

North Dakota

Solid Waste Management Plan



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EXECUTIVE SUMMARY

The State Solid Waste Management Plan is a combination of the eight Solid Waste Management District Plans developed in 1992. The 1991 legislative session established eight solid waste management districts across the state to plan for and manage solid waste disposal within their boundaries. Each district prepared and submitted a district plan to the North Dakota State Department of Health and Consolidated Laboratories (NDS DHCL) by January 1, 1993. On the basis of the district solid waste plans it is evident that solid waste in North Dakota is currently being effectively and economically managed statewide.

It is also apparent that until recently, in most communities, solid waste management in the state meant landfilling one's garbage in the nearest landfill. Solid waste management in the future will be much more diverse. With the inception of new federal and state rules governing municipal solid waste (MSW) landfill location, design, operation, and closure, many landfills in North Dakota will close. The new rules will increase the cost of waste disposal by landfilling, as well as promote regionalization of waste disposal facilities. Consequently, alternative forms of waste management will become more attractive and play a greater role in the total waste management scheme.

The 1991 legislative session set goals for reducing the volume of municipal waste disposed in landfills. By 1995 at least a 10 percent reduction is proposed, by 1997 at least a 25 percent reduction is proposed, and by 2000 at least a 40 percent reduction is proposed. To do so, the citizenry of the state must adopt an integrated approach to solid waste management embracing other alternatives such as waste reduction and reuse, recycling, composting and incineration with energy recovery over landfilling.

Waste reduction and reuse is the highest priority of waste management alternatives. Waste reduction not only simply means decreasing the amount of waste produced but also decreasing the toxicity of the waste. The key to effective waste reduction programs is education. State and local government and solid waste districts should provide public education forums and materials on waste reduction. Local governments should also get involved in promoting waste exchanges to keep household hazardous wastes from being disposed in landfills.

Recycling and composting are becoming much more popular across the state. Composting, or separate handling and disposal of yard waste, is now nearly universally accepted. As regionalization of MSW landfills occurs in the near future, it is expected yard waste will no longer be disposed in MSW landfills. Communities without a landfill will not want to pay to transport and dispose yard waste in an expensive MSW landfill and communities with landfills will not want yard waste taking up valuable space in an MSW landfill. Composting programs can be as simple as having a local landowner pick up separated yard waste at collection sites within a city and directly applying it to fields or as sophisticated as the city of Fargo's composting facility which handles over 5500 tons of yard waste annually.

Recycling could best be described as being in its infancy in most of North Dakota. Most recycling in the state centers around three large processing facilities in Bismarck, Fargo, and Grand Forks. There are also several smaller community processing facilities across the state. For the most part recycling is currently

being driven by the private sector and is expected to continue to be. Markets for recyclable commodities have been improving steadily, however, the distance to markets from North Dakota continues to be a problem. Not only are most markets great distances from processing facilities in North Dakota, many small communities are great distances from the processing facilities which could handle and market their recyclables. Several solid waste districts propose coordinating sub-regional recycling centers within their districts. These centers would serve as consolidation points for recyclable commodities from which they could more economically be transported to processing facilities and ultimately marketed. Several solid waste districts also proposed that district-wide, local governments should implement volume-based disposal fees in conjunction with a recycling program. Volume-based disposal fees would do more than anything to enhance waste reduction and recycling programs.

Waste incineration or waste to energy is not currently widespread in the state. At minimum, more attention should be given to recovering energy from clean burning wastes such as wood, oil, tires, and other high BTU materials rather than disposing such materials. There is minimal incineration for volume reduction (box burner incinerators at grocery or department stores) and incineration of regulated infectious waste. Several districts are examining the option of a waste to energy facility for future solid waste management and other districts may as landfill capacity diminishes. The state is cooperating with Dakota Gasification Company on a test burn of old tires in their facility. If the test burn proves positive, this could become a major option for disposal of old tires. The state and local governments and private enterprises should also cooperate to eliminate the "box burner" type incinerators whenever another viable option such as recycling exists. Box burner incinerators are energy users, and cost the State in the form of inspections and enforcement.

Currently, 85 to 90 percent of the MSW produced in the state is landfilled. As of January 1993 there were 42 permitted operating MSW landfills across the state. The new federal and state regulations governing the location, design, operation, monitoring, and closure of MSW landfills will have a profound affect on the number of landfills continuing to operate in the state as well as the amount of waste to be managed by landfilling. The new regulations will substantially increase the cost of operation of MSW landfills and consequently make alternative methods of waste management more attractive. It is expected that after 1993 there will be 13 operating MSW landfills in the state. On a statewide basis landfill capacity should not be a problem. The facilities expecting to continue operation provide better than twenty years of disposal capacity for all the MSW generated in the state. There are isolated areas of the state where disposal capacity is of some concern such as Districts 3 and 4 where there is one landfill expected to continue operation with limited capacity. However, those districts are addressing the situation at this time. Inert waste landfills and waste transfer stations will continue to play a large part in controlling costs for MSW management.

Municipal solid waste is currently being managed effectively and economically statewide, however, solid waste management in North Dakota is changing. Municipal solid waste management is going to be a very dynamic process in the next year. Citizens, the private sector, and all levels of government will need to work cooperatively if solid waste is to be safely and economically managed. Education is most important in this endeavor. We all must make every attempt to inform ourselves and others of the reasons for effective waste management, the options

available for effective waste management, and how to evaluate and implement any of the options.

I. INTRODUCTION

A. Content and Purpose of Plan

The 1991 North Dakota legislature passed new solid waste management legislation dividing the state into eight solid waste management districts which were to submit comprehensive solid waste management plans to the NDSDHCL for approval. Each plan must include the district's ability to properly manage and plan for adequate disposal capacity, accessibility and waste flow control. The purpose of the planning process was to familiarize local political subdivisions and waste management professionals with the often complex issues of solid waste management, form a consensus on locally acceptable options, and find cost-effective and environmentally sound solutions to solid waste management. The Department was charged with incorporating all district solid waste management plans into a comprehensive statewide solid waste management plan. The legislation further encouraged the following goals for solid waste management in the state:

- ▶ By 1995 at least a 10 percent reduction in volume of municipal waste deposited in landfills.
- ▶ By 1997 at least a 25 percent reduction in volume of municipal waste deposited in landfills.
- ▶ By 2000 at least a 40 percent reduction in volume of municipal waste deposited in landfills.

The broad definition of solid waste in the State Century Code includes any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

Solid waste is subdivided into categories by origin and by characteristic in state law and rules. Categories by origin are agricultural waste, yard waste, municipal waste (includes household garbage), commercial waste, industrial waste, and special waste. Categories by characteristic are hazardous waste, regulated infectious waste, putrescible waste, and inert waste.

Hazardous waste management is regulated under a separate section of law and rules and a different program than municipal solid waste. Hazardous waste management was not required to be addressed in this plan or the development of the district plans although some communities and districts are addressing the household quantities and unregulated small quantities of hazardous waste that are commonly disposed in municipal solid waste landfills. The other categories of solid waste were addressed in the district plans where applicable and have been included in this plan. The district plans and this plan deal primarily with municipal solid waste (MSW) management although MSW landfills may commonly receive varying amounts of many categories of waste.

Because of limited resources, no study was made of the composition of the state's waste stream. For planning purposes, it was assumed North Dakota's waste stream is similar in volume and composition to the 1986 national average cited by Franklin and Associates in a 1988 report to EPA. The materials and the percent by weight of the total waste stream for various materials is as follows:

- 41.0% - paper and paperboard
- 17.9% - yard waste
- 8.7% - metals
- 8.2% - glass
- 8.1% - rubber, leather, textiles, and wood
- 7.9% - food wastes
- 6.5% - plastics
- 1.6% - miscellaneous organic wastes

It was assumed the average waste generation rate was 4 pounds per person per day.

This plan was developed based on publicly available information and information available in the district solid waste management plans as well as observations and information compiled at public meetings around the state during the development of the district plans. This plan is intended to be primarily a working plan. It is the state's blueprint for handling solid waste for the next five years. Some of the components of the state's plan include:

- ▶ A broad description of the state's geology, hydrology and demographics as it relates to solid waste management.
- ▶ A history and current state of solid waste management in North Dakota.
- ▶ An analysis of integrated solid waste management practices in the state and how these practices can achieve the state's waste disposal reduction goals.
- ▶ An action plan which discusses different waste management practices, how they can be implemented, why they are needed and hurdles standing in the way of this achievement.

A number of problems are identified in this plan. Many, but not all, have recommendations to correct them. Therefore, there will be a need for future solid waste management planning. In fact, with the advent of the *RCRA Subtitle D Regulations* in October 1993, solid waste management planning will be an evolving dynamic process for the next several years.

B. History of Solid Waste Management Planning in North Dakota

Until the 1970s, solid waste management in North Dakota had been handled at the local level with each individual community having its landfill or dump at the edge of town to handle disposal of its own wastes. Changes began to occur in the 1970s with the inception of the federal Resource Conservation Recovery Act (RCRA) and corresponding state requirements to

upgrade the operation of open dumps to sanitary landfills. The Solid Waste Management and Land Protection Act (the State Act), which is Chapter 23-29 of the North Dakota Century Code, was adopted by the 1975 session of the State Legislature and has subsequently been amended in the 1981, 1983, 1987, 1991, and 1993 sessions. The Solid Waste Management Rules, which are Article 33-20 of the North Dakota Administrative Code, were first promulgated in July 1976. These rules remained unchanged until December 1, 1992 when revisions became effective. The revisions were due primarily to additional requirements of the amended State Act in the 1991 Legislative Session. The amendments to the State Act were due primarily to requirements of the amended Subtitle D of the Federal Solid Waste Disposal Act.

As a result of the new federal and state legislation, in the mid-1970s, 106 open dumps were closed, a number of landfills consolidated and approximately 85 sanitary landfills were permitted under the 1975 State Act. This was the beginning of regionalization of landfills in the state. The number of sanitary landfills operating under a solid waste permit increased to 110 in 1987 as open dumps were upgraded to sanitary landfills, but the number has been declining since then. The decline is a result of actions of the NDS DHCL to close or upgrade those landfills in hydrogeologically unsuitable sites, the expansion of service areas of operating landfills to include other cities, and the recognition of some cities that closure will avoid higher costs of compliance with increasingly stringent regulatory criteria. As of January 1, 1993, approximately 42 landfills were operating under solid waste permits. There are also some open dumps operated by some smaller cities with populations of less than 200 people.

Post RCRA solid waste planning activities in North Dakota have included the completion in January 1981 of the Solid and Hazardous Waste Management Plan for the State of North Dakota. In May 1989, the North Dakota Waste Management Task Force completed a "Final Report on Municipal Waste Management Issues in the State of North Dakota." In December 1989, the NDS DHCL, in cooperation with the Waste Management Task Force, prepared "A Proposed Plan for Solid Waste Management in North Dakota."

The 1991 North Dakota legislative session passed House Bill 1060 providing for substantial solid waste management directives in the state and at the local level. Provisions included in House Bill 1060 are:

1. A public education program on integrated solid waste management.
2. Rules governing solid waste management, solid waste management facilities financial assurance, and district solid waste management planning.
3. The establishment of eight solid waste management districts.
4. Landfill operator certification requirements.
5. A requirement for environmental compliance background reviews for applicants of solid waste management permits.

6. A demonstration by the generator of solid waste from outside the state to have an effective program for waste quality control and waste characterization.
7. A prohibition on landfill disposal of lead-acid batteries, used motor oil, major appliances, and untreated infectious waste.
8. Preconstruction site reviews for any proposed landfill site and site suitability assessments for existing landfills operating as of July 1, 1991 by the State Water Commission, the State Geological Survey and the North Dakota State Department of Health and Consolidated Laboratories.

The provisions of House Bill 1060 were tailored to help North Dakota citizens find locally acceptable solutions to the broad changes envisaged in the then proposed Federal *RCRA Subtitle D Regulations*. House Bill 1060 established eight regional solid waste management districts which follow the lines of the existing regional planning councils (Figure 1).

More information on the solid waste planning program will be presented later in this plan.

