will calculate the amount of waste disposed (landfilled + incinerated) per capita annually. This will provide a direct measure of the goal of reducing the per capita disposal rate and an indirect measure of the impact of waste prevention, reuse and recycling programs.

4) *Calculate the Statewide Diversion Rate*

In addition to making annual estimates of the statewide diversion rate based on quarterly facility reports, every five years the Agency will gather more comprehensive data on the diversion of Vermont waste. The Agency will use this data to calculate the statewide diversion rate utilizing the EPA method or other method appropriate for Vermont.

5) *Inform Solid Waste Managers and the Public*

The Agency will provide solid waste managers, other stakeholders, and the public with information resulting from the four action items above and other efforts. The Agency will evaluate opportunities to exchange solid waste information and data, and will implement those it believes are most effective.

5. Monitoring Disposal Capacity

There may not be sufficient long term in-state capacity for wastes generated by Vermonters.

In 1999 approximately 24% of Vermont's municipal solid waste, 8% of construction/demolition debris, and 48% of biosolids were exported for disposal. Additionally, all HHW/CEG waste collected for disposal is sent to out-of-state facilities. Exports will continue unless more waste is directed to in-state landfills or additional in-state capacity becomes available at a competitive price. Although disposing of waste out-of-state may be the most economical option for some communities, excess reliance on out-of-state facilities could narrow in-state disposal options for Vermonters and ultimately make disposal more expensive.

Much of the control of solid waste destined for disposal currently resides with the private waste haulers and the companies which own transfer and disposal facilities. Decisions about where Vermont's waste is disposed of in-state and out-of-state are primarily economically driven based on the costs of transportation, taxes, and disposal. Some solid waste districts exercise control of waste disposition through contracts with the private sector.

At current permitted rates of fill, the two currently operating regional lined landfills in Vermont will reach permitted capacity in about seven years (Table 2.1). If all of Vermont's solid waste requiring disposal were disposed of at in-state landfills, permitted capacity could be reached in six years. One of these private landfills intends to apply for expansion permits, but the development and timing of this additional capacity is dependent upon many factors, including economics, permitting and construction. Additional capacity has been permitted by the Agency for one town and three district landfill sites, but these facilities have not yet received all necessary permits and none have been financed or constructed. Another district plans to apply for necessary permits for a lined landfill, if

successful in obtaining the property. While these sites represent potential capacity, they may never be built and thus are not considered in the state's capacity projections (Table 2.1). These uncertainties in future additional capacity, along with potential changes in waste import laws in other states and possible price increases resulting from limited capacity in the northeast could make Vermont vulnerable to future price increases for solid waste disposal.

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Citizen Survey Result:

"Constructing more landfills" was identified by citizens as being one of the most important solid waste management issues facing the state in the next 5 years.

Based on the disposal capacity available and waste generation rates, the Agency is not concerned about whether Vermont will have a place to dispose of its waste over the next five years. Beyond that time frame available capacity is less certain. Shifts in available regional disposal capacity, concerns raised by other states about waste imports into their states, and the potential impact on regional capacity and costs which may result from the closure of the Freshkills, NYC landfill all illustrate the risks of reliance on inter-regional landfills. The long lead times required to site, design, permit and construct a landfill necessitate early action to identify and avert any potential capacity crisis.

TABLE 2.1

Operating Solid Waste Disposal Capacity in Vermont ⁽¹⁾
Status as of January 2001

MSW Landfills ⁽²⁾	Remaining Capacity (tons)	Maximum Permitted Fill Rate 2001		Actual Fill Rate For 1999 Permit Year (tons/year)	Estimated Remaining Years of Capacity
		(tons/day)	(tons/year)		
Waste USA, Coventry (Phase I, II, III)	1,990,000	1,500	240,000	179,812 ⁽³⁾ (4/1/99 - 3/31/00) (permitted max = 180,000 tons)	8.3 ⁽⁴⁾
WSI ⁽⁵⁾ , Moretown (Cell 2)	680,000	600	125,000 ⁽⁷⁾	118,695 ⁽³⁾ (1/1/99 - 12/31/99) (permitted max = 120,000 tons)	5.4 ⁽⁴⁾
Totals	2,670,000	2,100	365,000	298,507	7.3 ⁽⁴⁾
Vermont Solid Waste Requiring Disposal (1999)				427,070	6.3 ⁽⁶⁾

- (1) Does not include other capacity certified by ANR that has not been developed (Northwest District, Greater Upper Valley District, Lamoille District, and Town of Randolph), capacity proposed for permitting by one privately owned operating landfill, or potential capacity involved in other legal proceedings (Chittenden Solid Waste District).
- (2) Does not include the three 1000 TPY unlined landfills operating in Bristol Town, Shaftsbury, and Salisbury.
- (3) Actual fill rate for permit years includes biosolids disposed.
- (4) Based on maximum yearly permitted fill rate in 2001.
- Note: Waste USA received an additional 11,342 tons of waste and WSI received an additional 9,674 tons of waste which were used in the landfills as alternative daily cover or road base material.
- (5) WSI = Waste Systems International, Inc.
- (6) Years of capacity remaining if all Vermont MSW, sludges, construction/demolition debris, and "other waste" were to be disposed of in-state. Does not include biosolids.
- (7) Upon submission of a written request and fees, the maximum permitted fill rate can be increased to 172,000 tons per year.

Goal:

Safe and affordable solid waste disposal for Vermont residents and businesses.

Action Plan:**1) *Monitor Disposal Capacity***

The Agency will continue to monitor landfill and incinerator disposal capacity in Vermont and the northeast so as to anticipate potential capacity shortfalls resulting from the closure of landfills or incinerators.

2) *Reduce Demand for Disposal Capacity*

The Agency will continue to work to reduce waste generation, and increase reuse, recycling, and composting to lower the demand for landfill capacity. The Agency will identify waste types currently being landfilled or incinerated which lend themselves to recycling, reuse or other acceptable uses, and will target programs accordingly.

3) *Develop a Contingency Plan for Shortfalls in Available Capacity*

The Agency will develop a contingency plan in the event that a shortfall in capacity for Vermont waste is anticipated. The Agency will work closely with the public and private sector to evaluate the problem, identify possible solutions, and implement recommendations. Trends that could cause the Agency to initiate development of a contingency plan include:

- In-state remaining landfill capacity drops below 2,000,000 tons, or 5 years capacity at 400,000 tons per year;
- A substantial increase in disposal costs over a 3 year period; or
- A downward trend in the percentage of in-state disposal over a 3 year period.

4) *Inform the Public*

The Agency will provide the public with information about waste disposal, existing capacity, the benefits of reducing demand for capacity and efforts to develop additional capacity.

6. Consolidation, Competition and Price of Services

The continued consolidation of the solid waste industry in Vermont creates the potential for reduced competition, increased prices and a decline in the scope of waste management services available.

Over the past decade, Vermont's solid waste industry has followed the national pattern of consolidation (fewer and larger companies providing services) and vertical integration (the same company providing collection, hauling and disposal services). The 1989 Plan reported that there were 500 licensed solid waste haulers in Vermont. Today, there are about half that number with 277 solid waste hauling companies licensed in Vermont. An estimated 44% of Vermont's solid waste that was disposed in 1999 was transported by one company, and an estimated 48% of Vermont's solid waste was disposed of in landfills owned by this same company. County by county percentages may be higher. Continued consolidation creates the potential for reduced competition, fewer choices for consumers, and increased prices for solid waste management services.

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Citizen Survey Result:

58% of the respondents reported that the amount they pay for solid waste services are "just right". 28% report that they are paying "too much", and 5% say they pay "too little".

