

**THE IMPLEMENTATION OF MUNICIPAL COMPOSTING  
IN THE STATE OF MONTANA**

**by**

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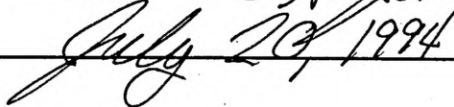
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## ABSTRACT

In 1991 the Montana Legislature passed House Bill 160 which set a state goal of 25% reduction in the volume of solid waste going into landfills by 1996. Location and population of a rural community are significant in the placement and life expectancy of a landfill. The rural communities' location and population also affect what kind and amount of inorganic and organic waste that will go into the landfill.

Presently, the guidelines are not organized for guiding municipalities in Montana toward a composting program which will be the most successful for their particular circumstances and needs.

This study reviewed publications on composting systems utilized throughout the nation to develop a list of common criteria that are indicative of a successful municipal composting program. This list of criteria was the basis for a survey distributed to municipal compost operators in four states; Montana, Idaho, Wyoming, and North Dakota. The operators rank ordered 19 criteria from most important to least important necessary for successful municipal composting programs.

The survey outcome indicates the level of agreement between the municipal composting operators and the results obtained from the review of literature. The results of criteria agreement may be viewed in TABLE 4.

The results of the criteria ranking from the review of literature and the criteria ranking from the survey are compared in TABLE 5. The findings of the two criteria rankings do not match for any of the criteria.

It is important to address state law to see if there are any areas of conflict that would nullify or lower the effect for any of the criteria that has been discussed. To accomplish this task, the pending Montana State Law on composting was reviewed as well as the surrounding states of Idaho, Wyoming, and North Dakota.

The findings of the two criteria rankings do not match for any of the criteria which clearly indicates that although a given criteria may have been widely discussed within literature numerous times, it does not mean that the given criteria is as important in practical application by municipal composting operators in cold rural environments such as Montana.

## CHAPTER I

### INTRODUCTION

On October 9, 1991 Congress promulgated revisions for landfill design, maintenance, and management in response to the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA). Each state is to further define these guidelines by producing specific criteria for implementing and monitoring requirements for landfills.

The actual planning and direct implementation of solid waste programs under Subtitle D, however, remain largely state and local functions, and the act authorizes states to devise programs to deal with state-specific conditions and needs.

These subtitle D criteria establish minimum national performance standards necessary to ensure that "no reasonable probability of adverse effects on health or the environment" will result from solid waste disposal facilities or practices. A facility or practice that meets the criteria is classified as a "sanitary landfill". A facility failing to satisfy any of the criteria is considered an "open dump" for purposes of state solid waste management planning. (EPA, 1991, p.50979)

In 1991, the Montana Legislature passed House Bill 160 (see APPENDIX E) which set a voluntary state goal of a 25%



reduction in the volume of solid waste going into landfills by 1996. The location and population of a rural community are significant in the placement and life expectancy of a landfill. The rural community's location and population also affect what kind and amount of inorganic and organic waste will go into the landfill.

The Environmental Protection Agency (EPA) has recorded that more than 25% of current landfill waste consists of biodegradable material. Composting is one viable solution for the partial reduction of buried landfill waste.

#### Statement of the Problem

Presently, the guidelines are not organized for guiding municipalities in Montana toward a composting program which will be the most successful for their particular circumstances and needs.

#### Purpose of the Study

The purpose of this study is to create a list of criteria necessary for developing an effective municipal composting program as a solid waste management strategy in Montana.

### Need for the Study

Simply viewing the contents of any landfill indicates how our nation has become accustomed to the convenience of disposable products. The availability and cheap cost of raw materials have created a wasteful use of natural resources by industry for the manufacturing and packaging of products. Current literature points out that corporations are working toward limiting waste by reducing the quantity of raw materials used for production. In some cases, this process may reduce the amount of compostable organic matter which ends up in landfills.

To discourage the amount of waste going into Montana landfills, the Montana Legislature of 1991 passed House Bill 160 that established a solid waste reduction target: "It is the goal of the state, by January 1, 1996, to reduce by 25% the volume of solid waste that is either disposed of in a landfill or incinerated" (Montana Session Law, 1991, p.511).

The Montana Department of Health and Environmental Sciences (DHES) held a series of public meetings between January 27 and March 12, 1992 to give the public an opportunity to express concerns about waste management practices. One individual stated, "We've talked about composting at our new landfill. We have the space, just not the time to figure it out. We're just way behind with our old landfill and don't have the resources" (Expressed Public

Concerns, 1992).