C. The Future of Solid Waste Management in North Dakota

Solid waste management nationwide has evolved to an integrated management system combining a hierarchy of approaches to best handle portions of the waste stream. Integrated solid waste management in North Dakota is in its infancy. The waste management hierarchy of source reduction, recycling, combustion with energy recovery and landfilling is beginning to be addressed statewide through the efforts of solid waste planning mandated by the 1991 legislature as well as the efforts of numerous community groups. At this time, approximately 85 to 90 percent of all solid waste generated in the state is landfilled. There are a number of reasons for the disproportionate amount of landfilling of solid waste in the state, including sparse population over a large geographic area, instability of some recyclable commodity markets, and distance to markets, but perhaps the single biggest reason for landfilling waste in North Dakota is that it has historically been inexpensive.

Solid Waste Management in North Dakota is going to be an extremely dynamic process for the next several years. With the upcoming effective date for the *RCRA Subtitle D Regulations*, many landfills will be closing leaving many more North Dakota communities with the prospect of hauling their garbage to a regional landfill. It is anticipated there will be no more than 13 municipal solid waste (MSW) landfills operating in the state after October 9, 1993.

The increased cost of waste disposal resulting from increased requirements for landfills will result in the closing of many of the landfills across the state and the resultant regionalization of waste management. As the cost of landfilling increases alternative forms of waste management become more attractive. The recently completed district solid waste plans indicate that landfilling will continue to be a primary method of handling

solid waste disposal, but greater emphasis will be placed on reducing the amount of waste generated, recycling and composting those wastes which can be, and possibly combustion with energy recovery of some waste in the state. One thing consistent through all district plans is the paramount importance of education programs to further integrate solid waste management in North Dakota. In fact, in the short term, the future of solid waste management in North Dakota could be summed up as "**education.**"

II. EXISTING CONDITIONS IN NORTH DAKOTA

A. Demographics

The 1990 Census data shows the population for the state of North Dakota at 638,800. This is a 2.1 percent loss of population from the 1980 Census. To obtain an impression of population impacts on waste management, we need to look at population distribution within the state. North Dakota is comprised of 53 counties encompassing 70,665 square miles. In the last 10 years, six counties experienced a population growth, all other counties lost population. All counties in the state but one experienced net out-migration. As of the 1990 Census, there were 366 incorporated cities in the state. The largest city in the state has a population of approximately 74,000. There are eight other cities with populations of 10,000 or greater and three additional cities with populations of 5000 or greater. A breakdown of the 366 incorporated cities by population is included in Table 1.

Table 1. North Dakota Cities by Population.

<u>Population</u>	<u>Number of Cities</u>
<200	183
200 - 500	80
500 - 1000	51
1000 - 2000	30
2000 - 5000	10
5000 - 10,000	3
10,000 - 25,000	5
over 25,000	4

The six eastern most counties of the state, those bordering Minnesota, contain 35 percent of the state's population. From a population density standpoint, the six eastern most counties contain an average of 28.3 persons per square mile. The remaining 47 counties contain an average of 6.6 persons per square mile.

The Institute for Business and Industry Development at North Dakota State University in Fargo has developed population projections for the state through the year 2010. These projections are shown in Table 2 and should be regarded cautiously as they are only as accurate as the assumptions on which they are based.

Table 2. North Dakota 1990 Population and Projected Population for 1995, 2000, 2005 and 2010

					Percent Change
<u>1990</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>1990-2000</u>
638,800	630,705	618,150	604,446	591,896	-3.2

Overall, rural cities and counties have lost the most population and are projected to continue to have the largest population declines.

B. Economics

North Dakota's economic base is in primarily five sectors: agriculture, federal government outlays, manufacturing, tourism, and energy. The state's economy is dominated by agriculture (34%), federal activities (34%), and energy (21%). Manufacturing (7%) and tourism (4%) are less dominant sectors of the economy but are the areas targeted and poised for growth.

Historically, the state has relied to a large extent on agriculture and the energy industry for its economic well being, particularly in the rural areas of the state. Because these industries experienced difficult times in the 1980s, the rural areas of the state subsequently experienced difficult times. Many of the reasons for these industries' difficulties go beyond the state's boundaries. There are currently excesses in both agricultural commodities and energy due to over-production in the '70s and '80s as well as both industries being greatly affected by international competition and federal policies.

The decline in rural economy leads to a pattern of fewer rural jobs and services, rural population declines, and the economic disparity between the rural and urban areas of the state just continues to grow. Yet there are some areas of encouragement in the state. There is growth in the manufacturing and tourism sector employment, growth of telecommunication-based services, and additional opportunities for service and retail employment created by population growth in the state's metropolitan areas. Multi-community or local government cooperation on service delivery can prove to be more cost effective in the more sparsely populated rural areas of the state.

C. Geology

Most of North Dakota north and east of the Missouri River was covered by glaciers several times during the Ice Age. As glaciers flowed over the preglacial surface as recently as 10,000 years ago, they picked up and transported large quantities of rock and soil. When the glaciers melted, the materials contained in the ice were dropped on the ground completely changing the shape of the North Dakota landscape. Glacial sediments reach a total thickness of up to 750 feet in central North Dakota.

As the glaciers melted and receded northward, a variety of landforms were left in their wake. Large valleys known as meltwater trenches, examples of which are the James, Souris, and Sheyenne River valleys, were left as water flowed from the melting glaciers. Large irregular, hummocky areas having water-filled potholes were left as "dirty" ice melted and slumped. As clean ice (ice with less debris on its surface) melted, a gently rolling surface known as the "glaciated plains" developed. In other areas, the ice pushed large amounts of material along with it leaving especially hilly land near the glacier margins. In still other areas, large glacial lakes formed as the glaciers melted and receded northward damming melt water behind them. As the lakes eventually drained away, broad, flat poorly drained fertile lake floors such as is characteristic of the Red River Valley remained on the surface.

In contrast to the glaciated areas of the state, southwestern North Dakota south and west of the Missouri River is part of the Great Plains, a broad area that slopes gently eastward away from the Rocky Mountains. Southwestern North Dakota's geological formations consist mainly of layers of siltstone, sandstone, and clay interbedded with layers of lignite coal and scoria. As opposed to the glacial sediments, these sediments were deposited tens of millions of years ago.

The landscape through this area is almost entirely a result of erosion with the shape of individual landforms being the result of the differences in resistance of the near surface materials to erosion by wind and running water. The main reason for the differing landscapes between western and eastern North Dakota is that erosion has been occurring much longer in the unglaciated parts of western North Dakota than in glaciated areas in the east; several hundreds of thousands of years in the west as opposed to tens of thousands of years in the east.

D. Hydrology

To understand the occurrence and availability of groundwater in any area a general knowledge of the geology of the area is necessary.

Generally, groundwater in North Dakota can be found in two major rock types; the unconsolidated rocks or glacial sediments and the soft bedrock formations underlying the glacial or surface sediments. Even though the earth beneath the state is saturated with water at some depth some formations yield much larger quantities than others. Both the quantity and quality of water that can be obtained at any given location vary greatly across the state. Aquifers in the unconsolidated rocks or glacial sediments are generally more productive and yield less mineralized water than those in the bedrock. Useable groundwater in the bedrock formations occurs mainly in the beds of sandstone and lignite.

The unconsolidated glacial sediments which contain the most productive aquifers in North Dakota are loose sediments of sand and gravel primarily deposited as a result of flowing glacial meltwater, glacial lake beaches, and delta formations. Water readily moves through these porous deposits some of which are tens of square miles in area and as much as 100 feet thick. The aquifers commonly are linear in shape with tributary branches

and resemble surface drainage systems. Major aquifers may yield from 50 to 500 gallons per minute. Away from the major aquifers, water is available in many places within the glacial sediments but in smaller quantities, generally 10 gallons per minute or less. These minor aquifers consist of thin, isolated beds of sand and gravel that seem to have a random distribution both horizontally and vertically. Minor aquifers occur in such sufficient numbers in the glaciated areas of the state that wells with adequate yields for domestic need can generally be drilled within the confines of a farmstead.

More than 60 percent of the people in the state use groundwater for some purpose. For most farm families and their livestock, groundwater is their only source of water. Many small towns and cities also rely on groundwater as their source of supply. Across the state, county-by-county evaluations indicate good potential for groundwater development particularly in the glaciated region of the state north and east of the Missouri River.

Because of the great variability in the hydrogeology across the state and the need to protect groundwater resources, the state has established guidelines for hydrogeologic investigations of solid waste facilities. The guidelines, based on the state rules, describe the minimum scope of work for hydrogeologic investigations of solid waste landfills and establish some consistency between investigations conducted at different landfills.

E. Climate

The climate of the state is characterized by large annual, daily and day-to-day temperature changes, light to moderate precipitation tending to be irregular in time and coverage, low relative humidity, plentiful sunshine, and near continuous air movement. While most of the state has a semi-arid climate, portions of the eastern part of the state are subhumid. Annual precipitation ranges from less than 13 inches in the northwest to more than 20 inches in parts of the Red River Valley and southeast. Approximately 50 to 60 percent of the annual precipitation falls in the four month period from April through July, while 75 percent occurs in the six month period from April through September.

III. EXISTING SOLID WASTE MANAGEMENT SYSTEMS IN NORTH DAKOTA

The Guidelines for Solid Waste Management Planning in North Dakota asked all district boards to evaluate the existing solid waste management systems within their district. The district plans focus primarily on the existing and future management of municipal solid waste (garbage), however, the plans do address the existing management of other solid wastes including industrial wastes and special wastes (fly ash, bottom ash, oil field drilling cuttings, etc.).

Special wastes in the state are for the most part associated with the energy industry. Oil and gas industry wastes resulting from oil exploration are generally disposed on the drilling site and are regulated by the North Dakota Industrial Commission. Wastes hauled away from the drilling site as well as oil field waste from production and storage are usually handled in special use

landfills primarily in the production area. Oil and gas waste from the refining process is handled at industrial waste landfills. Coal mining and electric generating industry waste is handled in special waste landfills usually near the power facility. Other manufacturing industrial waste is handled at industrial waste landfills or codisposed with municipal waste in a MSW landfill. Industrial waste may be codisposed in an MSW landfill if it amounts to less than or equal to ten percent by month of the weight of the municipal waste, except that the accumulated amount of industrial waste must not exceed 20,000 tons per year or 3000 tons in any one month. There are a number of agricultural processing plants in the state whose waste is handled onsite at special waste landfills or other local MSW facilities.

Appliances, lead acid batteries, and used motor oil are no longer allowed in landfills as of July 1, 1992. Lead acid batteries are now required to be accepted in trade at any business which sells them. A number of communities or businesses are now providing collection centers for used appliances or used motor oil. The materials are then further processed through scrap dealers or used oil brokers.

The disposal of unrinsed pesticide containers and agricultural chemical residues in landfills and open dumps has been one of the most serious hazardous waste problems in the state. Educational efforts by the Department and the Department of Agriculture have helped improve the proper rinsing of containers. In addition, a major chemical manufacturer has begun to collect rinsed plastic pesticide containers for recycling.

There are approximately 1300 tons of MSW generated per day in the entire state of North Dakota, 85 to 90 percent which is disposed in landfills. Other than waste oil, minimal amounts of waste are incinerated for volume reduction, and/or medical waste management. Yard waste composting, ranging from very simple programs to very sophisticated programs is growing in popularity. There is also a limited amount of recycling taking place in the state currently centering around three major recycling centers with several smaller localized or city-wide programs. The existing integrated MSW management system is discussed below.

A. Waste Reduction and Reuse

Waste reduction and reuse, the highest solid waste management priority, is not an easily categorized waste management technique. Waste reduction simply means creating less garbage. Waste reduction can be achieved in several ways:

- ▶ By decreased consumption;
- ▶ By reusing products and materials;
- ▶ By increasing the durability of products; and
- ▶ By reducing the resources used to develop and market products.