In order for municipalities and districts to be able to provide solid waste disposal alternatives in a market where options have been limited due to waste industry consolidation, municipalities and districts need to be assured of waste flow to their facilities. One method which can be effective is the funding of waste management through the tax base rather than at the facility gate. A downside to this approach is that unlike unit based pricing (paying at the point of disposal based on the amount of waste), it does not create

²² *Macro® Poll Results.* Vermont Dept. of Environmental Conservation. February 1998.

an economic incentive to reduce, reuse and recycle. A community with tax-based funding of waste services must implement strong programs (such as education and promotion, providing convenient services, and mandatory recycling) in order to offset the lack of economic incentives and meet the goals of this plan.

Goal:

Ensure that Vermonters have access to safe and competitively priced solid waste collection, recycling and disposal services.

Action Plan:

1) *Support Municipal and District Authority*

- A. The Agency will continue to support municipal and solid waste district authority to collect waste surcharges and enforce ordinances. One of the purposes for this support is so that beneficial programs that do not generate revenue and need to be subsidized (e.g. HHW education, waste prevention and recycling education) can continue and expand.

- B. The Agency will support the ability of districts and municipalities to provide direct solid waste services and compete in the solid waste marketplace. The Agency recognizes the benefits of allowing municipalities and districts to fund some or all of their solid waste program and infrastructure through the property tax base (rather than through unit-based pricing programs) in order to provide a reliable waste and revenue stream. Town and district solid waste implementation plans which incorporate this funding approach may be approved by the Agency if the planning entity develops programs to offset the reduced incentive to reduce, reuse and recycle.

2) *Monitor Prices and Competition*

Table 2.2 presents average prices in 1999 for residential collection and disposal in Vermont. A system to monitor prices charged to Vermont residents, businesses, and solid

waste haulers for collection, recycling and disposal will be implemented by the Agency with the assistance of towns and solid waste districts. In addition, the Agency will work with the Office of the Vermont Attorney General and the Vermont Department of Public Service to establish a program for monitoring competition and pricing in solid waste collection, hauling, and disposal. In evaluating prices, comparisons will be performed against prices in similar areas of northern New England.

3) *Implement Contingency Plan*

If prices are found to be higher than in similar areas, and if the Agency determines the difference in price is the result of lack of competition in the marketplace, the Agency will implement the contingency plan described below:

- A. Assist municipalities and non-profit organizations in offering services by providing them with technical assistance and capital grants.
- B. Support the ability of towns and districts to affect competition and prices by protecting their authority to own, operate or franchise solid waste collection, transfer or disposal services and facilities.
- C. Attempt to reduce the barriers to entry for new or smaller competing private firms.
- D. Recommend that the Legislature review options up to and including regulating solid waste collection and disposal as a public utility, with formal regulation as a public utility being the option of last resort.

TABLE 2.2
1999 Estimated Average Costs of
Residential Solid Waste Management in Vermont ⁽¹⁾

Service	Average Rate	\$/Household /Year	Estimated Number of Households ⁽⁴⁾	Estimated Cost to Vermonters ⁽⁵⁾
MSW Curbside Collection	\$23.75/month	\$285	95,000 (40%)	\$27million
Recyclables Curbside Collection	\$5/month	\$60		
Full Service Curbside⁽²⁾	\$27.75/month	\$333		
MSW Drop-Off	\$2.13/bag	\$153	143,000 (60%)	\$22 million
Recyclables Drop-Off	\$0.29/bag ⁽³⁾			
Combined Drop-off	\$2.42/bag			
TOTAL ESTIMATED COST OF RESIDENTIAL MSW MANAGEMENT TO VERMONT HOUSEHOLDS				\$49 million

- (1) *The Price of Solid Waste Collection and Disposal Services in Vermont.* Vermont Department of Environmental Conservation, prepared by DSM Environmental Services. June 1999.
- (2) Full service curbside means pickup of both recyclables and trash.
- (3) The costs and units for recyclables collected at 64 Vermont drop-off centers reported in *The Price of Solid Waste Collection and Disposal Services in Vermont* varies from free to \$1.50 per 30 gallon bag. This results in an average of \$0.29/bag.
- (4) The estimated number of households is based on the Vermont Department of Health's 1997 Vermont Population and Housing Estimates as well as the Agency's estimate of curbside collection vs. drop-off. The estimated number of households have not been adjusted to account for those that illegally dispose of their wastes.
- (5) Does not include the cost of recycling collection and drop-off. The total cost to Vermonters for recycling collection and drop-off services was not estimated because of the variability in prices charged and subsidies provided throughout the state.

7. Managing Biosolids and Septage

There has been an increase in the amount of biosolids landfilled and incinerated. This uses up landfill space, increases incinerator emissions, and is a loss of beneficial resources.

During the last ten years, there has been a significant decline in the amount of biosolids and septage that is beneficially used. Beneficial uses of biosolids and septage include land application, composting, and use as landfill cover. In 1999, 74% of the biosolids generated were beneficially used, compared to 98% in 1987. Feedback received during public forums indicates that the public is not confident that there is adequate management and regulatory oversight of the beneficial use of biosolids, and that there are concerns about health and environmental impacts when biosolids are applied to the land, particularly with respect to potential long-term impacts.

Vermont law requires municipalities to be responsible for the management of biosolids and septage in conformance with the State plan. Historically, municipal involvement in the management of biosolids and septage has been limited to those towns which have a wastewater collection and treatment system. Over half the towns in Vermont rely solely on septic systems, and most of these towns have not been actively involved in the management of septage generated in their communities.

Reversing the trend of landfilling and incinerating Vermont biosolids will require additional efforts by the state, municipalities, districts, and the wastewater treatment facilities. Cooperative efforts between municipalities, landowners, and environmental groups are necessary to ensure that safe and affordable beneficial use projects can be implemented.

Citizen Survey Result:

When citizens were asked if they would be willing to pay more to increase the beneficial use of septage and biosolids, 40% said yes, while 47% said no.

Goal:

By 2005, achieve a state-wide goal of managing 75% of the biosolids generated in Vermont through beneficial use. Identify and address any barriers to the safe and affordable beneficial use of biosolids.

Action Plan:*1) Continue to Evaluate Environmental and Health Impacts*

The Agency will work with university and college researchers, the Agricultural Extension Service, the Department of Agriculture, Food and Markets, the Department of Health, environmental groups, wastewater treatment facility operators and other groups knowledgeable or interested about biosolids and septage uses. Through these efforts, the Agency will continue to evaluate the environmental and health impacts of long-term use of biosolids in Vermont to ensure that biosolids and septage are beneficially used in a safe and effective manner.

2) Evaluate and Reduce Contaminants

The Agency will determine the average concentrations of various contaminants in the biosolids wastestream. Known and potential sources for the various contaminants being discharged to the sewer system will be identified, and ways to reduce or eliminate the contaminant sources will be developed. Mercury will be one of the first contaminants targeted. Where source reduction or elimination involves other state programs or solid

waste management districts, Agency staff will discuss options with those programs and seek their assistance. The Agency will also promote the identification and elimination of any illegal sources of contaminants.

3) *Revise the Rules for Biosolids Management*

Utilizing the information obtained regarding the environmental and health impacts of long-term use of biosolids, the Agency will work in an open forum to develop proposed revisions to the Solid Waste Management Rules regarding biosolids management. Among the issues to be evaluated and addressed in these revisions are:

- New limits on long-term metals loadings at land application sites;
- The contaminant concentrations limits for biosolids; and
- Standards for all biosolids used in Vermont, including biosolids imported to the state after being generated, treated, or composted at an out-of-state facility.