Although there are different options available to help obtain the 25% reduction goal, composting can be a partial solution to the quantity of waste entering Montana landfills. Within the United States, approximately one-fifth, by weight, of the material sent to landfills or combustion facilities (not including food wastes) has been estimated by the EPA to consist of leaves, grass clippings, and brush and other woody materials, collectively termed yard trimmings (Kashmanian, 1992).

Municipal composting can be categorized into four methods: (1) standing pile, (2) turned windrow, (3) forced aeration, and (4) in-vessel composting systems (Cobb & Rosenfield, 1991). Randomly selecting one of the composting methods does not ensure a satisfactory solution and may lead to costly and unsatisfactory results and possible abandonment of an idea that may have worked under the right circumstances. Books, journals, and other media abound with information on how to compost. However, few deal with the implementation of decision-making criteria to guide local governments.

#### Method of Procedure

This study reviews publications on composting systems utilized throughout the nation and develops a list of common criteria that are indicative of successful composting. This

study further consolidates and prioritizes a list of requirements or criteria via qualitative analysis through a secondary review of literature. This list of criteria will be the basis for a survey to be distributed to municipal compost operators in four states. A study to be conducted in the future using the results from the original survey can help develop a decision-making model to be utilized by community leaders and landfill operators. That model will inform and guide users about which standards should be addressed for the implementation of a successful composting program in their community.

### Objectives

1. Determine those criteria that are necessary for the implementation of an effective municipal compost management program for rural Montana communities.
2. Verify those composting criteria through a questionnaire distributed to selected regional landfill operators.
3. Provide composting criteria for the development of a municipal composting model for rural Montana communities.

### Assumptions

1. On a nationwide basis, yard waste makes up approximately 20% of the residential waste stream.
2. Composting is appropriate for Montana.
3. Montana communities will be committed to the state's goal of a 25% reduction of waste currently entering landfills.

### Delimitations

1. The initial criteria information was collected from literature relating to composting on a nationwide scale. The subsequent research conducted for the survey was directed to municipal composting operations in Montana, Idaho, Wyoming, and North Dakota due to similarities in climate, the rural setting, and state wealth.
2. The municipal composting programs shall cover refuse or yard waste composting and solid waste composting but will not be concerned with the composting of sewage sludge.
3. Composting shall be directed towards rural communities in cold climates such as Montana.
4. Municipal composting will be examined only, but not backyard composting.

### Definitions

Composting--a controlled method of solid waste management whereby the organic component of the solid waste stream is biologically decomposed under controlled conditions to a state where it can be handled, stored, and/or applied to the land without adversely affecting the environment (Golueke, 1977).

Dump--a refuse disposal area that fails to meet government criteria. This includes general environmental performance standards addressing eight major topics: floodplains, endangered species, surface water, ground water, land application, disease, air, and safety (EPA, 1991).

Expert--an individual familiar with the composting process. Such a person has either hands-on experience or has worked with those directly involved with composting; consequently, this individual can make educated answers to questions concerning any phase or level of composting.

Facility--a manufacturing, processing or assembly establishment; a transportation terminal; or a treatment, storage or disposal unit operated at one site. This definition does not include infectious waste incinerators or other facilities (Solid Waste Management, 1992).

Landfill--an engineered refuse disposal area that meets government criteria. A facility may be classified as a sanitary landfill and not an open dump only if there is no reasonable probability of adverse effects on health or the environment from the disposal of solid waste at such facility (EPA, 1991).

MSW composting--"Municipal Solid Waste" composting, i.e., the controlled degradation of municipal solid waste. This term includes the composting of municipal solid waste after some form of preprocessing to remove non-compostable inorganic materials (Solid Waste Management, 1992).

Putrescible--liable to become putrid or in a state of putrefaction, i.e., the decomposition of organic matter, and/or the typically anaerobic splitting of proteins by bacteria and fungi with the formation of foul-smelling, incompletely oxidized products (Webster's New Collegiate Dictionary, 1976).

Recyclables--materials that still have useful physical or chemical properties after serving their original purpose and that can, therefore, be reused or remanufactured into additional products (Solid Waste Management, 1992).

Recycling--the process by which materials otherwise destined



for disposal are collected, reprocessed or remanufactured, and reused (Solid Waste Management, 1992).

Solid Waste--all putrescible and nonputrescible wastes, including but not limited to garbage; rubbish; refuse; ashes; sludge from sewage treatment plants or air pollution control facilities; construction and demolition wastes; dead animals, including offal; and discarded home and inert materials (Solid Waste Management, 1992).