Besides reducing total volumes of waste, waste reduction principles can also be important in reducing the toxicity of the waste stream by reusing toxic materials (i.e. paint, solvents, etc.) and buying only what you need. Product and material reuse is second nature to many state residents, second hand or thrift stores are prevalent throughout the

state. The district plans did not document any established waste reduction programs, however, pilot programs have begun to educate North Dakota consumers of the importance of reducing the volume and toxicity of the waste produced. The Department has conducted workshops and has guidelines available on waste reduction and reuse. Enviroshopping is a program sponsored by North Dakota State University Extension Service educating consumers to shop smartly by avoiding excessive packaging. The cities of Bismarck and Fargo have participated in waste exchange programs promoting the wise use rather than disposal of household hazardous waste. The District 2 Solid Waste Board has initiated a household hazardous waste education program throughout their district.

Waste reduction at the source is primarily a result of education of how goods are produced and sold and how and what consumers buy. Educating people, businesses, and institutions to change prevailing attitudes and habits can contribute significantly to reducing total volumes of waste or toxicity of the waste stream. A simple practice such as not collecting grass clippings can significantly reduce the 20 percent average amount of yard waste in the waste stream. Since all the district solid waste plans emphasized the importance of education in solid waste management, the future for waste reduction programs in the state looks promising.

B. Composting

Currently there are no MSW composting facilities operating in the state. Composting of yard waste, however, is widespread across the state and increasing. Composting by citizens can be done simply in the back yard. If done properly, composting will not create odors or increase vectors. Some cities have had to rescind ordinances banning backyard composting. Yard waste management at the community level may be as simple as a local landowner picking up separated yard waste at the community drop-off sites or at the landfill and directly applying it to fields or as sophisticated as the state of the art yard waste composting facility at the city of Fargo, composting over 5,500 tons of yard waste annually.

Most major cities and a large number of smaller cities are currently managing yard wastes separately from other MSW either through composting or direct field application. Some problems have occurred when composting yard waste is not turned often enough or surface water is not controlled, thus generating odors and contaminated surface water. Cities need to be cognizant of basic composting processes.

C. Recycling

Though recycling in the state is best described as being in its infancy, it has made tremendous strides in the last three years. A number of regional processing facilities and community processing facilities have opened in the last several years, providing many cities greater accessibility to recycling. A listing of the known recycling collection and processing facilities across the state is included as Appendix A.

State residents are interested in recycling and will voluntarily promote programs advancing recycling efforts. However, the actual and perceived

problems faced by the recycling industry nationally also affects the industry here in North Dakota. North Dakota may have more pronounced or unique challenges in recycling compared to other areas due to our large geographical area, small population concentrations, and longer distances to end markets for recyclable commodities.

Finding reliable, consistent end markets for recyclables is the largest problem facing recyclers across the country. A few recycling programs around the state began collecting recyclables without having established reliable end markets only to find their recyclable materials become merely segregated trash. The startup of several major regional recycling centers have to an extent addressed the problem. Successful programs in smaller cities can get their recyclables to a regional facility which collects materials in sufficiently large quantities to take advantage of economics of scale in transportation and marketing. However, the difficulty of finding reliable, consistent markets for some commodities (plastics and glass), the remoteness of the state to established end markets, and the resultant costs of transportation places a marketing burden on even the regional processing facilities in the state. Consequently, the transportation of commodities from small towns or cities to regional processing facilities must be efficient for recycling to succeed.

Contamination of recyclables is a problem here and around the country. The full range of recycling options are employed in the state, from city-wide curbside collection, to city-wide, remote, unmanned drop-off boxes, to centralized manned drop-off locations. By far, curbside collection and manned drop-off locations provide for the least contamination of recyclables and consequently a more cost-effective marketable product. On the plus side, contamination is a problem which can be readily addressed and overcome through education programs. North Dakotans are by nature helpful and will do whatever they can to make something succeed. Our challenge is to educate people of the importance of separating their recyclables and of the damaging effects of contamination.

Another stimulus for recycling, volume-based disposal fees, or charging citizens directly for the amount of waste they dispose rather than charging the same amount to every household is becoming more popular in the state. Currently a number of communities in the southeastern part of the state have implemented volume-based disposal fees. Four of the solid waste districts proposed implementing volume-based disposal fees as a goal in their plans. This issue was addressed at public meetings in every district across the state as a fairness issue as much as a waste management tool. Volume-based fees in conjunction with an education and recycling program may be the most effective means of promoting waste reduction and recycling.

The 1991 Legislature established another tool which will significantly help recycling in the state. House Bill 1061 established the State Solid Waste Management Fund to provide for grants and low interest loans for development of markets for recyclable products, waste reduction, planning, and resource recovery projects. The Fund is accumulated from a monthly fee on residential and commercial waste disposal accounts. The grants or

low interest loans are available to any political subdivisions in the state.

Another organization which may help recycling in the state, the Mid-Continent Recycling Association, has recently been organized. This organization is a group of six states and two provinces to cooperatively market recyclables and attempt to establish end markets for recyclables within the region.

Encouraged by the 1991 legislative assembly, recycling of lead acid batteries now takes place statewide. The same legislation also banned landfill disposal of used appliances and used motor oil. The Department maintains a listing of companies recycling these materials and has promoted programs statewide. Consequently a number of communities now offer services to recycle these materials. Used appliances are commonly collected at city municipal or inert waste landfills or scrap metal yards and stockpiled separately for pickup by a regional scrap metal processor. The recycling of appliances has proved to be very popular throughout the state. Cities must be aware to charge a processing fee to anyone disposing of an appliance containing chlorofluorocarbons (CFCs.) By federal law, CFCs are required to be collected from old appliances before recycling or disposal. Trained personnel with specialized equipment must collect CFCs from old appliances before recycling. Such processing typically entails a modest fee for the service. Used oil is currently being collected by some cities and counties at landfills or city or county equipment maintenance shops. The used oil is then reprocessed through an oil jobber or burned for energy recovery. Additionally, members of several private industries (oil companies) provide drop-off locations for used oil from do it yourselfers at their local service centers.

One other problem waste which has had limited success in recycling and which needs further attention is old tires. Stockpiling of tires, often illegally, is practiced throughout the state and out of state companies facing more stringent tire programs in other states have attempted to haul tires into North Dakota for stockpiling. Currently, old tires are allowed to be landfilled in the state; however, landfilled tires do not bury easy, take up valuable space, and tend to surface over time. Some communities collect money up front for tires and then pay to have them transported to and recycled by processors operating in Minnesota. The recently enacted Intermodal Surface Transportation Efficiency Act (1991) requires the use of recycled rubber in pavements financed all or in part by the U.S. Department of Transportation. Given the law's requirements for inclusion of 20 percent recycled rubber in asphalt by the year 1997 and the number of federally financed road miles paved each year, this is a potentially huge market for scrap tire rubber. Scrap tires also contain an appreciable amount of oil which represents a potential energy source with proper processing.

D. Incineration and Energy Recovery

As indicated by the district solid waste plans, a minimal amount of waste incineration occurs around the state. There are no mass burn MSW incinerators currently operating in the state. Incinerators operating

currently are primarily for volume reduction at large volume combustible waste producers, particularly cardboard box burners at supermarkets or for combustion of infectious waste. Burning waste oil as fuel and burning scrap wood and other high BTU wastes for energy also occurs on a small scale in many areas. Recovering energy from clean burning high BTU wastes should be encouraged.

The state is currently in the process of sponsoring a tire test burn at the Dakota Gasification Company plant near Beulah, ND. The test burn will involve evaluating the performance of the gasification plant when burning 50 tons of shredded tires in place of the normal lignite coal fuel. If this process works well, it could provide an optional use for all used tires in North Dakota and surrounding states.

E. Landfilling

Landfilling is by far the major method of solid waste management in the state. As of January 1993, there were 42 licensed operating MSW landfills in the state (Figure 2). Of these, 13 were privately owned and operated and 29 were municipally or governmentally owned and operated. Table 3 shows a breakdown in the size of the currently operating facilities.

Table 3. Current MSW Landfill Distribution by Size

<u>Operating Size of Facility</u>	<u>No. of Landfills</u>
>250 tons per day	3
100 to 250 tons per day	3
20 to 100 tons per day	8
less than 20 tons per day	28

The 42 currently operating MSW landfills are geographically widespread across the state as evidenced by Figure 2. Table 4 shows the geographical distribution of the currently operating MSW landfills by Solid Waste Management Districts.

Table 4. Current MSW Landfill Distribution by District

<u>District</u>	<u>No. of Landfills</u>
District 1	3
District 2	5
District 3	6
District 4	6
District 5	4
District 6	4
District 7	10
District 8	4

Of the currently operating 42 MSW facilities, 12 have had extensive site suitability assessments completed. Eleven sites have indicated they definitely will upgrade their facilities to meet the design and operating requirements of the federal rules.

There is currently a large number of inert waste landfills across the state. These landfills are designated to take inert waste which means nonputrescible solid waste which will not generally contaminate water or form a contaminated leachate. Inert waste does not serve as a food source for vectors and includes but is not limited to construction and demolition material such as metal, wood, bricks, masonry and cement concrete, asphalt concrete, tires, tree branches, bottom ash from coal fired boilers, and waste coal fines from air pollution control equipment. Compliance with North Dakota Solid Waste Rules for inert waste landfills while improving in recent years, is relatively poor. A number of sites operate as open dumps.

As more small communities close their MSW landfills because of the new regulations, the well run inert waste landfill could become an important cost saving tool in the total price of solid waste management. By segregating inert waste and disposing of it locally in an inert waste landfill, the amount of waste to be transported to a regional MSW landfill can be reduced substantially. While the design, monitoring, and closure requirements for inert waste landfills are much less complicated than for an MSW landfill, a community must be aware of the minimum standards and requirements to keep these facilities an effective part of the total MSW management scheme or the facilities can pose obvious health and environmental problems.

There are also a number of waste transfer stations permitted and operating primarily in the eastern part of the state. As the number of open dumps and smaller landfills decreased in the late '70s and '80s, a vast, widespread network of private waste haulers emerged around the state. This waste hauling network greatly facilitated the initial regionalization of waste disposal providing nearly every city of the state a viable alternative to their own city dump for disposal of their solid waste.

IV. GOVERNMENT ROLES AND RESPONSIBILITIES IN MUNICIPAL SOLID WASTE MANAGEMENT

A. Federal Government

The Resource Conservation and Recovery Act of 1976 (RCRA) is the foundation at the federal level for the responsible management of the nation's waste. MSW is regulated under Subtitle D of RCRA. The primary goal of Subtitle D is to encourage solid waste practices that promote resource conservation, maximum reuse of resources, and environmentally sound disposal methods.

The long-awaited amendment to Subtitle D was published October 9, 1991 in the Federal Register. A new Part 258-Criteria for Municipal Solid Waste Landfills will have a profound affect on the future operation of MSW landfills in the state.

Any landfills that received municipal solid waste after October 9, 1991 are subject to the final cover requirements specified in the federal rules. There is a delayed effective date for the remaining criteria listed in the amended federal rules. Any MSW landfill receiving waste after October 9, 1993 must comply with all requirements of amended Part 258 with some minor exemptions. The major requirements listed in Part 258 include location restrictions, operating criteria, design criteria, groundwater monitoring and corrective action requirements, closure and postclosure care requirements, and financial assurance criteria. A partial exemption to the rules, which may have applicability in North Dakota is termed the small facility exemption. This provides that owners or operators of new or existing facilities or lateral expansions, which dispose of less than twenty tons of MSW per day based on an annual average, are exempt from the design criteria so long as there is no evidence of groundwater contamination from the existing facility and it serves a community that has no practicable waste management alternative and the facility is located in an area that annually receives less than or equal to 25 inches of precipitation. There are also other flexibilities available in some sections of the federal criteria to states which have an approved program for implementing MSW permitting deemed adequate by EPA pursuant to Section 4005 of RCRA.

Other federal statutes that affect MSW management include the Clean Air Act, which requires combustion facilities to meet source performance standards that limit emissions of air pollutants; and the Clean Water Act which requires facilities discharging surface water to use the best available technology to control discharges and obtain a permit to discharge. The provisions of the Clean Air Act, the Clean Water Act, and the Safe Drinking Water Act are administered at the state level for compliance monitoring and enforcement.