4) *Provide Information*

The Agency will provide information to the public about biosolids management and the relative risks associated with contaminants at levels normally found in Vermont biosolids. Information comparing these risks to the risks associated with everyday activities will also be provided. Public outreach efforts will emphasize information sharing in order to promote informed decision making.

5) *Support CEG & HHW Programs to Reduce Contaminants*

The Agency will provide technical and financial support for conditionally exempt generator (CEG) and household hazardous waste (HHW) collection programs to reduce the contaminant loads in septage and biosolids from these sources.

6) *Promote Beneficial Use*

The Agency will promote beneficial use of biosolids and encourage generators to consider beneficial use options for managing biosolids.

7) *Use Biosolids on State Owned Lands*

The Agency will work with other departments and agencies to use biosolids and septage on state owned land.

8) *Increase Field Inspections*

The Agency will increase efforts to assure that all biosolids that are land applied meet strict quality assurance/quality control (QA/QC) requirements, and that land application sites are properly operated to ensure the safety of biosolids application. This will require that the Agency perform more field inspections of biosolids and septage land application activities to ensure that land application is carried out in a manner that protects public health and the environment.

9) *Develop Data Management System*

The Agency will develop a computerized data management system for tracking compliance with regulatory standards and evaluating environmental trends.

8. Managing Household Hazardous Waste, CEG Waste, Landfill Banned Materials and Other Special Wastes

Household hazardous wastes (HHW), conditionally exempt generator (CEG) wastes, landfill banned materials, and other special wastes can pose a threat to the environment and public health, and are costly to collect and manage separately from municipal solid waste.

Household hazardous waste, waste oil and landfill banned materials (excluding appliances and tires) make up an estimated ½ %, by weight, of Vermont's solid waste stream.²⁴ In 1999 and 2000, Vermont HHW/CEG collection programs shipped more than 400 and 485 tons respectively of hazardous wastes for treatment and disposal.²⁵ Vermont is a national leader in establishing programs to properly manage HHW/CEG waste. An estimated 96% of Vermont's population has access to at least two HHW collection events per year, and just under 50% have access to convenient collections year-round.

Wastes in this diverse group present management problems distinct from the bulk of solid wastes, due to their physical or chemical characteristics.²⁶ A few of these materials, such as lead-acid batteries, are recyclable commodities with established markets. However, for the remainder, the cost to manage these materials can range from \$75 per ton for waste oil, to \$4,000 per ton or more to dispose of some pesticides. These high costs are the result of special handling, transport, storage, treatment and disposal requirements.

Participation rates at HHW/CEG collections range from approximately 16% in Chittenden County (daily drop-off is available in Burlington to all Chittenden County residents) to less

²⁴ *Household Hazardous Waste: Steps to Safe Management*. U.S. Environmental Protection Agency, EPA/530-F-92-031. April 1993.

²⁵ DEC Environmental Assistance Division, August 4, 2000.

²⁶ *Management of Hard to Handle Wastes In Vermont*. A Discussion Paper. Vermont Department of Environmental Conservation. May 1998.

than 1% of the target population at some one day collection events in other areas of the state. One way to increase participation is to make collection options more convenient. If HHW is not collected, it will either be disposed of with the trash, dumped, washed down the drain, or stored by the homeowner.

Costs for managing other special wastes can be significant, particularly for higher volume wastes such as tires, which were banned from landfill disposal in 1991 and continue to be a management challenge. A number of pilot projects in the early 1990's identified potential in-state uses for waste tires. However, in 1998, the state's only tire processor closed its shredding operation. Consequently, at this time, most Vermont tires are sent out of state to be shredded into tire-derived fuel (TDF).

As the types and technology of consumer products continue to change, we will continue to have new management challenges into the years ahead. Examples include computers, mercury-added products and other consumer electronics.

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Citizen Survey Result:

People were asked if they had convenient ways to properly dispose of certain household hazardous products:

Paint	36% yes	38% no
Oil	41% yes	32% no
Pesticides	24% yes	39% no

51% of the respondents would pay more for more access to programs, 42% would not pay more.

Citizen Survey Result:

31% of those surveyed reported convenient access for proper tire disposal, 42% did not have convenient access.

Goals:

Reduce risks to human health and the environment through the proper management of HHW, CEG waste, landfill banned materials, and special wastes. Ensure access to safe, affordable and convenient collection programs for all Vermonters. Reduce the use of toxics in order to minimize future generation of these wastes. Prioritize HHW and special waste management activities based on the relative environmental and public health risks posed by the waste, and the additional costs of managing the waste separate from municipal solid waste.

Action Plan:

Action plans regarding waste reduction are presented in Critical Issue 1. In particular, Action Plans 1 and 3 in Critical Issue 1 address HHW, CEG wastes, landfill banned materials, and special wastes.

1) Implement Management Strategies for Specific Wastes

The proposed action steps for special waste management by waste type are listed below in Table 2.3; initiatives that require increased agency attention are indicated by an asterisk (*).

2) Ensure Planning & Implementation of Collection and Outreach Programs

The Agency will review District and municipal plans to ensure that they address management of these wastes (with the exception of the “other special wastes” and consumer electronics listed in Table 2.3), and that convenient collection programs are available to residents at least twice a year. In addition, plans must include an educational and technical assistance program for conditionally exempt generators. These plans must also include outreach programs to promote collections and to reduce future generation through toxics use reduction. The Agency will take a more active role in on-site plan review and assistance to promote continued improvement in districts and municipalities, especially those in which participation rates are low. The Agency has provided financial assistance to towns and districts to help fund HHW/CEG collection programs, equipment, and

outreach. In fiscal year 1999, \$75,000 was awarded to programs serving 181 Vermont towns. In fiscal year 2000 and 2001, \$125,000 was awarded each year to programs serving 216 and 212 towns respectively.

3) *Evaluate Costs and Benefits*

When planning for possible regulatory, grant or other programs for HHW/CEG wastes the Agency will coordinate regionally and with EPA to utilize new and existing information. This information will be used to evaluate and prioritize specific wastes, especially new and increasing wastes, according to environmental and public health risks and relative costs of collection.

TABLE 2.3 Action Steps for Specific Wastes

Automotive Wastes

Waste oil	Increase accessibility to private and public sector collection points through public education and grants for collection tanks.
Oil filters	Provide grants for oil filter crushers for municipalities, districts and private firms. Promote use of private sector collection facilities.
* Tires	Evaluate advance disposal fee and other options to fund collection programs. Promote take-back programs and beneficial use of used tires.
Antifreeze	Increase accessibility to private and municipal collection points through regulatory relief and increase the number of drop-off locations through limited grant funding.
Lead-Acid Batteries	Continue as is, due to high percentage capture through current infrastructure.

Household Related Wastes

Pesticides	Continue technical and financial support for HHW/CEG hazardous waste collections for outdated pesticides, subsidized by the Dept of Agriculture from pesticide registration fees .
Household Chemicals	Focus on toxics use reduction and education. Convene committee to identify methods and approaches to increase consumer awareness of less and non-toxic products. Provide funding support for consumer awareness campaigns and other education initiatives.
Paint/Related Wastes	Continue to exempt dried latex based paints from landfill bans. Gather more information on management costs for other paints and paint related waste. Promote reuse programs where possible.
Dry Cell Batteries	Evaluate cost of increasing accessibility to alternative management for sealed lead acid batteries. Continue to advertise availability of industry sponsored Ni-Cad collection program. Allow other batteries to be landfilled based on type and risk.