Source Reduction--the design, manufacture, acquisition, and reuse of materials so as to minimize the quantity and/or toxicity of waste produced. Source reduction prevents waste either by redesigning products or by otherwise changing societal patterns of consumption, use, and waste generation (Solid Waste Management, 1992).

Source Separation--the segregation of specific materials at the point of generation for separate collection. Households separate recyclable material from the garbage as part of a curbside recycling program (Solid Waste Management, 1992).

Storage--the actual or intended containment of wastes, either on a temporary basis or over a period of years (Solid Waste Management, 1992).



Transfer Station--a solid waste management facility that may have a combination of structures, machinery, or devices, where solid waste is taken from collection vehicles (public, commercial or private) and placed in other transportation units for movement to another solid waste management facility (Solid Waste Management, 1992).

Transport--the movement of waste from the point of generation to any intermediate points and finally to the point of ultimate storage or disposal (Solid Waste Management, 1992).

Yard Waste--leaves, grass clippings, prunings, and/or other natural organic matter discarded from yards, gardens, parks, etc. (Solid Waste Management, 1992).

### Method of Investigation

#### Introduction

Current books, journals, and media were researched to derive a common list of criteria that Montana communities might use to establish successful composting programs. It was necessary to gather a list of common factors or criteria for a composting program from assorted readings and the additional review of literature. Rank ordering was performed using a survey instrument directed to regional landfill operators.

### Design of the Study

Data describing the characteristics of composting were used to compile necessary information for the design of a decision-making model. Therefore, the design of the study was descriptive. Responses from each resource (journals and books) were obtained using a chart displaying the criteria from each article. The data, that is, the composting criteria, consisted of a list of factors necessary for successful composting taken from each article included in the review of literature.

### Sampling Procedures

Due to the limitation in sampling size and accessibility to literature published on composting, nonprobability accidental sampling was used to define the municipal composting population. Geographic area sampling was conducted for the survey. Cities that participate in some form of municipal composting with a population of fewer than 50,000 in Montana, Idaho, Wyoming, and North Dakota were used.

### Analysis

The composting criteria which appear in current literature was ranked regarding the frequency of discussion within the articles. This criteria list was constituted of factors necessary to institute a successful composting program for communities of rural Montana.

A survey instrument was mailed to municipal compost operators in order to rank order these criteria. A comparison of the literature ranking and each landfill operator's ranking will then be made.

### Summary

Composting is one effective way to help reduce the amount of garbage that would otherwise end up in a landfill. This study is an attempt to identify the criteria that composting literature and facilities have found to be important to successful composting and then to use these criteria in the development of a decision-making model that will guide rural Montana towards a successful composting program for its communities.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

The literature does not address all the guidelines or parameters in one specific source necessary for developing an effective municipal composting program for Montana. Therefore, the review of literature was essential to develop a list of criteria needed for a successful municipal composting program for Montana.

Composting is the decomposition of the organic component of the solid waste stream under controlled conditions until such a time that it can be handled, stored, and/or applied to the land without adversely affecting the environment (Golueke, 1977). It is important to note that this composting process differs from the natural decomposition of organic matter by use of controlled conditions; thus, composting can be considered a managed process. However, a static pile or undisturbed pile must still be monitored and maintained during the decomposition process.

Studying the basic principles, classification, and processes needed for composting programs throughout the nation

will create a better understanding of composting. Finally, defining a detailed design of composting factors and collection procedures should lead to the identification of criteria necessary for successful municipal composting programs in Montana.

### Municipal Composting

Those communities considering a Municipal Solid Waste (MSW) composting approach must define what they want to accomplish. Do they wish to reduce the amount of waste going to the landfill? To reduce costs? Do they want to own the facility or work out a privatized package (Cobb & Rosenfield, 1991)? There are several factors to address when officials are considering composting for the community. Some factors are the benefits and drawbacks, the type of community, the complexities of the system, and questions one might ask the distributor of composting equipment (Cobb & Rosenfield, 1991).

The implementation of a supplemental backyard composting program can be of benefit to both the community and the individual by reducing the time and money spent at the local municipal landfill (Wirth, 1990). Furthermore, as composting programs continue to expand, more attention is being given to product quality, utilization, research, and market development. Composting projects which have ignored the steps necessary to build markets for the finished product or have

produced inferior quality compost material have found it difficult to remain in operation or gain public support (Alexander, 1994).

"Developing a successful program, and obtaining a market share, does not occur overnight. However, its development can be improved with the assistance of experienced individuals and by performing market research" (Alexander, 1994).