B. State Government

The NDS DHCL has the responsibility for the administration and enforcement of the State Solid Waste Management Program. The Waste Management Division of the Environmental Health Section is the specific division administering the Solid Waste Program. Current State Law governing MSW management is North Dakota Century Code Chapter 23-29. The corresponding rules promulgated for MSW management are included in North Dakota Administrative Code Article 33-20.

In addition to administering the Solid Waste Program in the state, other powers and duties of the Department particular to MSW management include:

1. Provide technical assistance on request to political subdivisions of the state and others and cooperate with appropriate federal agencies in carrying out the duties of solid waste management.
2. Encourage and recommend procedures for the utilization of self-financing solid waste management systems and intermunicipal agencies in accomplishing the desired objective of solid waste management.

3. Promote the planning and application of resource recovery facilities and systems which preserve and enhance the quality of air, water, and all resources.
4. Serve as the official state representative for all purposes of the Federal Solid Waste Disposal Act [Pub. L. 89-272; 79 Stat. 997; 42 U.S.C. 3251 et seq.], as amended, and for other state or federal legislation to assist in the management of solid wastes.
5. Survey the solid waste management needs within the state and maintain and upgrade the North Dakota solid waste management plan.
6. Require any person or combinations thereof within the state to submit for review and approval a solid waste management plan to show that solid wastes will be disposed of in accordance with the provisions of North Dakota State Law.
7. Adopt and enforce rules governing solid waste management, in order to conserve the air, water, and land resources of the state; protect the public health; prevent environmental pollution and public nuisances; and enable the Department to administer this chapter, the adopted solid waste management plan, and delegated federal programs.
8. Establish the procedures for permits governing the design, construction, operation, and closure of solid waste management facilities and systems.
9. Prepare, issue, modify, revoke, and enforce orders, after investigation, inspection, notice, and hearing, prohibiting violation of any of the provisions of this chapter or of any rules and regulations issued pursuant thereto, and requiring the taking of such remedial measures for solid waste management as may be necessary or appropriate to implement or effectuate the provisions and purposes North Dakota State Law.
10. Adopt rules to establish categories of solid waste and solid waste management facilities based on waste type, facility operation, or other facility characteristics.
11. Adopt rules to establish standards and requirements for each category of solid waste management facility.
12. Adopt rules to establish financial assurance requirements to be met by any person proposing construction or operation of a solid waste management facility sufficient to provide for closure and postclosure activities. Financial assurance requirements must include any or all of the following: insurance, trust funds, surety bonds, letters of credit, personal bonds, certificates of deposit, and financial tests or corporate guarantees.
13. Conduct an environmental compliance background review of any applicant for any permit requested after July 7, 1991. In conducting the review, if the Department finds that an applicant for a permit

has intentionally misrepresented or concealed any material fact from the Department, or has obtained a permit by intentional misrepresentation or concealment of a material fact, has been convicted of a felony or pleaded guilty or nolo contendere to a felony involving the laws of any state or the Federal government within three years preceding the application for the permit, or has been adjudicated in contempt of an order of any court enforcing the laws of this state or any other state or the federal government within three years preceding the application for the permit, the Department may deny the application. The Department shall consider the relevance of the offense to the business to which the permit is issued, the nature and seriousness of the offense, the circumstances under which the offense occurred, the date of the offense, and the ownership and management structure in place at the time of the offense.

The State Water Commission and the North Dakota Geological Survey assist the Department in preconstruction site reviews for solid waste disposal facilities. They also review permit applications for the hydrogeological assessment and monitoring proposals and make recommendations to the Department.

Currently the State Engineer and State Geologist offices are involved in a site suitability review of all existing MSW landfills within the state. By July 1, 1995, the review of all the existing landfills should be complete and reports provided to the Department for use in site improvement, site remediation, or landfill closure.

Two other state agencies have programs that have benefitted waste management in North Dakota. The Office of Intergovernmental Assistance (OIA) co-sponsored the 1991 Solid Waste Symposium, sponsored a 1992 Waste-to-Energy Symposium, and has provided grants to a number of waste-related projects in the state. The North Dakota Department of Agriculture administers "Project Safe-Send" which collects unusable agricultural chemicals for proper disposal.

C. Solid Waste Management Districts

The 1991 North Dakota Legislature passed a number of amendments to NDCC 23-29. One of the amendments divided the state into eight solid waste management districts. The districts originally had the same boundaries as the regional planning councils across the state; however, the legislation provided flexibility for any political subdivision to opt out of a district into another if the board of each district approves the change.

Each of the solid waste management districts has a governing board consisting of one representative from each county within the district, one representative from the cities within each county in the district, one representative from a licensed disposal facility, and one representative of the waste haulers within the district. The political subdivision representatives must be appointed by the subdivisions involved. The waste hauler and disposal facility representatives are selected by the political

subdivision members of the board. Effective in August 1993, cities with a population exceeding 10,000 must be represented on the boards.

Each solid waste management district is charged with developing a comprehensive solid waste management plan for the district. The plan is to include the district's ability to properly manage and plan for adequate capacity, accessibility, and waste flow control. The plan must take into consideration existing waste transportation patterns and the ability of existing landfills to handle solid waste. All MSW in the district except that exempted from State Law (individuals may dispose of their own waste on their own property if unplatted and/or unincorporated so long as no health hazard is created) must be managed at solid waste management facilities identified in the district's solid waste management plan.

The solid waste management districts are an opportunity to manage solid waste concerns at the local level. With the coming changes in landfill design and operating criteria, a number of landfills are going to be closing in the next several months, particularly small landfills. Consequently, regionalization of waste management is becoming more of a reality. The cost of waste disposal is increasing due to more environmental safeguards and longer transportation distances to disposal facilities. The district solid waste boards could help temper the increasing costs of waste disposal by working collectively for the economics of a region. Also, in some cases, the ability to locate new landfill sites is limited due to geologic or social factors; thus, conservation of landfill capacity is a key element in solid waste planning. The solid waste management districts through education can help minimize the amount and toxicity of waste disposed and plan for new solid waste management facilities if necessary.

The district plans were completed and submitted to the Department in January of 1993. It is anticipated that the district plans will need to be amended on a regular basis. The district plans are meant to be a blueprint for the district to handle its waste and because of the dynamic nature of waste management, the plans will, by necessity, be updated and amended as need be.

D. Counties, Townships, and Cities

Rising awareness of integrated waste management is apparent throughout the state; however, with the ever-changing nature of solid waste issues and of governmental bodies, political subdivisions should encourage careful ongoing evaluation of solid waste systems. Task forces, study groups, and the solid waste planning process can be instrumental in fostering awareness and consensus. Informed and open-minded decision makers are a key to ensuring efficient and effective waste management systems for the state.

Counties

Chapter 11-11-14 of the NDCC provides for county commission boards to establish a garbage and trash collection system encompassing all or any part of the county. The words "garbage and trash collection system

include the operation and maintenance of one or more sanitary landfill sites or other types of processing sites for the disposal of trash and garbage. The board may borrow money by issuing certificates of indebtedness. The expenses of establishing the operation and maintenance of a solid waste system may be financed by fees charged to persons receiving direct benefits or by special assessment against the parcels of land properly charged therewith.

Few counties in the state have chosen to provide for a garbage and trash collection system within their county. Only three of the 53 counties currently provide for a solid waste management system. Of these three, it is expected that only one will continue to operate a solid waste system on its own. Some counties have provided for county equipment and personnel to aid small communities in developing, maintaining or closing inert waste landfills.

Other county roles in solid waste management are in the areas of enforcement of illegal dumping and zoning for waste handling or waste management facilities. With the anticipated regionalization and increased waste disposal costs in North Dakota, it is expected the incidence of illegal dumping in the state will increase also. The majority of the illegal dumping unfortunately takes place in rural areas. Consequently, counties may expect to spend increased time, money and effort policing and enforcing littering and illegal dumping. It also may be beneficial for counties, particularly those within each solid waste district, to adopt and uniformly enforce ordinances dealing with illegal dumping.

Many counties across the state have already adopted land use zoning plans for the lands in the county. These plans generally zone all the land within a county for a variety of purposes, predominantly agriculture. Generally, for counties with zoning, any variations from the zoned purpose of a land use needs to be approved by the county commission. In this manner, the county has a mechanism for orderly development within its boundaries. The 1993 North Dakota Legislature passed legislation requiring counties to have zoning in-place to deal with proposed solid waste management facilities before July 1, 1994.

Townships

Another local level of government, which may have a role in solid waste management, is township government. Township governments operate primarily in the eastern and east central areas of the state. There is very little organized township government in western North Dakota. Currently, no townships own or operate waste disposal facilities and it is not anticipated any townships will do so. However, townships do get involved in solid waste management through local ordinances, zoning, and in coordinating local waste management services. Many of the organized townships in eastern and central North Dakota have zoning ordinances in-place dealing with land uses within their boundaries. Townships can play an important role in ensuring rural areas have "drop box" or dumpster locations for rural waste disposal. Similarly, rural recycling services could be provided by township governments.

Cities

City Governments are by far the driving force in solid waste management in the state. Of the currently operating 42 landfills in the state, 13 are privately owned and operated, three are owned and operated by the county government, three are operated by a group of cities joined together as a public corporation or under a joint powers agreement to form an authority and 23 are owned and operated by individual cities. Furthermore, it is expected that of the 13 landfills which will continue operating after 1993, two will be owned and operated by Indian tribes on reservation lands, three will be privately owned and operated, one will be county owned and operated and seven will be city-owned and operated. The reason for this is obvious; a city of 10,000 or more is a population center in the state. As such, and with the significant distances between population centers, most cities over 10,000 find it economically practical to maintain their own waste disposal system. In the case of smaller cities, if not maintaining a MSW disposal facility, they may maintain an inert waste facility or serve as the contracting agent with a private hauler to provide garbage collection services for their city. Many cities now maintain ordinances dealing with solid waste management ranging from littering ordinances to a ban on landfilling yard waste in MSW landfills. Some cities are providing or cooperating in providing recyclable material collection and processing facilities or yard waste composting facilities. It is expected that city governments will continue to be most centrally involved in solid waste management.

E. Solid Waste Authorities

Another governmental entity which currently has and may continue to have a role in solid waste management, are solid waste management authorities. Under North Dakota Century Code, political subdivisions may join together under a joint powers agreement to form an authority to carry out a responsibility or provide a service they each may do individually. There are currently at least three solid waste authorities operating in the state. These authorities are groups of cities who have organized to own and operate a collection and disposal system. It is not expected that any of these existing authorities will continue to function in operating an MSW disposal facility; however, they may continue for the operation of a collection and transfer system, inert waste landfills, and recycling services. It is anticipated that solid waste authorities may continue to function within the state. All of the political subdivisions in Solid Waste Management District 3 are currently forming an authority to own and operate a disposal facility within the district. This appears practical for the district since it is uncertain that any of the existing disposal facilities in the district will continue operation past 1993. Solid waste management authorities may become more practical in other solid waste districts as disposal facilities fill and the districts collectively look for new disposal options.

F. Native American Tribes

There are five Native American reservations in the state of North Dakota. All tribes were invited by NDS DHCL to participate in the district solid

waste planning process prior to the districts' development of their solid waste plans. The level of participation in the planning process has been variable.

Tribal governments are required to comply with the federal standards set forth in the Resource Conservation and Recovery Act, Subtitle D. While state and local governments do not have any jurisdiction for solid waste management on reservation lands, the Environmental Protection Agency, the Bureau of Indian Affairs and Indian Health Services are working with the tribes to coordinate their solid waste management activities. The Department has always indicated a willingness to work with the tribes for mutual benefit. The regional solid waste districts will also continue to coordinate with tribal governments to seek solutions to recycling and waste disposal issues.

V. STATE SOLID WASTE MANAGEMENT PLAN

This section is a compilation of the district solid waste management plans. It includes the districts' proposals for an integrated solid waste management system. Some of the proposals are already in place. Many of the proposals are going to take a commitment and coordination at the state and local government level to implement. Many of the proposals will not be easy to implement, if only because they constitute a change from how things are currently done. All of the proposals enumerated in the district plans are achievable.