Waste Electrical Products

* Fluorescent lights/ballasts	Increase availability of public and private drop-off facilities. Increase awareness of businesses and the public. Provide funding as available.
Thermostats	Continue to handle at hazardous waste collections. Increase awareness of businesses and the public. Provide funding as available. Promote manufacturer take-back programs, like the Thermostat Recycling Corporation at participating plumbing, heating, and electrical wholesalers, and other options to increase manufacturer responsibility for proper disposal.
* Consumer Electronics	Gather more information on disposal risks at MSW landfills. If justified, develop system which may include manufacturer participation. Evaluate advance disposal fee option to fund collection programs and examine the manufacturers role in waste prevention and extended product responsibility. Continue funding and promoting ongoing and special collection events for consumer electronics at districts, alliances, private and non-profit establishments.
White Goods	Continue managing through the scrap metal infrastructure/industry. Agency will provide assistance to identify and remove hazardous materials (i.e. PCB capacitors, mercury switches) found in white goods .

Other Special Wastes

Asbestos	Provide technical assistance to municipalities, districts, and the private sector to assure proper management and disposal.
* Medical Waste	Continue development of solid waste regulatory system. Implement the medical waste procedure (June 2001 and subsequent versions). Provide technical assistance to municipalities, districts, and the private sector to assure proper management and disposal.
Dead Animals	Implement the <i>Procedure Addressing Disposal of Dead Animals</i> (March 2001 and subsequent versions). Provide technical assistance to state agencies, municipalities, districts, farms, households, and the private sector to assure proper management and disposal.
* Mercury-added Products	Increase accessibility to private and municipal collection points through regulatory relief (Universal Waste designation) and through limited grant funding.

* initiatives that require increased agency attention

9. Managing Junkyards

Junkyards vary in their environmental management practices, and have the potential to create risks to public health and the environment.

Junkyards handle old and damaged vehicles, appliances, and other scrap that can contain waste oils, antifreeze, gasoline, lead acid batteries, PCB's, freon, and other potential pollutants. These wastes can leak onto the ground or into the air and pose a threat to the environment and public health. Other wastes handled by junkyards, such as tires, can also pose a threat if not managed properly. The Agency believes that junkyards pose at least the same level of environmental risk as other solid waste management facilities. However, there is insufficient data on the actual impacts of junkyards on Vermont's environment.

Currently, automotive junkyards are regulated by the Agency of Transportation (AOT) for aesthetic purposes. To date, the Agency has only exerted regulatory authority over junkyards when one is identified as a hazardous waste generator or hazardous waste site. When a junkyard is identified as a hazardous waste site, clean up costs can be extensive. The Agency believes that it would be more cost effective to develop regulations designed to prevent junkyards from becoming environmental problems. The Agency currently does not have adequate resources to oversee these facilities.

Goal:

The Agency will develop a program to improve monitoring and environmental management at junkyards.

Action Plan:

The Agency will undertake the following new initiatives to improve the environmental management of junkyards:

1) *Clarify Regulatory Status of Junkyards*

Provide regulatory clarity regarding junkyards (definitions, relevant rules, current regulatory authority, and definition of state role). This may require legislative changes.

2) *Evaluate Management Practices at Junkyards.*

Gather information about how junkyards are currently managing wastes.

3) *Establish Acceptable Management Practices*

Develop acceptable management practices, determine technical assistance needs and provide assistance to junkyard owners/operators to help them implement sound environmental management practices.

4) *Develop Regulations Related to Junkyards*

If legislative changes are made, rule changes will be developed that include management standards to ensure that junkyards have adequate environmental oversight. Include siting standards to avoid siting junkyards in environmentally sensitive areas. The regulatory process developed needs to encourage local involvement.

5) *Implement Compliance Program for Junkyards*

To the extent resources can be secured, develop an appropriate monitoring, compliance, and enforcement program to respond to complaints and to ensure compliance with management standards.

10. Municipal and District Solid Waste Implementation Plans

Few municipalities or districts own or operate solid waste landfills today. The municipal role in solid waste management has changed because of more stringent environmental regulations, increased costs, and greater private sector involvement. However by law, municipalities are ultimately responsible for solid waste management.

State law requires that municipalities manage solid wastes within their jurisdiction in conformance with the State Solid Waste Management Plan. Municipalities (either individually or through a district) need to adopt solid waste implementation plans that are in conformance with the State Plan, and include all the elements required for consistency with the adopted State Plan. Existing approved plans adopted in conformance with the 1989 State Plan will have to be revised to conform with the Revised State Plan. The Agency's goal is to make the revision process as simple as possible, and to provide clear guidance and assistance to towns, districts, and alliances.

Goal:

All solid waste districts, alliances, and municipalities revise their solid waste implementation plans to be in conformance with the Revised Vermont Solid Waste Management Plan. Approved plans are implemented and achieve the goals set forth in the state plan and solid waste laws.

Action Plan:

The Agency will provide a guidance document to assist Towns and Districts in preparing revised plans. Within 18 months of the effective date of any revision to the state solid waste management plan all municipalities, either individually or through a solid waste management district or an intermunicipal association, shall submit a solid waste implementation plan that includes all the elements necessary for conformance with the state solid waste management plan. During this 18 month period, existing approved plans adopted under the 1989 State Plan will still be considered to be in conformance with the State Plan.

In order to be consistent with the revised State Solid Waste Management Plan, local and regional solid waste implementation plans shall describe how the district or municipality will achieve the following priorities (in descending order) of Title 10 V.S.A. Section 6604(a)(1):

- The greatest feasible reduction in the amount of waste generated;
- Reuse and recycling of waste to reduce to the greatest extent feasible the volume remaining for processing and disposal;
- Waste processing to reduce the volume or toxicity of the waste stream necessary for disposal; and
- Land disposal of the residuals.

Solid waste implementation plans shall include the following components:

1. *Implementation Report*

A completed implementation report with the following information about the town(s) or district:

- A. Calculation of total disposal and per capita disposal rate for municipal solid waste;
- B. Biosolids beneficial use rate;
- C. Current charges at facilities used by residents of town or district (pay-per-bag, per ton, recycling, special waste or other tipping fees);
- D. Current tipping and transportation fees paid by town or district;
- E. Current destinations for all wastes and recyclables (may be the transfer station or the materials recovery facility if that is all you know);
- F. Contracted or anticipated disposal facility for the next 5 years, and a backup location for disposal in the event of an emergency or changes in available disposal facilities;
- G. Date of last and next HHW/CEG collection events and annual participation rate;
- H. Summary of illegal disposal problems and solutions; and
- I. Updated budget and timeline.

In order to track future progress and performance, and to remain in conformance with the state plan, implementation reports will be required every two years.

2. *Waste Diversion Plan*

In order to reduce the per capita disposal rate for municipal solid waste, identify the following waste diversion programs that are or will be implemented. The municipality should consider, at a minimum, the programs or goals listed below. Describe why the programs were chosen given the personnel, financial and other constraints of the municipality, and how the program will increase waste diversion.

- A. Reducing waste generation and reducing toxics use;
- B. Increasing reuse;
- C. Increasing the residential (single and multi-family) participation rate, capture rate, collection efficiencies and materials recycled;
- D. Increasing the seasonal home/resort participation rate;
- E. Increasing the commercial recycling participation rate, capture rate, collection efficiencies and materials recycled;
- F. Increasing the institutional recycling participation rate, capture rate, collection efficiencies and materials recycled;
- G. Preventing the incineration or disposal of marketable recyclables;
- H. Increasing construction/demolition debris reduction, reuse and recycling;
- I. Increasing organic waste recycling (leaf/yard, food waste, brush, stumps, appropriate papers); and
- J. Education/information/outreach plan for schools, youth, consumers and businesses.