Composting has always been a natural process; as such, although there have been significant improvements in the composting process, the basis for a successful composting program for a municipality revolves around the intended goal of a municipal composting operation. This goal will be reflected in a successful composting operation and begins by assessing the viability of a compost program.

#### Composting and the Waste Management Plan

A good understanding of the local and regional solid waste situation is crucial to designing an effective waste management plan. To make the system effective, it is important to assess the waste stream that enters the landfill. Such an assessment will determine the quantity, composition, sources of waste, and possible end uses for finished compost.

According to Cobb & Rosenfield (1991), there are two methods for assessing incoming waste: (1) visually inspecting incoming waste (the most accurate) and (2) using existing data

from state and federal offices along with books, journals, and tapes. Although visual inspection may be more accurate than utilizing existing data, there is the cost of hiring additional manpower to perform this task. For small communities, this may be a major deterrent; therefore, existing records may have to suffice.

The planning stages of a composting operation should address this question: what will be done with the compost once it is finished? Assuring a high quality finished product will enable the producers to establish markets. O'Leary (1989) clarifies the importance of a market strategy for the finished product:

There are no set rules for marketing composts that would apply to all composting facilities-it's site specific. Variations in the quality of the compost produced at various locations, differences in soils, agronomic and horticultural practices, climatic conditions, and social patterns all must be individually evaluated for each composting plant. The criteria that best fit the market needs of the region should be incorporated into the marketing plan. (p. 36)

Some of the possible end uses can be potting soil mixes, mulches and material which can be incorporated into field soils or used on golf courses for landscaping, and on agricultural crops. Once the assessment of compostable material has been made, the mode for collecting compostable material can begin.



## Compost Collection and Processing Alternatives

### Collection

The planning that goes into the collection process can, in the end, save a community both time and money. The effort that the public puts into presorting their garbage helps the composting facility realize a more efficient processing operation back at the plant. Up-front processing is one such presorting operation. Furthermore, up-front processing will lead to compost that is free from disease-carrying microbes and man-made foreign objects (Glenn, 1991).

### Separation

When processing waste for possible inclusion in a composting program, there are four different manual separation strategies for producing a clean and marketable end product: (1) no separation, or the composting of an entire waste stream with little or no attempt to control inputs, which produces a low quality compost product with high levels of heavy metal, particularly lead; (2) source separation of organics, or the control of inputs at the facility utilizing a positive sort which pulls out the desired or targeted materials from the waste stream, whereas a negative sort pulls out materials that are considered contaminants, leaving behind the targeted materials as well as everything else not captured. A positive sort is effective in achieving a high quality compost, based



on heavy metal content; (3) centralized separation, or a compost facility that accepts the entire waste stream collected at the curb in a single container, transports the materials to the compost facility, and through pre-processing, separates out recyclables and contaminants; and (4) wet/dry separation systems, or placing compostables in a wet bin and all other materials in the dry bin -- a positive sort for compostables but a negative sort for recyclables. Greater understanding and greater sophistication in applying these tools at all levels of the economy and government are needed. Little data exist on the effectiveness of different separation strategies in producing a clean and marketable end product (Prince, 1992).

#### Sorting and Grinding

The step before composting is the physical break-down of the compostable material into manageable sizes. The preparatory step of sorting and grinding depends on the nature of the operation and the types of material to be composted.

Sorting, or the segregation and classification of the compostable material, involves the removal of material not suited or not intended to be composted. The presence of some materials such as glass shards, plastic, and metal may be detrimental or fatal when composted material is placed on pastures for animal intake or placed on crop fields for human consumption (Golueke, 1977).

Grinding can be accomplished through the implementation of size reduction equipment which should break down the compostable material to sizes of 2" or less. Due to the complexities and broad-based categories of compostable material, the machinery is over-designed to handle all types of refuse, leading to the high cost of the equipment and operating costs (Golueke, 1977). Once the processes for sorting and grinding have been performed on all incoming waste, a decision must be made as to which composting system is to be used for the facility, that is, mechanized (in-vessel) or nonmechanized (windrow).

### Composting Systems

There are two basic systems for composting: (1) windrows; standing piles or undisturbed windrows, turned via mechanical means, forced aeration, which helps to speed up the composting process; and (2) in-vessel or mechanical composting systems. These systems vary in processing rate, land area required, equipment, and cost (Cobb & Rosenfield, 1991).

### Windrow Composting

Golueke (1977) states that when assessing the validity of the nonmechanized system, or windrows, there must be adequate room for the shape and dimensions required to maintain aerobic conditions. Air trapped in the voids between the particles of

wastes and the dimensions of the pile should be such that the volume of the individual interstices (voids) is not overly reduced by the crushing weight of the material. The basic dimensions should be approximately 5 to 6 feet high and 7 to 8 feet wide at the base.