Several of the district plans were much more aggressive than others in studying and proposing waste reduction and recycling initiatives. Some district plans proposed to simply provide for the most economical waste management system for the district without much analysis of waste management options. It is hoped that options which have been researched and proposed in some districts may be applicable and proposed in other districts across the state. Those which appear practical statewide will be recommended in this plan.

This plan is intended to be an action plan. It is the state's blueprint for handling solid waste for the next 5 years. Like the district plans, it is expected this plan will need to be amended regularly. Solid waste management will be an extremely dynamic process in the next several years with the implementation of new federal and state solid waste management rules.

A. Reduction Plan

One state goal is to reduce to the fullest extent the amount and toxicity of waste to be further managed or disposed. This can only be achieved by everyone practicing waste reduction. There are many factors which enter into effective waste reduction, and the means to reduce waste is unending, limited only by one's imagination. The one single factor which can most affect waste reduction is EDUCATION. Everyone should have a role in waste reduction as part of everyday life. For this to happen, prevailing attitudes and habits need to change. Education is essential.

There is a general lack of understanding about what individuals can do to prevent waste from being generated in the first place. Simple acts such as not bagging grass clippings on homeowners lawns so the clippings return to the soil as fertilizer could save state residents over a million dollars per year. There is also, in some instances, a lack of available alternatives, such as reusable packaging, bulk products or waste exchanges instead of disposal. Manufacturers have perceived or real expectations that consumers social and cultural values favor convenience, time savings and newness in products. Individuals need to understand they can do much to affect their own waste generation directly as well as indirectly affecting manufacturers packaging decisions. Consumer buying habits can affect product packaging and durability more than government directives or mandates.

In addition to individual initiatives, the private sector and government can play significant roles in waste reduction. Businesses can change packaging practices, using less packaging or more reusable, recyclable packaging. Government can set an example in waste reduction through purchasing and operating procedures. Local governments can evaluate and where appropriate implement volume-based disposal fees. Again, perhaps the most significant thing government can do to contribute to waste reduction is to provide educational programs and opportunities for both individuals and the private sector.

Solid Waste District Waste Reduction Plans & Roles

All of the district plans recognize the importance of a continuing education effort. Seven of the eight districts proposed that within the next year they sponsor a solid waste conference within their area. Additionally, five of the eight districts intend to maintain a reference library of solid waste management issues for use by the district. Several districts propose to develop or help develop solid waste lesson plans for use in all grade levels. These worthwhile educational projects merit consideration by all of the districts statewide.

Two waste reduction proposals in several district plans were banning of yard waste from MSW landfills and volume-based disposal fees. With the decreasing number of MSW landfills available statewide after 1993 and the expected higher disposal costs, it is expected that yard waste disposal in MSW landfills will be voluntarily reduced. The major cities which continue to operate landfills either have in place or plan to have in place yard waste composting mechanisms in the near future. The smaller cities and towns which will haul their waste to a regional landfill will not want to pay for hauling and disposal of yard waste when it can be composted locally. In addition to community programs, many homeowners compost yard waste at their own homes. Many simply do not collect grass clippings. While it is widely recognized by solid waste officials that yard waste has no place in landfills, a ban on disposal of yard waste in landfills should be considered to help local officials and waste haulers address this problem.

Volume-based waste disposal fees, proposed in four of the district plans, along with appropriate waste education can be extremely effective in

promoting waste reduction and recycling. Volume-based fee systems are currently in place in several cities around the State, usually in connection with recycling programs. This topic will be addressed later in this plan in connection with recycling.

The solid waste management districts, in cooperation with the local city and county governments of the districts, could also coordinate waste exchanges around the district. This could help greatly in reducing the amount of toxic waste ultimately being disposed.

State Government's Role in Waste Reduction

State government as a whole must show an active role in promoting waste reduction as well as using recycled materials. A number of state entities have taken steps in this direction. Senate Bill 2049, passed during the 1993 legislative session, requires the state Office of Management and Budget in consultation with the NDSDHCL to prepare and submit to the governor and legislative council a comprehensive solid waste management plan that assesses the ability to reduce the solid waste it generates and increase the amount of recycled products it uses. The Office of Intergovernmental Assistance (OIA) has provided educational grants to several entities to promote waste reduction and recycling.

Since 1991 the NDSDHCL has employed a staff person to develop and disseminate educational materials to encourage voluntary municipal waste reduction, source separation, reuse of materials, recycling efforts and appropriate management of municipal waste. The Department has developed or accumulated a large volume of educational materials available either free of charge or on loan. The Department has sponsored or co-sponsored state solid waste symposiums in 1990, 1991, and 1993 and has participated in a number of teacher training sessions. In addition, Department staff are available to assist communities in educational forums or programs.

Other valuable sources for further public education in solid waste management is the North Dakota State University (NDSU) Agricultural Extension Service. The NDSU Extension Service has prepared a variety of printed educational material on solid waste management. In addition, the Extension Service has added lists of recyclers, materials taken, areas served, and related solid waste management activities to its computerized extension information network. This information is available to anyone through the county extension offices located across the state.

B. Recycling Plan

The North Dakota state legislature has established the goal of reducing the volume of municipal waste disposed in landfills by 40 percent by 2000. This can be done to some extent by reducing the amount of waste generated, which is difficult to measure. To a much greater extent, this goal will be met through recycling whatever possible in the waste stream.

There is some recycling activity in all regions of the state, however, by far Regions 4, 5 and 7 have had the greatest success. Primarily this is due to the existence of major recyclable material processing facilities

located in these regions along with actions of local citizen groups, businesses, city governments, and the news media. Recycling, often symbolized by a loop made up of three arrows, includes collection of materials, processing of recyclables to make a product, and subsequent use of the product. Failure of any of the three steps impedes recycling.

Collection methodologies vary greatly across the state. Truly there is no magic method for establishing a recycling program. What will work varies from community to community. For the most part, the smaller communities in the state rely on a drop-off center somewhere centrally or conveniently located within the community. Experience has shown the materials are usually better segregated and cleaned if the drop-off center has an attendant onsite who can provide people with proper directions for preparing and separating materials. Currently, one of the larger cities in the state has a city-wide curbside recycling program. Several other cities are either doing curbside on a small scale basis or contemplating curbside recycling at this time.

Whatever the collection method, collection of recyclables has not been the major problem in implementing a recycling program for many of the cities. In fact, a number of entities have been very successful at collection and now have buildings full of recyclable material. Two major issues encumbering recycling in North Dakota are how to consolidate materials within the state to provide for marketable quantities and the economics of marketing recyclables from North Dakota. The consolidation of recyclable commodities within the state is a difficulty which can and should be addressed within each solid waste district. The difficulty of establishing and maintaining reliable markets is something to be addressed statewide, regionally and nationally.

Processing of materials to make products is limited in North Dakota. There are no steel mills or aluminum plants, no glass or plastic plants using recyclable materials and no large scale paper processing facilities. There is an insulation manufacturer in Fargo who uses a relatively small amount of newsprint. Some investigation is being made to determine the feasibility of shredding newspaper for animal bedding. A company in Moorhead, Minnesota shreds tires for fuel or other products. An egg carton from a newsprint plant is also being built in Moorhead.

The district plans included the following goals and objectives regarding recycling in their districts.

- ▶ District 1 - Goal is to encourage the increase of recycling by government, individuals and corporate citizens to recycle all solid waste possible. Specifically, to do this the district encourages a district-wide task force to study recycling, support the existing recycling programs and encourage the coordination of efforts when possible. The city of Williston's recycling center provides the most extensive full service recycling in the district. This program recently was recognized by the district as the program to accept and consolidate recyclable commodities from the district. The Williston program is currently working with a local recycling processor in their

district and a major recycling processing facility in Bismarck to get their materials to market.

District 1 also encourages the establishment of a statewide training program for local recycling program coordinators and would support any efforts to work with entities to develop end markets for recyclable materials within the district.

- ▶ District 2 - Goal is to assist communities in any manner possible with the coordination of a recycling program. Specifically, the district would research the development of feeder programs to funnel the low quantities of recyclables generated in the region into a network of collection centers to consolidate the materials. Currently there are several community recycling collection centers in the district. These programs market their products through regional processing centers in District 7. There are also several aluminum can redemption centers and large scrap metal dealers operating in the city of Minot. The district also wants to encourage businesses and individuals to purchase recycled products.
- ▶ District 3 - Goal is to provide solid waste disposal and recycling to all areas of the district. Specifically, the district is pursuing a paper baling and/or pelletizing project to provide for alternative uses for all paper products within the waste stream. The only identified community recycling collection program in the district is the city of Devils Lake. They market their materials through a recycling processing facility in Grand Forks.
- ▶ District 4 - Goal is to provide recycling opportunities to the district in the course of providing an integrated solid waste management system. The district takes the position that private enterprise should provide these services wherever possible; however, in the rural areas of the district, it is difficult to accumulate marketable quantities of recyclables. A private company, Recyclers Protecting Nature (RPN) operates in Grand Forks as a regional recycling processing facility. Having the existence of a regional processor like RPN provides an outlet for smaller communities within the district to get their materials to market.
- ▶ District 5 - Goals include: (1) completion of a waste characterization study for the district; (2) involve every city in the district in recycling; (3) obtain equipment for shared use by smaller communities in the district to help in recycling; (4) provide household waste exchange centers in the region; (5) enact local government procurement policies on recycled products; (6) carry out research on how to recycle waste into useful products through local universities; (7) involve all major businesses, industries, schools, colleges, and hospitals in recycling; (8) develop an integrated educational program on recycling for the district; and (9) achieve volume based waste disposal fees in the district. Specifically, the district is very well situated to provide for marketing of recyclables having two private entities now providing collection, processing, and marketing services of recyclables.

Minnkota recycling in Fargo is a full service regional processing and recycling center providing service to the city of Fargo and surrounding area. Minnkota has developed a variety of collection programs for North Dakota and Minnesota cities including rural drop-off sites, community collection sites, and municipal curbside programs. Northern Waste Systems Inc. (NWSI) is a regional waste hauler operating in southeast North Dakota. In conjunction with waste hauling services, NWSI provides recycling collection services to its customers. Northern Waste Systems Inc. is located in Wahpeton.

The district proposes to provide regional household waste exchange centers in each of the six counties of the district by 1994. Working with the regional recycling centers, the district hopes to provide recycling pickup for all cities designated in their district plan by 1994. Local governments will be encouraged to have procurement policies for recyclable materials in-place by 1995. The district hopes to provide collection centers for used tires, white goods, and used motor oil to serve district needs by 1995. And the district working with the local political subdivisions hopes to have volume based pricing for waste collection in-place district-wide by 1996.

- ▶ District 6 - Goal is to continue support of the existing recycling programs in the district, assess the waste stream within the district, develop a practicable program to consolidate recyclable materials in the district and implement volume based disposal fees district-wide by 1995. The district is not currently served by a regional recycling center, however, 4R's Recycling in Carrington is providing processing services to Carrington and some surrounding communities.
- ▶ District 7 - Goal for recycling involves developing programs to recycle materials with low collection costs and high marketability. The district proposes to coordinate recycling efforts through the district to effectively consolidate recyclable material from the fifty communities in the district to eight sub-regional recycling centers. In addition, the district is fortunate to have two recycling processing facilities operating within the district. Jesz Recycling in Turtle Lake serves a number of smaller communities throughout the district. Dietrich Sanitary Services, Inc. is a regional recycling processing facility located in Bismarck and serving several districts within the state. The district is encouraging political subdivisions to adopt volume based disposal fees to help encourage recycling.
- ▶ District 8 - Goals include forming a task force with a coordinator to organize a total regional recycling program. This would include designating the city of Dickinson as the hub of District 8 recycling and establish sub-regional sites around the district to consolidate recyclable materials. The district hopes to research markets and transportation costs to evaluate a cooperative marketing system. Also, the district intends to promote educational and informational programs on the methods and benefits of recycling.