3. *Biosolids & Septage Management Plan*

Plan for the management of septage and biosolids generated in the municipality or district, including:

- A. How biosolids and septage generated in the town or district will be managed;
- B. What percentage of biosolids generated at wastewater treatment plants are currently beneficially used;
- C. Steps to increase the amount of biosolids beneficially used, by identifying barriers to beneficial use within the municipality/district and steps to address these barriers.

- D. How sources of contaminants will be identified and reduced; and
- E. Public outreach on biosolids and septage management.

4. *Plan for Non-Regulated Hazardous Wastes, Landfill Banned Wastes and Special Wastes*

A. HHW/CEG Waste

Describe the management program and current access to collection programs for household hazardous wastes and conditionally exempt generator wastes (including but not limited to waste oil, oil filters, antifreeze, lead-acid and nickel-cadmium batteries, pesticides, household chemicals, paint/related wastes, dry cell batteries, fluorescent lamps, thermostats and other mercury-added products). If a collection program is not currently available, include a plan for providing convenient collections at a reasonable cost to participants. At a minimum, collections need to be available to households twice a year. In addition, plans must include an educational and technical assistance program for conditionally exempt generators.

Address the specific "nonregulated hazardous waste" elements required by 24 V.S.A. Section 2202a(c)(4), including:

- i. Participation in plan development and implementation by receiving solid waste disposal facility, citizens, businesses and organizations;
- ii. Two public hearings after public notice on the plan (can be part of public participation process for entire plan);
- iii. Statement of priorities (in descending order):
 - Reducing or eliminating the use of hazardous, particularly toxic, substances;
 - Reducing the generation of hazardous waste; and
 - Proper management of HHW/CEG waste.
- iv. Basis for selection of HHW/CEG management strategy;
- v. Education program for schools and households promoting the priorities of reduction and proper management;
- vi. Education and technical assistance program for small quantity generators;

- vii. Methods coordinated with owners of solid waste facilities, for preventing HHW, CEG waste and landfill banned materials from ending up in the solid waste disposal facility and otherwise properly manage unregulated hazardous waste; and
- viii. A priority program for those wastes that present the greatest risks.

B. Landfill Banned Wastes

Describe the waste management system for the following landfill banned wastes (except for those already addressed in section A above): lead-acid batteries, waste oil, white goods, tires, paint, nickel-cadmium batteries, small sealed lead-acid batteries, non-consumer mercuric oxide batteries, and labeled mercury-added products.

C. Other Special Wastes

Describe the waste management system for asbestos waste, medical waste, dead animals and consumer electronics.

5. *Unit Based Pricing Plan*

An action plan for implementation by both public and private haulers of volume or weight based charges for residences and businesses. If implementation of unit based pricing is not proposed, provide the reason for any exceptions and alternative mechanisms to promote waste reduction.

6. *Buy Recycled Plan*

Include steps to be taken to maximize the use of recycled products, used products and compost by the town or member towns. Educate residents and businesses on opportunities for them to "buy recycled."

7. *Illegal Disposal Plan*

An action plan that will be implemented at the district or local level to reduce illegal burning and dumping. Specify how this goal will be achieved through adoption and enforcement of an ordinance, or by other means that will achieve equivalent results. If

adoption and enforcement are not proposed, demonstrate how the proposed activities will achieve equivalent results. Explain how the effectiveness of the proposed activities will be determined. The action plan on illegal disposal also needs to address education, and the cost and convenience of available alternatives to illegal dumping and burning.

8. *Solid Waste Facilities Siting Criteria*

Describe any siting criteria that will apply to solid waste management facilities which may be proposed by any public or private entity in the town or district. If the planning entity (district, town, alliance, etc.) intends to own or operate new solid waste facilities, describe the facility site selection process that will be used to site these facilities.

9. *Specify Facilities Included in the Plan*

A. Specify what existing solid waste facilities are "included in" the plan.

Under state law (10 V.S.A. Section 6605(c)), the Agency shall not issue a certification or recertification for a solid waste facility (except for a sludge or septage land application project) unless it is included in the district or municipal solid waste implementation plan. *Note: the plan should also include any known solid waste landfills which were closed since 1989 so that they can receive post-closure certifications.*

B. Describe how proposed facilities will be reviewed for inclusion in the plan.

Explain the process to be used to determine if solid waste facilities proposed to be located in the municipality or district will be "included in" the solid waste implementation plan. The process may reference the siting criteria (developed under paragraph 8 above) and existing zoning ordinances, may require a host town agreement, or may defer to the requirements in the Vermont Solid Waste Management Rules for some or all types of solid waste facilities. The standard(s) for being "included in" the solid waste implementation plan should be clear.

10. Budget/Timeline

Provide a budget and timeline for each step in the solid waste implementation plan. The budget and timeline will be reviewed and updated every two years and submitted as part of the implementation report.

11. Public Participation Plan

Describe the process used to ensure early and sustained public participation in development and implementation of the plan. Local citizens, businesses, organizations, and solid waste management facility owners should be notified of the opportunities to participate in the public process for plan development and implementation.

12. Solid Waste Ordinances

Include copies of any local ordinances pertaining to solid waste.

13. Conformance with Other Plans

Demonstrate that the Implementation Plan is in conformance with any municipal and regional plan adopted in accordance with 24 V.S.A chapter 117. Demonstration may be in the form of a letter from the applicable regional planning commission and the municipal planning board regarding conformance of the solid waste plan with the regional and municipal plan, copies of pertinent sections of the municipal or regional plan, or other documentation that proves conformance.

SECTION III: APPENDICES
APPENDIX A: Summary of Plan Revision Action Steps
TABLE A.1: Financial Requirements and Additional Staffing Needs

This table presents a summary of Agency staffing requirements and financial resources that would be necessary to fully implement the action steps outlined in this Revised Plan. Some of these activities are already being implemented to some degree so only the additional staffing requirements are outlined. Not all the action steps will be implemented on an annual basis and the Agency is not obligating itself to implementing action steps that are beyond our annual personnel or operating budgets. On the last tables information is provided on the current fiscal year (FY01) spending plans, and on proposed expenditures for FY02.

Most of the projects are expected to be paid for from the Solid Waste Management Assistance Fund (SWMAF). The only exceptions are the waste tire project (\$ 600,000 plus ½ FTE) and the junkyard project (2 FTE). If these two initiatives get through the legislative process the tire project would be funded through a special tire fund, and funding for the junkyard project would still need to be determined. There is no need or recommendation at this time to increase the per ton surcharge that funds the SWMAF.