In addition to the aforementioned goals, those districts which do not have an existing regional collection and processing facility within their boundaries suggested that they might need to investigate marketable outlets for recyclable products. All the districts recognize the importance of educating and informing the public and businesses of the method and benefits of recycling.

Recommendations for Action

Clearly, if the state is going to meet the legislative goal of 40 percent reduction of volume of waste disposed in landfills by the year 2000, recycling is going to play a major role in meeting that goal. Recycling in North Dakota is currently driven by the private sector and will probably continue to be. However, there are some things which the solid waste districts and local and state government can do to facilitate collection and marketing of recyclables.

Local Government Role

Local governments can enhance recycling and hold down waste disposal costs by educating citizens and businesses of the benefits of efficient waste management. Local governments and citizen study groups can and should work cooperatively between each other and the private sector to consolidate recyclable materials. There may be areas of the state where additional regional recycling processing facilities can profitably exist; however, in absence of those, by using existing recycling processors to market materials, communities can avoid investments in equipment, staff, buildings, etc., to process, store, and develop the out-of-state markets which are final destinations for most recyclable materials. To make it most economically advantageous to work with regional processing facilities, communities need to work together to consolidate the smaller quantities of recyclables they generate into more accessible central locations for more efficient processing and marketing. Most regional processing facilities in the state are currently operating well below their capacity and are willing to work with communities to find a suitable arrangement to handle their recyclables.

Perhaps the most beneficial thing local governments could do to enhance recycling is to implement volume-based disposal fees. Volume-based fees, or paying proportionately for the amount of waste disposed, enhances waste reduction, recycling, and composting efforts, extends landfill life, and is perceived as being more equitable. It is important that before implementing volume-based disposal fees, a community have in-place an effective education and recycling program. The issue of fairness in waste disposal fees was addressed in every district. In light of the impending increased costs for disposal services, the cost of those services for the elderly or those on fixed incomes was a matter of concern. Coincidentally, these people for the most part generate a relatively small amount of garbage. It is practical that those who generate more garbage and use more landfill space should pay more for disposal services. If volume-based fees are to be considered at the local level a number of issues must be considered including billing concerns by haulers,

resistance to change, increased illegal disposal, and the overall cost of the system.

Local governments can also enhance the recycling of used appliances and motor oil. If private scrap dealers are not available, cities can ensure that locations, either at their landfills or elsewhere are available to stockpile used appliances. On a regular basis a scrap metal processor can collect and transport the materials for recycling. Cities should be aware to charge a fee for disposal to collect any chlorofluorocarbons in appliances containing those refrigerants. Many Amoco service stations and Jiffy Lube centers across the state will now take used oil from do it yourselfers who change their own oil. The city or county should provide or ensure there is good access to used oil collection locations which could be serviced on a regular basis by used oil jobbers.

Finally, local governments can enhance recycling by examining their procurement policies to buy recycled products whenever possible. Buying products manufactured with recycled contents helps create the demand needed for stable markets.

Solid Waste Management District Role

The solid waste districts can play a crucial role in enhancing recycling by helping educate local governments, citizens, and businesses on the need to recycle, how to organize a collection program, how to prepare materials and how to enhance participation. The district can serve as an information clearinghouse for anyone within the district.

The districts can enhance recycling by coordinating the consolidation of recyclable commodities within the district. The economics of recycling for small communities hinges on efficient transportation of their materials to a processing facility. Most communities have a group or entity which can be the driving force for starting and operating a collection program and most communities have available some limited storage capabilities. The problem comes with smaller communities having to transport their recyclables great distances to a processing facility or the facility having to pick up small quantities of materials great distances away. Organization of sub-regional recycling centers within a district will take coordination between a number of communities and a regional recycling processor. The solid waste districts, being comprised of local multi-governmental entities, could assist in this endeavor.

Finally, the district, with the local governments, could serve as a focal point to develop end market processing plants for recyclable commodities within the district. It is very possible that given the available work force and excellent living conditions in the state, the development of end market processing facilities for a number of recyclable commodities could become a reality.

State Government Role

The 1991 Legislature established the State Solid Waste Management Fund to provide grants or low interest loans to political subdivisions for the

purposes of solid waste planning, development of recycling programs and/or markets and waste reduction and resource recovery projects. The fund, accumulated from a surcharge on residential and commercial waste collections, generates approximately \$1.2 million per biennium and is administered by the State Bank and the NDS DHCL. The first grants were approved from the fund in late 1992 for 13 recycling and education programs across the state. This fund can continue to provide a valuable source of seed money for education programs, development of sub-regional recycling centers, and hopefully, end markets for recyclables within the state. The 1993 legislature allocated a substantial portion of the fund for the 1994-1995 biennium to the State Geological Survey and the State Water Commission to complete landfill site investigations and to the NDS DHCL for educational programs. The NDS DHCL will solicit grant and loan applications to the fund on a yearly basis.

The NDS DHCL is also developing and disseminating educational materials to encourage waste reduction, recycling, and appropriate management of solid waste. This program has developed a number of materials which are available from the Department upon request. Additionally, Department personnel are available for public presentations or help in developing community programs.

The state is currently involved in the organization and development of a Mid-Continent Recycling Association (MCRA). MCRA was formed to develop programs to improve market access and price availability and stability for recyclable materials. The experience of recyclers across the region has often been that costs of shipping materials to buyers were unacceptable or the prices paid for materials were unpredictable or no buyers could be found for the materials. To address these problems, a group of state and local government representatives, and private recyclers from six states and two provinces formed a task force in January 1992 to develop plans for a regional marketing association. The resultant association, MCRA, was organized April 15, 1993 at an organization meeting in Bismarck, ND.

MCRA is composed of members from Manitoba, Saskatchewan, Minnesota, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. The mission statement of the organization is *"to foster regional cooperation and coordination in development of recycling, including markets, market research, formulation of policies, marketing of recyclable materials and procurement of recycled products."* MCRA is not intended to take the place of any local or state organization already in-place to enhance marketing or market development. Rather it can enhance the economic viability and profitability of recyclers by networking individual recyclers and their organizations. Eventually, if possible, the Association could act as a facilitator for siting of recyclable processing plants within the region.

Finally, state government can enhance recycling by examining procurement policies to buy recycled products whenever possible.

C. Incineration or Waste to Energy Plan

Recovery of energy from wastes with high BTU content such as wood, waste oil, rubber, and other materials is practiced on a limited scale

throughout the state; however, rising disposal costs and increased awareness may encourage additional development and utilization of wasted fuel resources.

Currently there are no MSW incineration facilities in operation in the state. There are a number of infectious waste incinerators operating statewide and a number of small incinerators operating to reduce volume of a combustible material, mainly "box burners" at supermarkets and department stores.

There are no immediate plans in any of the district plans to develop MSW incineration or waste to energy facilities; however, both Districts 4 and 5 have included the possibility of an incineration, waste to energy or refuse derived fuel facility in their future.

Most of the land in Districts 4 and 5 is not well suited for landfill disposal of solid waste. The eastern part of the districts, the Red River Valley, is characterized by high water tables in poorly drained soils. While the soils contain fair amounts of clay, the water tables present a problem in landfill operation. West of the Red River Valley are the beach deposits of the glacial Lake Agassiz. The beach deposits are characterized by light soils, silty sands and gravels, and high water tables which are not conducive to sanitary landfill operations. Further west high water tables, extensive wetlands, and/or soils overlying fractured bedrock or glacial aquifers limits suitability of much of the land for landfills.

There is a higher population density in these two districts relative to the remainder of the state. The ten counties in Districts 4 and 5 contain 38 percent of the state's population and generate approximately 40 percent of the state's solid waste.

The largest population center in District 4, the city of Grand Forks is currently in the process of evaluating future waste management options. The city projects having about seven to eight years of available disposal capacity at their existing landfill and anticipates their waste flows will increase in late 1993 as they become a regional facility. The city has contracted with a consultant to review all their available solid waste options and expects a report by late 1993.

While MSW incineration/waste to energy may be considered by some to be an easy solution, some obstacles need to be addressed. High startup costs, concerns on air pollution, the disposal of ash which may contain heavy metals, and finding a year around market for the energy are often problems facing such proposals. Some types of refuse-derived fuel appear easier to handle and burn cleaner than mass-burn facilities. Separating the clean-burning fractions reduce citizen concerns on pollution and ash disposal.

The state is currently cooperating with Dakota Gasification Company near Beulah, ND to do a tire test burn in the company's coal gasification facility. If the test burn proves successful, this would provide another disposal option for used tires.

Recommendations for Action

It appears from some of the district plans that waste to energy incineration or refuse derived fuel projects may be viable solid waste management options in some areas of the state. The state will neither discourage nor encourage these types of facilities. The decision to proceed with this type of project will be a local or district decision based on an economic and environmental analysis of the options. In North Dakota, such fuels will find competition with readily available fuels such as coal, oil, and natural gas.

At minimum, all areas of the state should investigate recovering energy from clean-burning waste materials. Wood waste, waste motor oil, paper, biomass, and even tires can be cleanly burned if systems are set up to segregate, process, and recover energy from such materials.

With regard to the existing volume reduction incinerators or "box burners," private industry, local governments, the solid waste districts, and the state should work together to eliminate this type of incineration whenever practical alternatives are available. Corrugated cardboard is a recyclable commodity. Whenever possible, when a recycling collection center is available, every attempt should be made to recycle this commodity. Box burners are currently inspected by the Environmental Engineering Division of the NDS DHCL to see that the unit is operating efficiently. There are few controls on box burners, many or most are located within city limits at supermarkets and all are energy consumers, burning natural gas or propane. If recycling options are available, box burners should no longer continue to operate.

D. Landfill Disposal and Waste Transportation Plan

Landfilling of solid waste is by far the prevalent method of disposal in the state. Of the 42 currently operating MSW landfills in the state, it is anticipated that 13 landfills will continue to operate after 1993. The recently published federal Subtitle D regulations adopt stringent criteria for the design, operation, and closure of landfills. Because most of these criteria apply to all facilities regardless of size (less than 20-ton per day landfills in very remote areas may be exempt from the design criteria) there is a resultant economy of scale in landfill operations. Operating small landfills in compliance with these regulations will be more expensive on a per unit of waste disposal basis than operating a large landfill. Accordingly, to provide for economic MSW disposal we can expect to see a regional approach to solid waste management.

A recent report by the Department of Agricultural Economics at North Dakota State University published in January 1993 titled "Estimating Optimal Landfill Sizes and Locations in North Dakota" addressed the issue of regionalizing waste management in the state. This project was to estimate through the use of a programming model, the number, location, and capacity of MSW landfill facilities that would minimize the sum of waste transportation and disposal costs for North Dakota communities. The results of the study show that by regionalization of waste disposal, the state could save substantial dollars, with most of the savings realized

by remote, sparsely populated counties. The basic problem of comprehending regionalized MSW disposal facilities is to recognize the trade-off between facility operation costs and transportation costs.

A result of regionalized MSW disposal will likely be an increase in the number of waste transfer stations across the state. Many communities are working together to own and operate a waste transfer station in conjunction with an inert waste disposal facility. Many other small communities will simply continue to be served by a local waste hauler who regularly picks up for the community on a scheduled route. The combination of these facets in cooperation with a waste reduction and recycling program can substantially reduce a community's waste disposal costs.

DISTRICT 1 WASTE DISPOSAL FACILITIES:

District 1 will be served by two MSW landfills, the City of Williston landfill and the McKenzie County landfill. Based on the waste generated in the district and imported to and exported from the district, it appears there is 30-40 years of landfill disposal capacity available to the district. The Northwest Solid Waste Council landfill in Noonan will be closing and the Council will develop a transfer station.

City of Williston Municipal Solid Waste Landfill

Facility Owner: City of Williston

Operator: City of Williston

Location: One mile east of city

Operation Status: Currently in the process of upgrading to meet Subtitle D design criteria.

Permitted Acreage: 40 acres

Estimated Operating Volume for 1993: 55 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 30 years (based on 1993 operating volumes)

McKenzie County Municipal Waste Landfill

Facility Owner: McKenzie County

Operator: McKenzie County

Location: N1/2, NE1/4, NE1/4 and NE1/4, NW1/4, NE1/4, Sec.36, T150N, R100W.

Operation Status: Operating under Subtitle D small facility exemption and state alternative design rules for less than 20 ton per day facility.

Permitted Acreage: 20 acres

Estimated Operating Volume for 1993: 8 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 50 years (based on 1993 operating volumes)

One additional landfill which will continue to operate within the bounds of District 1 is the Three Affiliated Tribes landfill on the Fort Berthold Indian Reservation in McKenzie County. The district and state do not have detailed operating information on this facility, since it is not under state jurisdiction.

DISTRICT 2 WASTE DISPOSAL FACILITIES:

District 2 will be served by two MSW landfills, the City of Minot landfill and the McDaniel landfill, a privately owned and operated facility. Based on the waste generation rates in the district and waste imports and exports, it appears there is 25-40 years of landfill disposal capacity available within the district. The cities of Bottineau, Kenmare, Mohall, Rugby, Stanley, and Harvey will be operating waste-transfer stations within the district.

City of Minot Municipal Solid Waste Landfill

Facility Owner: City of Minot

Operator: City of Minot

Location: 1/2 mile SW of city

Operation Status: Currently in the process of upgrading to meet Subtitle D design criteria.

Permitted Acreage: 160 acres

Estimated Operating Volume in 1993: 200 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 40 years (based on 1993 operating volumes)

HCS McDaniel Landfill

Facility Owner: Hjalmer Carlson Sanitation

Operator: Hjalmer Carlson Sanitation

Location: NE1/4, Section 24, T152N, R82W

Operation Status: Complies with EPA Subtitle D and state criteria for design and operation.

Permitted Acreage: 12 acres

Estimated Operating Volume for 1993: 100 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 25 years (based on 1993 operating volumes)

DISTRICT 3 WASTE DISPOSAL FACILITIES:

District 3 will not have any existing MSW landfills operating within the district after October 9, 1993. The district is currently in the process of organizing a district waste management authority for the purpose of owning and operating a waste disposal facility. The City of Grand Forks landfill in District 4 has indicated it would accept approximately one-half of the District 3 waste at its facility. Also, the HCS McDaniel landfill has indicated it would accept all of the District 3 waste at its facility. The City of Langdon currently operates a waste transfer station and the City of Devils Lake will have a waste transfer station as their MSW landfill closes.

DISTRICT 4 WASTE DISPOSAL FACILITIES:

District 4 will be served by one MSW landfill, the City of Grand Forks Municipal landfill. Based on the waste generation rates in the district and waste imports and exports it appears there is 6-8 years of landfill disposal capacity available within the district. Two joint powers authorities within the district which have been operating small landfills, the Valley Landfill Association and the Consolidated Landfill Ltd., will be closing their landfills and will be operating waste transfer stations.

The City of Grand Forks is currently working with a consultant to evaluate future waste management options for the city and the district. City officials have invited input from the remainder of the District. The district, as well as a number of political subdivisions surrounding the district are examining the possibility of forming a waste authority or other legal arrangement which allows for power sharing and district capacity assurance. The results of these discussions and the recommendations of the consultant will characterize the future waste management system in the district.

City of Grand Forks Municipal Solid Waste Landfill

Facility Owner: City of Grand Forks

Operator: City of Grand Forks

Location: 3 miles west of city on U.S. Highway 2

Operation Status: Currently in the process of upgrading to meet Subtitle D design and operation criteria.

Permitted Acreage: 160 acres

Estimated Operating Volume in 1993: 250 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 6-8 years (based on 1993 operating volumes).

DISTRICT 5 WASTE DISPOSAL FACILITIES:

District 5 will be served by two MSW landfills, the City of Fargo landfill and the Dakota Municipal Landfill, a privately owned and operated facility. Based on the waste generation rates in the district and waste imports and exports, it appears there is 40 years of landfill disposal capacity available within the district. The City of Wahpeton currently has a waste transfer station and the City of Mayville is considering a transfer station.

City of Fargo Municipal Solid Waste Landfill

Facility Owner: City of Fargo

Operator: City of Fargo

Location: Seventh Avenue N & 45th Street N, Fargo, North Dakota

Operation Status: Complies with EPA Subtitle D and state criteria for design and operation.

Permitted acreage: 160 acres

Estimated Operating Volume for 1993: 310 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 40 years (based on 1993 operating volumes)

Dakota Municipal Solid Waste Landfill

Facility Owner: USA Waste Systems, Inc.

Operator: Big Dipper Enterprises, Inc. (a North Dakota Corporation).

Location: Three miles North of Gwinner on Highway 32, then two miles west, then one mile south.

Operation Status: Currently in the process of upgrading to meet Subtitle D design and operation criteria.

Permitted Acreage: 30 acres

Estimated Operating Volume for 1993: 205 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 48 years (based on 1993 operating volumes)

NOTE: The current permit for the Dakota landfill authorizes 5800 cubic yards per month or less than 100 tons per day. The facility is currently operating beyond its permitted volume. Also, the estimated life span of the facility addressed in the plan is based on permitting more acreage than the currently permitted 32 acres

DISTRICT 6 WASTE DISPOSAL FACILITIES:

District 6 will be served by two MSW landfills, the City of Jamestown landfill and the Jahner Sanitation, Inc. Municipal Landfill, a privately owned and operated facility. Based on the waste generation rates in the district and waste imports and exports, it appears there is 25-30 years of landfill disposal capacity available within the district. The cities of Ellendale and LaMoure currently operate waste transfer stations and the City of Valley City is considering a transfer station.

City of Jamestown Municipal Solid Waste Landfill

Facility Owner: City of Jamestown

Operator: City of Jamestown

Location: E1/2, NE1/4, Section 36, T140N, R63W

Operation Status: Currently in the process of upgrading to meet Subtitle D design & operation criteria.

Permitted Acreage: 80 acres

Estimated Operating Capacity for 1993: 41 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 15 years (based on 1993 operating volumes)

Jahner Sanitation, Inc. Municipal Solid Waste Landfill

Facility Owner: Jahner Sanitation, Inc.

Operator: Melvin Jahner

Location: W1/2, NW1/4, Section 8, T132N, R72W

Operation Status: Currently in the process of upgrading to meet Subtitle D design and operation criteria.

Permitted Acreage: 120 acres

Estimated Operating Capacity for 1993: 20 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 50 years (based on 1993 operating volumes)

DISTRICT 7 WASTE DISPOSAL FACILITIES:

District 7 will be served by two MSW landfills, the City of Bismarck, landfill and the Sioux County landfill. Based on the waste generation rates in the district and waste imports and exports, it appears there is 30 years of landfill disposal capacity available within the district. Currently the city of Linton is the only city with a waste transfer station in the district. This transfer station is owned and operated by Jahner Sanitation, a private waste hauler operating in the area. However, as a number of smaller cities throughout the district close their existing landfills by October 9, 1993, a number of the cities may go to a waste transfer station.

City of Bismarck Municipal Solid Waste Landfill

Facility Owner: City of Bismarck

Operator: City of Bismarck

Location: NE edge of city limits

Operation Status: Currently in the process of upgrading to meet Subtitle D design and operation criteria.

Permitted Acreage: 40 acres

Estimated Operating Capacity for 1993: 180 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 30 years (based on 1993 operating volumes)

The Sioux County landfill is operated on the Standing Rock Indian Reservation. The district and state do not have detailed operating information on this facility, since it is not under state jurisdiction.

The district is examining the feasibility of using a reclaimed surface coal mine site as a future municipal waste landfill for District 7 and other waste districts. A feasibility study of the project has been included in the district's work plan for 1993-94.

DISTRICT 8 WASTE DISPOSAL FACILITIES:

District 8 will be served by one MSW landfill, the City of Dickinson landfill. Based on the waste generation rates in the district and waste imports and exports, it appears there is 40 years of landfill disposal capacity available within the district. Currently, there are no cities in the district operating waste transfer stations. However, as some of the smaller cities in the district close their existing landfills by October 9, 1993, some of them may operate waste transfer stations.

City of Dickinson Municipal Solid Waste Landfill

Facility Owner: City of Dickinson

Operator: City of Dickinson

Location: 2 miles east of city

Operation Status: Currently in the process of upgrading to meet Subtitle D design and operation criteria.

Permitted Acreage: 61 acres

Estimated Operating Capacity for 1993: 80 tons per day (based on 365 operating days per year).

Estimated Life Span of Facility: 40 years (based on 1993 operating volumes)

Several cities in the southwest of District 8 are investigating the option of transporting waste to an MSW landfill near Baker, Montana for disposal.

In many instances, waste from one district may be transported into another district for disposal. When waste is transported from one district to another, both district boards have acknowledged the waste movement in their district plans. Therefore, any district may be served by more landfills than those located within their district. Additionally, some landfills in the state may take waste from out of state sources as well as out of district sources. This is currently the case with the city of Grand Forks, the city of Fargo, the Dakota Landfill near Gwinner, and the city of Williston.

On a statewide basis, capacity assurance should not be a problem now. The state should have an average of twenty plus years of disposal capacity with the existing facilities. There are isolated areas of the state where disposal capacity is of some concern, such as Districts 3 & 4 where there is one landfill expected to continue operation with limited life expectancy. However, those districts are addressing the situation at this time. A proposal to increase the flow to the Dakota landfill near Gwinner may reduce the life expectancy of that site.

Currently in North Dakota MSW is transported up to 100 miles to disposal facilities. As the amount of long hauls increases in the future, there will be a number of communities operating waste transfer stations to take advantage of the economics to move large quantities of waste for long distances.

Inert waste landfills will also play a large part in controlling costs for MSW management. Many communities and possibly counties will maintain inert waste landfills for disposal of construction and demolition waste, yard waste, building materials, concrete, and asphalt. The NDSDHCL recently promulgated rules providing communities of less than 1000 persons to operate an inert waste landfill without having to apply for a permit if the facility complies with the inert waste landfill rules. The permit-by-rule provision does not exempt communities from the location standards for facilities as well as performance and design criteria for inert waste landfills. Communities or counties expecting to operate inert waste landfills should contact the NDSDHCL and familiarize themselves with the State Solid Waste Law and Rules.

Statewide, there has been some interest in the small facility exemptions or alternative designs provided for in the Subtitle D and North Dakota State Rules. Essentially, this provides for small facilities (accepting less than 20 tons per day) to be exempt from the design requirements of the federal and state rules. For facilities in North Dakota to qualify for the exemption, they must dispose of less than 20 tons of MSW daily based on an annual average, have no evidence of existing groundwater contamination, and serve a community that has no practicable waste management alternative. Additionally, the facility must be located in an area that receives less than or equal to 25 inches of precipitation annually.

To help address the federal regulation requirement of no evidence of existing groundwater contamination, the state requires geologic and hydrogeologic site assessments for existing and new or expanded disposal facilities. This is to help ensure that landfill facilities are sited in areas geologically and/or hydrogeologically suited to a landfill. It is questionable if a small facility exemption or alternative design could apply in the glaciated areas of the state. Due to the highly variable geology and hydrology in those areas, it is difficult to imagine an MSW landfill operation without a liner and minimal groundwater monitoring. In the unglaciated areas of the state, many areas have coal veins or permeable materials. A permit has been issued to McKenzie County to operate an alternative design (less than 20 tons per day) MSW landfill. The hydrogeologic assessment along with the minimum federal requirements can make the operation of a small facility expensive on a per ton basis.

Communities and small facility owners must understand that alternative designs or small facility exemptions do not relieve a small facility owner from the location restrictions, operating criteria, the closure and postclosure care criteria and the financial assurance criteria. In addition, a recent decision of the U.S. Court of Appeals ruled that even small landfills will have to do groundwater monitoring. Most communities with small landfills have determined that meeting these requirements is

proving to be overwhelming and cost prohibitive in many instances. Many landfills had a difficult time complying with the earlier rules in effect since 1976.