Critical Issues and Action Steps	Necessary Funds	Additional Staffing
1. Reducing Waste Through Waste Prevention, Reuse and Recycling	\$ 473,000 + \$ 87,500 (1.75 FTE)	
1) New and Innovative Source Reduction Initiatives	\$ 50,000	1.00 FTE
2) Consumer and Youth Education	\$ 75,000	
3) Business Assistance Programs		
4) Unit-based Pricing for Waste Collection and Disposal		
5) Clean State Program		
6) Increase Collection and Processing Efficiency	\$ 30,000	
7) Increase Diversion of Construction/Demolition Wastes	\$ 50,000	.30 FTE
8) Increase Diversion of Source Separated Organic Wastes		
A. Increase backyard and off-site composting	\$ 50,000	
B. Increase Composting Programs for Businesses	\$ 50,000	.25 FTE
C. Initiate Composting Recognition Program	\$ 3,000	
D. Increase Information and Education Resources Available	\$ 5,000	
E. Evaluate Landfill Ban on Leaf and Yard Waste		

Critical Issues and Action Steps	Necessary Funds	Additional Staffing
F. Reduce Barriers to Increased Composting		
9) Enhance End-Markets for Reusable, Recyclable and Compostable Materials		
A. State Purchase of Recycled and Reused Materials	\$ 50,000	.20 FTE
B. Market Development Information and Vermont Business Materials Exchange	\$ 20,000	
C. Assistance to Businesses for Using Reused and Recycled Materials	\$ 70,000	
D. Regional Recycling Market Development Coordination	\$ 20,000	

2. Ensuring Environmentally Sound Waste Management Facilities	\$ 35,000	
1) Ensure that solid waste facilities have proper certification and are operating in compliance with environmental requirements.		
A. Implement solid waste rules and issue facility certifications		
B. Issue post closure certifications for closed landfills		
C. Explore any needed legislative changes to ensure that landfills closed before 1989 are adequately capped and monitored		
2) Compliance and Enforcement		
A. Compliance evaluations for all sw facilities	\$ 35,000 (district tax compliance coordinator)	
B. Analyze landfill monitoring data		
3) Prohibit Incineration or Disposal of Marketable Recyclables		
4) Use Non-Regulatory & Innovative Approaches		

3. Reducing Illegal Disposal	\$ 160,000	+	\$ 75,000 (1.5 FTE)
1) Gather data on illegal disposal	\$ 10,000		.1 FTE
2) Develop Education and Enforcement Strategies			.2 FTE
3) Develop Convenient Drop-Off and Collection options			.2 FTE

4) Provide Enforcement Assistance to Municipalities	\$ 150,000	1.0 FTE
Critical Issues and Action Steps		
4. Improving Solid Waste Data	\$ 50,000 + \$ 25,000 (.5 FTE)	
1) Estimate Waste Composition	\$ 50,000	.20 FTE and
2) Estimate Total Diversion and Total Disposal		.20 FTE
3) Track the Disposal Rate Per Capita		.05 FTE
4) Calculate the Statewide Diversion Rate		.05 FTE
5. Monitoring Disposal Capacity		
1) Monitor Disposal Capacity		
2) Reduce Demand for Disposal Capacity		
3) Develop a Contingency Plan for Shortfalls in Available Capacity		
4) Provide the Public with Information Regarding Disposal Capacity		
6. Consolidation, Competition, and Prices of Services		
1) Support municipal and district authority	\$ 15,000 + \$ 10,000 (.2 FTE)	
2) Monitor prices and competition	\$ 15,000	.2 FTE
3) Implement Contingency Plan if necessary		
A. Assist public and non-profit sectors in offering services	(\$ 500,000)*	
B. Protect municipal authority to enter marketplace		
C. Reduce barriers to entry for new and small firms	(\$ 500,000)*	
D. Recommend legislative review of public utility option		
* not included in subtotal or total - necessary only if contingency plan implemented		
7. Managing Biosolids and Septage	\$ 60,000 + \$ 62,500 (1.25 FTE)	

1) Continue to Evaluate Environmental and Health Impacts			.25 FTE
2) Evaluate and Reduce Contaminants		\$ 50,000	.50 FTE
Critical Issues and Action Steps	Necessary Funds	Additional Staffing	
3) Revise Rules for Biosolids Management			
4) Provide information to the Public	\$ 10,000		.25 FTE
5) Support CEG/HHW Programs to Reduce Contaminants			(see section 8 below)
6) Promote beneficial use			
7) Use Biosolids on State Owned Land			
8) Increase Field Inspections			.25 FTE
9) Develop Data Management System			

8. Managing Household Hazardous Waste, CEG Waste, Landfill Banned Materials and Other Special Wastes	\$ 805,000	+	\$ 25,000 (.5 FTE)
1) Specific Wastes Management			
Waste Oil			
Oil filters			
Tires	\$ 600,000		.05 FTE
Antifreeze			
Lead Acid Batteries			
Pesticides			
Household Chemicals	\$ 155,000		
Paint/Related Wastes			
Dry Cell Batteries			
Fluorescent lights/ballasts			
Thermostats			
Consumer Electronics	\$ 50,000		

White Goods			
Asbestos			
Critical Issues and Action Steps	Necessary Funds	Additional Staffing	
Medical Waste			
Mercury-added products			
2) Ensure Planning and Implementation of Collection and Outreach Program			
3) Evaluate Costs and Benefits			

9. Managing Junkyards	\$100,000 (2 FTE)
1) Regulatory clarity	.20 FTE
2) Survey and document existing junkyards	.10 FTE
3) Develop acceptable management practices	.20 FTE
4) Develop Regulations related to Junkyards	1.50 FTE
5) Implement Junkyard Compliance Program	

10. Municipal and District Solid Waste Implementation Plans	\$150,000
1) Guidance document and technical assistance	\$150,000
SUBTOTALS	
	\$1,748,000 + \$385,000 (7.7 fte)
TOTAL	= \$2,133,000*

*Note: Does not include the \$1,000,000 necessary if need to implement the contingency plan in # 6.

TABLE A.2: Fiscal Year 2001 AND Fiscal Year 2002 Information

NOTE: DOES NOT INCLUDE FTE'S and FTE COSTS

Critical Issues and Action Steps	Project cost estimate	FY 01 Final Budget	FY 02 Final Budget
TOTALS	\$1,748,000	\$421,000 includes contracts and grants	\$ 483,500 includes contracts and grants

Notes -The totals do not include the \$1,000,000 necessary if needed to implement the contingency plan in # 6.

-The solid waste management assistance fund is the anticipated revenue source for all the projects with the exception of the tire project (\$ 600,000 plus ½ FTE) and the junkyard project (2 FTE).

1. Reducing Waste Through Waste Prevention, Reuse and Recycling	\$473,000	\$173,000	\$179,000
2. Ensuring Environmentally Sound Waste Management Facilities	\$35,000	\$35,000	\$42,000
3. Reducing Illegal Disposal	\$160,000	\$45,560	\$43,000
4. Improving Solid Waste Data	\$50,000	\$50,000	\$18,000
5. Monitoring Disposal Capacity	\$0	\$0	\$0
6. Consolidation, Competition, and Prices of Services	\$15,000	\$9,440	\$5,000
7. Managing Biosolids and Septage	\$ 60,000	\$ 20,000	\$20,000
8. HHW, CEG, Landfill Banned, and Other Special Wastes	\$ 805,000	\$ 213,000	\$176,500
9. Managing Junkyards	\$0	\$0	\$0
10. Municipal and District Plans	\$150,000 *	\$0	\$0

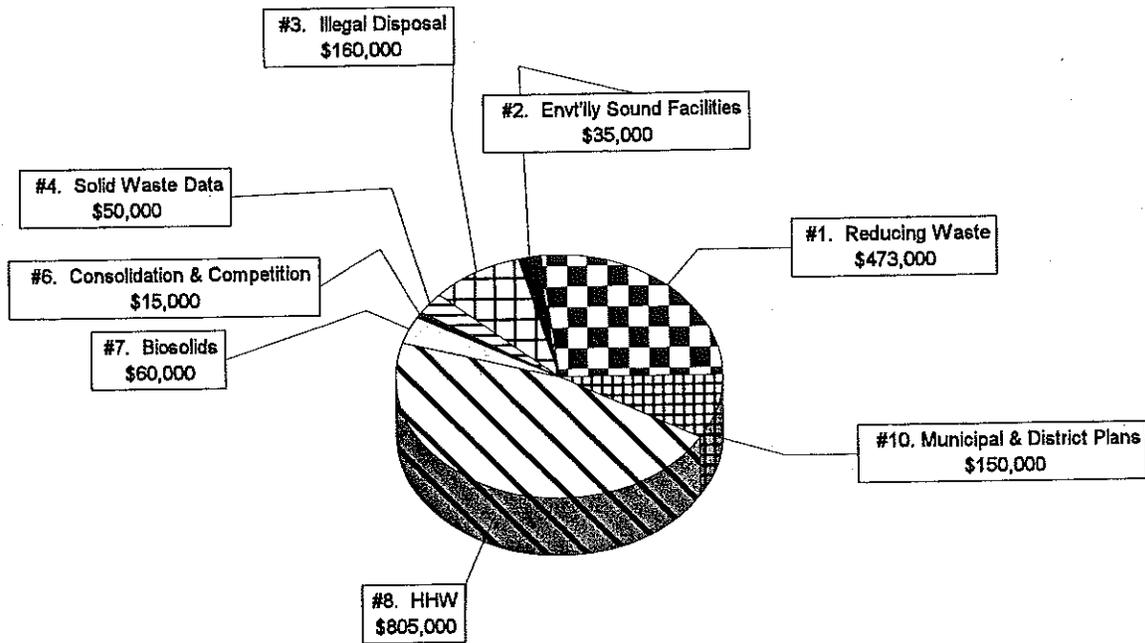
* Additional funds may become available to assist with municipal and district plans.

FIGURE A.1: FINANCIAL AND STAFFING REQUIREMENTS FOR PLAN IMPLEMENTATION

Summary of Financial Requirements for Plan Implementation

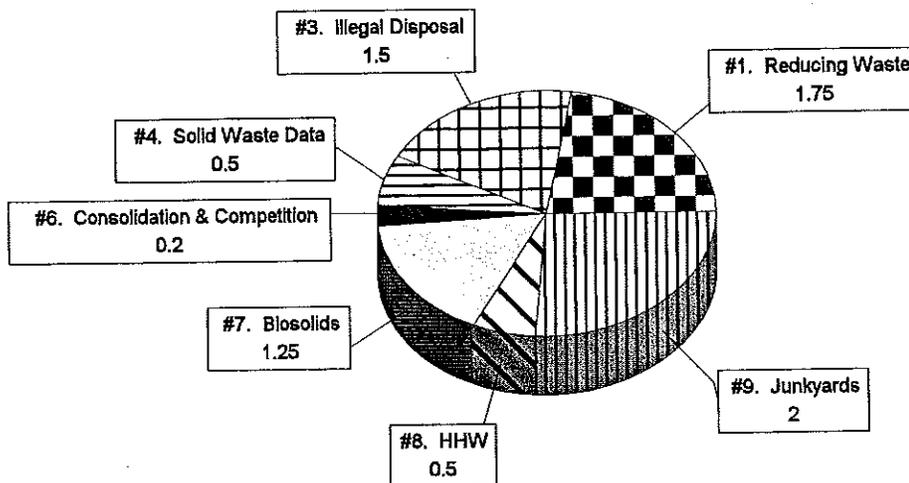
Total = \$1,748,000

Note: this total does not include Agency personnel costs or Agency overhead



Summary of Additional Staffing Needs for Plan Implementation

TOTAL = 7.7 FTE's Note: 7.7 FTE's would cost approximately \$385,000



FTE's

APPENDIX B Waste Generation and Composition

Municipal Solid Waste (MSW) Generation

Rough estimates of net solid waste generation were made for the 1989 Plan. According to Table 2-8 of the 1989 Plan, total solid waste generation, including MSW, appliances, construction and demolition debris and used tires, was estimated to be 346,500 tons in 1987. Roughly 427,000 tons of solid waste was disposed of by Vermonters in 1999 (Table 1.3). Comparison of the 1987 and 1999 estimates is of limited value since there were no accurate, Vermont specific, estimates of waste generation or disposal in 1987; most landfills did not have scales and the reporting systems were not standardized or institutionalized. However, in the future comparisons will be possible by comparing the baseline amount of municipal solid waste disposed per capita in 1999 (1220 pounds/person/year or 3.3 pounds/person/day)²⁸ to future per capita municipal solid waste disposal rates.

Composition of MSW

No data specific to Vermont were available in 1989 concerning the composition of the waste stream. An effort was made to collect waste generation and composition data from commercial and industrial generators as part of the subsequent regional planning effort. However, differences in regional efforts made it difficult to develop any comprehensive Vermont waste generation and composition estimates. Subsequently, little, if any, effort has been made to develop or maintain Vermont specific waste generation and composition data. As a consequence, as in the 1989 Plan, the only data available on composition are the national data published by the U.S. EPA. Table B.1 presents 1999 estimates of municipal solid waste²⁹ composition for Vermont, based on these national data and compares them with composition estimates used in the 1989 Plan.

²⁸ Based on 474,820 tons of MSW disposed in 1998 (table 1.3) and the estimated 1998 Vermont population of 590,883 (1998 Vital Statistics, Vermont Dept. of Health).

²⁹

The EPA study defines municipal solid waste as durable goods, non-durable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional and industrial sources. It does not include construction and demolition wastes, junk autos, biosolids from wastewater treatment plants, or industrial process waste.

TABLE B.1
Changes in Municipal Solid Waste Composition
(1987 vs. 1998)

Material	1987 ⁽¹⁾ Percent By Weight	1998 ⁽²⁾ Percent By Weight	Change in Percentage Points
Paper and paperboard	41%	38.2%	↓ 2.8
Glass	14%	5.7%	↓ 8.3
Metals	7%	7.6%	↑ 0.6
Plastics	4%	10.2%	↑ 6.2
Food & Yard Waste	21%	22.6%	↑ 1.6
Wood	-	5.4%	-
Other	13%	10.3%	↓ 2.7

(1) 1989 Vermont Solid Waste Management Plan, Figure 2-4.

(2) U.S. EPA *Environmental Fact Sheet. Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 1998*. April 2000.

A comparison of the 1987 and 1998 composition data indicates that while glass decreased as a percentage of total MSW by an estimated 8 percentage points, plastics increased by 6 percentage points. This demonstrates the growing use of plastics in packaging and other consumer products and the declining use of glass in packaging.

APPENDIX C
Summary of Public Input Process for
Revision of State Solid Waste Management Plan

The State recognized at the onset of this project that the Plan Revision would only be meaningful and useable if there was extensive involvement by the public and other stakeholders. Steps were taken to ensure a thorough public process.

An advisory committee was formed that included Steve Maier, Addison SWMD; and Karen Horn, Vermont League of Cities of Towns. The advisory committee assisted the State in defining the Scope of Work and the choice of a contractor to assist the State with the Plan Revision process.

In consultation with DSM Environmental Services Inc. (the selected contractor assisting with revision of the State plan), a public participation plan was developed that identified methods for the State to get information to the public about the plan revision, and to receive information and comment back from the public.

Before any plan drafting had begun, a phone survey was designed and implemented in January 1998 by the Institute for Community Environmental Management (ICEM), a subcontractor to DSM. The survey was intended to gain information about local views regarding solid waste management in Vermont. A total of 80 people were surveyed, of which 16 were locally elected officials, 36 were non-elected local officials, and 22 were citizens involved in solid waste issues. These people were asked ten multiple choice or open-ended questions, and the answers were then tabulated and submitted to the State.

Another phone survey was implemented in January 1998 but the respondents in this case were 414 randomly selected Vermonters over the age of 18. This poll, implemented by MACRO International Inc., included four multi-part questions about waste management services and priorities for system improvements. The survey also attempted to gain information about peoples willingness to pay for additional services. Survey results were broken down by respondents age, income, gender, geographic region, and education level.