Recommendations for Action

Local Government and Solid Waste District Role:

Local governments must work together to provide for the most responsible and economical waste disposal system possible. Of the anticipated 13 MSW landfills to be operating in the state after 1993, three will be privately owned, one will be owned by a county and operated under the small facility alternative design, and seven will be city-owned and operated by the largest cities within seven of the eight districts. The solid waste issue is becoming another issue exacerbating the differences between large cities and small towns in the state. Small towns cannot, because of their limited waste, justify the costs of owning and operating an MSW landfill. Larger cities, because of the volumes of waste generated, are able to economically operate an MSW landfill. Small towns, besides having to pay greater transportation costs to get their waste to a regional disposal facility, in some instances, pay greater disposal costs at the disposal facility and, consequently, feel some frustration in controlling their waste disposal costs.

Large cities have either upgraded or are in the process of upgrading their facilities at the expense of their residents and do not want to lose control of their landfill. In some instances, such as in Districts 3 and 4, when the largest city in the district is in the process of looking for a new waste disposal facility, all the political subdivisions might investigate the formation of a waste management authority. This would at least provide all participants with equal disposal fees at the facility. In addition, large cities may need the cooperation of township and/or county governments, in the future, to site new disposal facilities. Small towns may find it beneficial to cooperate between themselves to develop inert landfills or transfer stations in conjunction with recycling collection centers. County government can be instrumental in providing equipment and personnel to develop, maintain, and close inert waste landfills within the county. Local governments also need to reflect the true cost for waste disposal services back to its constituents. Too often waste disposal costs have been subsidized or hidden in other areas of city or county budgets.

The solid waste management districts can provide for the local control of solid waste disposal and landfill capacity assurance. The districts can function in implementing equal procedures across the district whether they be comparable ordinances for illegal dumping, or volume based pricing or education programs on waste reduction and recycling. The solid waste districts can and should have a broad base of support having representatives of cities, counties, and private industry. They should be the mechanism for developing cooperation with the district.

There is a feeling at the local level within some districts that the solid waste management districts do not have a role in solid waste management other than to have developed the district plan. The authority of the solid waste districts is interpreted to be very limited. In many instances, the local levels of government have not supported the role of the Solid Waste District Board. There may be limited support for the

solid waste district both philosophically or financially. If this continues to be the case at the local level, the effectiveness of the solid waste districts will be limited.

State Government Role:

State government should allow for a waste disposal system as economically and environmentally sound, as practicable. State government, through the regulatory process, has a responsibility to protect the environmental resources (groundwater, surface water, air) and health of the state as legislatively mandated. State government also has the responsibility to work with the people of the state to provide every flexibility for the most economic system possible.

Comments made throughout the planning process across the state ranged from state government needs to be more flexible in applying solid waste rules, to the state needs to be more consistent in how it administers solid waste rules. Even though this sounds to be completely at odds, there may be some merit to both of these schools of thought.

There are many flexibilities available to facility owners and operators in the federal rules, if the state has an EPA approved program. The state is now in the process of getting a Federally-approved solid waste regulatory program. The state of North Dakota is extremely diverse geologically and hydrologically from east to west. Just as it is difficult implementing and applying Federal regulations to the diversity of states nation-wide, it is difficult applying those regulations within the state of North Dakota. Site assessment and design criteria need to be addressed on a site-by-site basis in the development of a facility in North Dakota. This can provide for maintaining the public health and environmental resources of an area while also providing for flexibilities which can affect the economics of any facility.

Blowing litter, disease-carrying vectors, and odors are characteristics which can apply to any solid waste management facility. In terms of basic location restrictions, operating criteria, closure and postclosure care and financial assurance, the state can be more consistent through enforcement in applying the rules to have facilities meet minimum functioning standards. Facilities need to understand if they cannot economically meet minimum functioning standards they should cease operation.

State government must work with local government to get current illegal dumps closed and to stop any proliferation of open dumping as the cost of waste disposal increases. In addition, state government will need to work with local government to see that facilities which will cease operation are properly closed to minimize future potential for groundwater contamination. As a result of the implementation of the new Federal and state solid waste regulations, many MSW disposal facilities will be closing shortly. Many of those facilities have little money available for proper closure of the facility and have no mechanisms to accumulate closure funds in this short time. One mechanism which may be helpful is the State Revolving Loan Fund. This fund can provide low interest loans

to communities to help cover closure costs of landfills. Additional information on fund availability and procedures for application can be obtained from the municipal facilities division of the Environmental Section of the North Dakota State Department of Health and Consolidated Laboratories.

State government must continue to educate local government officials, facility owners and operators, and the population on solid waste management. Raising the public's level of understanding of the possible effects on the environment and public health from solid waste disposal serves several purposes. It can increase support for waste reduction and recycling programs. It can provide information for the difficult choices which may have to be made such as siting a facility or implementing a program. It can also help the public understand the increased costs associated with the design, construction, and operation of a new waste disposal facility. In particular, the state must do a concerted effort to educate local government and the public of the value of properly maintaining an inert landfill. With the expected increase in inert landfill use, the proper management and operation of these facilities becomes increasingly important. State and local governments should educate the public of proper operation and maintenance of inert landfills.

VI. SUMMARY OF RECOMMENDATIONS FOR ACTION

The 1991 North Dakota Legislative Assembly set goals for solid waste management in the state through the year 2000. To meet these goals some specific recommendations have been generated in the district solid waste management plans. The recommendations summarized below have been listed earlier in this plan.

This state solid waste plan will be revised as necessary. With the expected revisions in district plans in the near future, it is anticipated revisions will be frequent in the next several years. Also, recommendations will be reviewed on a frequent basis to see which have been implemented and what progress is being made.

Education

- Every community, county, civic group, and business should take an active role in educating people by providing information, public forums, workshops, news articles, etc. on solid waste issues. Local governments should help form a consensus on solid waste issues by forming task forces or study groups to evaluate the various steps of integrated waste management.
- All levels of government and the private sector should cooperate in developing, implementing, and funding waste reduction, recycling, and composting education and information programs. Programs should focus on reducing amount of waste generated and toxicity of waste.

Waste Reduction

- Household hazardous waste exchanges should be available in all major cities in each district.
- Local governments should evaluate volume-based disposal fees to encourage waste reduction and recycling.

Recycling

- Communities and counties should see that recycling services are available to their citizens.
- All levels of government and the private sector should evaluate procurement policies which promote the use of recycled and recyclable materials. Retreaded tires, recycled paper, cloth towels, and other recyclable or reusable goods should be preferred over disposable or single use goods.
- The state should continue the solid waste management fund to promote development of end markets for recyclables as well as community and regional collection and processing programs.
- The solid waste districts, local governments, and businesses should coordinate the development of sub-regional recycling centers to consolidate recyclable commodities from small communities to better enhance marketability.
- Local governments should evaluate volume-based disposal fees in conjunction with effective education, composting, and recycling programs to provide effective alternatives to disposal.
- Recycling empty and rinsed pesticide containers should be encouraged by all levels of government in cooperation with the private sector.

Yard Waste Management and Composting

- All levels of government should strive to eliminate yard waste from the waste stream. Citizens should be encouraged to leave grass clippings on the lawn or to compost them and any leaves in a home compost pile or in a community compost project. Cities should consider having tree branches shredded for mulch rather than burying such materials.
- The state should continue to provide information on yard waste management. Regional training on yard wastes should be considered by the Department.
- A restriction or prohibition on the MSW landfill disposal of yard waste should be considered on both the local and the state government level.

Incineration and Energy Recovery

- State and local government and the private sector should eliminate small volume reduction or "box burner" incinerators whenever an alternative of recycling exists.
- Recovering energy from clean-burning waste materials should be a priority. Wood waste, oil, tires, and other high BTU potential fuels should be utilized for their fuel value if they cannot be reused or recycled.
- The state should continue to work with private entities to investigate utilizing tires as a fuel source.

Waste Disposal

- Citizens, governmental entities, and the private sector should be made aware of the actual costs of solid waste management. Government and solid waste management businesses should adopt rate structures to cover actual costs.
- Federal and state government should allow for all flexibility available in solid waste laws and rules while still maintaining public health and safety and environmental integrity.
- State and local governments should encourage public participation during all phases of the solid waste management planning and permitting processes.
- State and local governments and the private sector should work together to bring all disposal facilities into compliance with federal and state standards and eliminate all illegal open dumps through education and consistent enforcement.
- Local governments should work together to efficiently and economically coordinate, develop, and operate waste management facilities including inert waste landfills, transfer stations, and collection programs.
- Counties are encouraged to assist appropriate county residents on the operation of inert waste landfills, recycling programs, and MSW collection programs.
- Local governments and private waste management companies should implement programs to ensure that toxic and hazardous materials do not enter disposal facilities.
- The collection and proper disposal of unusable agricultural chemicals through the Department of Agriculture's "Project Safe-Send" and any other appropriate efforts should be continued and promoted.
- Solid waste management districts should plan for at least twenty years disposal capacity for the citizens of their district. Ensuring and preserving long-term disposal capacity assurance for North Dakota citizens

is essential to the continued development of North Dakota's economic base. Landfill capacity is a valuable resource.

- State and local governments should educate the public of proper operation and maintenance of inert waste landfills.

Ordinances and Enforcement

- The state should work with the political subdivisions to draft ordinances for consideration and enactment by county governments and any other interested political subdivision.
- Local governments should enact consistent ordinances dealing with zoning of solid waste facilities and illegal dumping of solid waste.

VII. NORTH DAKOTA SOLID WASTE MANAGEMENT - WHERE DO WE GO FROM HERE?

The citizenry of North Dakota appreciates and will pay for a clean environment. However, there is concern for the costs associated with meeting the increasing number of environmental mandates. The increasing costs for waste disposal were of major concern across the state. Federal and state government flexibility in administering the solid waste program, local government options such as waste reduction, recycling, and education can all help to control the cost of service to the consumer. With all these in place, however, costs will still go up. There was concern at many district meetings that with the decreasing number of disposal facilities, monopolies might occur which might necessitate some need for rate regulation in the garbage industry. There was also discussion of state ownership of disposal facilities within each district, thereby eliminating the possibility of monopolies. Neither the state plan nor any of the district plans advocate state ownership or rate regulation of the garbage industry.

The district and state solid waste management plans have examined the existing solid waste management systems across the state and looked to the future. The plans have identified some needed changes and improvements in both attitudes and solid waste management practices. The district plans or the state plan do not address all the issues relating to solid waste management in North Dakota. These are evolving plans and will need regular updates.

The next six months will be an extremely dynamic time in solid waste management in North Dakota as well as across the country. As facilities and communities make decisions to comply with impending legislation, waste management options will be reevaluated, waste flow patterns will be redirected, and facility operating capacities and lifetime capacities will change. As a result, district plans and the state plan will change.

Solid waste management in North Dakota is changing. Waste reduction and recycling will become increasingly important management options. The cost of solid waste management is going to increase. Governments and solid waste businesses must adopt and implement rate structures that reflect the true costs of solid waste management. Citizens and the private sector need to see how their actions can affect the true costs of waste management.

Citizens, the private sector, and all levels of government will need to work cooperatively if solid waste is to be safely and economically managed. Everyone must take a certain level of responsibility for the management of solid waste. If the current quality of the state's ground and surface water is to be maintained, if recycling is to be available statewide, if economic waste disposal is available, and if we hope to reach the goal of 40 percent reduction in the volume of waste deposited in the state's landfills by the year 2000, we must all cooperate.

Education is most important in this endeavor. We all must make every attempt to inform ourselves and others of the reasons for effective solid waste management, the options available for effective waste management and how to evaluate and implement any of the options. We must be responsible enough to not repeat and to correct any misinformation when encountered. It is a difficult job to simply provide everyone with accurate information on the encompassing issue of solid waste management, having to dispel misinformation only increases the difficulty and takes away time from productive education. If everyone understands solid waste management, we will more likely be willing to work towards constructive, realistic solutions.

Anyone using this plan is encouraged to send comments to the Waste Management Division of the North Dakota State Department of Health and Consolidated Laboratories. We welcome comments on making the plan more useable, issues which need to be updated, or additional information which should be addressed in the plan.

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