During the month of February 1998, ten meetings were held throughout the state to get more input from the public before drafting the plan revision. A total of 133 people attended the meetings and the ideas and

suggestions were thoughtful, diverse, and constructive. The meetings were held in Middlebury, St Albans, Lyndonville, Rutland Town, Norwich, Morrisville, Brattleboro, Bennington, Montpelier, and South Burlington. In addition, the "Critical Issues List", the Public Meeting Announcements, and the Meeting Summaries were placed on the Agency Website so that people could follow the plan revision process.

From March 1998 to March 2000 the Agency worked with DSM on developing a draft plan based on the input received. An all day forum for "stakeholders" on the critical issues and action plans was held in February 1999. The feedback received at this forum is also summarized on the Agency Website. The brainstorming at the forum provided the Agency with valuable insights and resulted in significant changes to the draft document. For the plan to be formally adopted it must go through the state Administrative Procedures Act public process.

The proposed Revised Vermont Solid Waste Management Plan was reviewed by the DEC Rules team in accordance with the DEC Rulemaking Procedure. The proposed plan was then filed with the Interagency Committee on Administrative Rules (ICAR). On January 2, 2001 ICAR issued its decision that "The committee has no objection to the proposed rule being filed with the Secretary of State, with notation that the public participation plan was exhaustive and effective". The proposed Revised Vermont Solid Waste Management Plan was filed with the Secretary of State on January 12, 2001. The proposed plan and information on the public hearings and comment period was then sent to interested parties and information about the hearings and the comment period were published in the Burlington Free Press and Rutland Herald. The proposed plan and information on the public hearings and comment period were also posted on the Agency website and distributed through limited e-mail. The public hearings were held on February 13, 2001 at 6 p.m. in Springfield, Vermont and on February 21, 2001 at 4:30 p.m. in Montpelier. The public comment period extended to March 16, 2001.

Following the hearings and public comment period, Agency staff reviewed all the comments and prepared a responsiveness summary, in which the Agency responds to each comment received at the hearings or in writing, and explains what changes were made to the plan in response to the comment. These changes were then incorporated into the final revisions to the proposed State of Vermont Revised Solid Waste Management Plan.

APPENDIX D

Demographic Changes Since the 1989 Plan

The 1989 Plan described the changes in population, culture, and economic activity in Vermont that effect solid waste management. Many of the trends identified in 1989 have continued through 1998.

The Vermont Department of Health had projected at the time of the 1989 Plan that Vermont's population would grow from 537,000 in 1987 to 617,000 by the year 2000. The 2000 U.S. Census indicates that Vermont's population was approximately 608,827 in the year 2000, slightly less than projections made ten years ago, but still representing a growth rate of about 1 percent per year. Since waste generation is a function of population and economic activity, it is clear that even successful waste management activities must account for overall increases in waste generation due to increases in population and attendant economic activities.

Population growth is also not spread evenly across the State. Table D.1 illustrates that growth continues to be most significant in the northwest portion of the state, surrounding Chittenden County. Population growth in the Northeast Kingdom and in the southern portion of the state is substantially less, or has even declined.

TABLE D.1
Population Projections, by County, and Projected Change in Population
(1990-2010)

COUNTY	CENSUS PROJECTIONS			% CHANGE
	1990	2000	2010	1990-2010
Addison	32,953	36,450	39,034	18.5%
Bennington	35,845	37,561	38,347	7.0%
Caledonia	27,846	29,355	30,485	9.5%
Chittenden	131,761	147,372	159,700	21.2%
Essex	6,405	6,371	6,208	-3.1%
Franklin	39,980	44,845	49,040	22.7%
Grand Isle	5,318	5,929	6,444	21.2%
Lamoille	19,735	22,617	25,381	28.6%
Orange	26,149	28,920	31,516	20.5%
Orleans	24,053	24,095	23,459	-2.5%
Rutland	62,142	65,120	66,478	7.0%
Washington	54,928	56,057	55,423	0.9%
Windham	41,588	45,261	48,239	16.0%
Windsor	54,055	55,115	54,704	1.2%
STATE TOTAL	562,758	605,068	634,458	12.7%

SOURCE: *Vermont Population Projections: 1990-2015*. Vermont Health Care Authority, Center for Rural Studies. June 1993.

U.S. Census Bureau Vermont Population Projections

Year	1995	2000	2005	2010	2015
State Population	585,000	617,000	638,000	651,000	662,000

SOURCE: *Population Projections: States, 1995-2025*. U.S. Census Bureau, Population Division. May, 1997

Also continuing the trend discussed in the 1989 Plan, is the change in employment activities. As illustrated by Table D.2, agricultural and manufacturing employment continue to decline as a percent of total employment, while the service sector continues to increase. Because of marked differences in the nature of wastes generated by different sectors of the economy, these trends will affect waste generation and composition, as well as efforts to reduce waste generation and recover materials for reuse and recycling. Significantly, the decline in manufacturing activities also reduces the ability of the Vermont economy to absorb increasing levels of recovered materials.

TABLE D.2
Employment, By Sector, 1997 vs. 1987

EMPLOYMENT SECTOR	1987 ⁽¹⁾		1997 ⁽²⁾		% Change Per Sector (1987-1997)
	Total	% of Total Employment	Total	% of Total Employment	
Agriculture ⁽³⁾	12,000	4.7%	10,000	3.5%	-16.7%
Construction	16,755	6.6%	12,850	4.5%	-23.3%
Finance, Insurance, Real Estate	11,968	4.7%	12,300	4.3%	2.8%
Government	35,904	14.1%	45,450	15.8%	26.6%
Manufacturing	50,266	19.8%	47,150	16.3%	-6.2%
Other	11,968	4.7%	12,200	4.2%	1.9%
Retail Trade	45,479	17.9%	52,550	18.2%	15.5%
Services	57,447	22.6%	83,550	29.0%	45.4%
Wholesale Trade	11,968	4.7%	12,400	4.3%	3.6%
Total Employment	253,755		288,450		

- (1) Adapted from VT Employment and Wages Covered by Unemployment Insurance, 1987, VT Department of Employment & Training
- (2) VT Department of Employment & Training, 1997 Statewide Report on Employment Based on Current Employment Statistics Monthly Survey.
- (3) Estimates used are from *National Current Population Survey* and are for 1996 and 1986 agricultural jobs (most recent data available).

The increase in the service sector, while mirroring a national trend, also reflects the continued increase in tourism and second home development in Vermont. Currently, homes defined as vacation or seasonal represent 16% of the total housing stock in Vermont (Table D.3), ranging from a low of 2% in Chittenden County to a high of 46% in Grand Isle County. Reducing waste generation and increasing recycling among second home and vacationing residents may be more difficult than for full time residents.

TABLE D.3
Vacation and Seasonal Housing Units as a Percent
of Total Housing Units, 1999 Estimates

COUNTY	YEAR ROUND	VACATION OR SEASONAL	PERCENT OF TOTAL HOUSING UNITS
	(#)	(#)	(%)
Addison	13,266	1,647	11.0%
Bennington	14,981	3,896	20.6%
Caledonia	12,457	2,242	15.3%
Chittenden	56,133	1,245	2.2%
Essex	2,679	1,546	36.6%
Franklin	16,590	2,166	11.5%
Grand Isle	2,596	2,201	45.9%
Lamoille	8,974	2,437	21.4%
Orange	10,791	2,058	16.0%
Orleans	10,652	3,426	24.3%
Rutland	26,230	5,693	17.8%
Washington	24,200	3,426	12.4%
Windham	18,729	8,327	30.8%
Windsor	25,563	6,739	20.9%
Total Housing	243,841	47,049	16.2%

SOURCE: Vermont Department of Health.