The minimal technology required for static windrow piles has been in use for a long period of time. Although this may be a major advantage to small communities, a pile left to its own demise can generate the heat necessary for spontaneous combustion, the point at which a chemical reaction results from a fuel source, oxygen, and high temperatures. Also, static piles can generate a serious odor problem at the height of the decomposition process (Cobb & Rosenfield, 1991).

Turned windrows are accomplished by mechanically turning the windrow, the most common method used for rapid composting of yard wastes. Frequently used equipment for this process is the front-end loader, although other equipment specifically designed for this operation is available, such as the windrow turning machine. The utilization of heavy equipment allows the compost pile to achieve the best means for controlling the process (Cobb & Rosenfield, 1991).

Forced aeration follows the same technique as the turned windrow method, except that aeration is accomplished by a network of perforated plastic pipes under the compost pile. The pile is left untouched until the decomposition process is finished. Due to the added cost of equipment such as blowers,

electricity, and piping, this process is more expensive than turned windrows (Cobb & Rosenfield, 1991).

### In-vessel Composting

In-vessel systems involve the process of placing raw wastes in a large container where decomposition is promoted via built-in aeration and mechanical mixing. The application of a mechanized system or enclosed unit usually entails a design that provides optimum conditions when working within a densely populated area. These systems offer the advantage of protection from the elements plus complete odor control, although the cost of operation of such a design is very expensive due to necessary capital, operating, and maintenance costs.

## Developing A Composting Process

### The Biological Process

In simplified terms, the compostable material which constitutes biodegradable organic material is broken down or decomposed through microbial decomposition. As the decomposers (microorganisms and invertebrates) work, they generate temperatures that range from 130°F to 170°F. The increased temperature increases water evaporation, necessitating proper moisture control. As the process nears completion (one month to one year), the pile temperature once

again approaches ambient air temperature (Dickson, 1991).

One of the main advantages of the biological process is its cost, which is lower than most mechanized (in-vessel) systems. Since composting is a biological process, only organic material of biological origin can be composted, meaning that organic compounds of nonliving origin cannot be composted and should be removed from the compostable material during the separation process (Golueke, 1977).

The goal in constructing and managing a compost pile is to provide an environment suitable for the desired microorganisms. One of the major factors in composting is the amount of oxygen present in the pile.

#### Aerobic Process vs Anaerobic Process

The aerobic process involves oxygen accessing all voids throughout the compost material, thereby speeding up the decomposition of organic matter. Aerobic organisms thrive at oxygen levels greater than 5% (humans require an oxygen level of 20.8% oxygen).

Aerobic composting is favorable over anaerobic because of the elimination of objectionable odors. The aerobic process will still generate some odor by the very nature of the raw material and of the intermediates formed. Odors generated from aerobic composting may be offensive to some individuals due, in part, to his or her training and cultural background (Golueke, 1977).

The anaerobic process or static pile, is the absence of oxygen within the compost material which results in undesirable odors. The most common product of anaerobic decomposition is hydrogen sulfide, which smells like rotten eggs. This chemical can be very hazardous depending on the internal temperature of the pile and may result in spontaneous combustion if a fuel source is present. In addition, anaerobic processes can generate acids and alcohols that are harmful to plants (Dickson, 1991).

### Composting Factors

The three factors that aerobic microorganisms require for the decomposition of organic material are physical, chemical, and nutritional. The physical factors are temperature, moisture content, and degree of mixing of the composting mass; the chemical factor is the concentration of oxygen; and the major nutritional factors are concentration and availability of nitrogen and carbon (Golueke, 1977).

### Physical Factors

Temperature affects the production rate of the composting process. The higher the temperature, the more rapid the decomposition of organic material due to the change in bacteria. Dickson (1991) states the important relationship between aerobic microorganisms and temperature:



Among all the bacteria, molds or fungi, actinomycetes, and protozoa, the aerobic bacteria are the most important initiators of decomposition and temperature increase within the compost pile. Psychrophilic bacteria work in the lowest temperature range and have an optimum temperature of about 55°F. Mesophilic bacteria thrive at temperature between 70°F and 100°F. Thermophilic bacteria are heat-loving and thrive in a range between 113°F and 155°F. Each category includes many strings of bacteria. (p. 4)

From the beginning of the composting process, the pile temperature will be around the ambient air temperature of 70°F. At this point the psychrophilic bacteria will begin to work by generating heat. As the temperature rises, the mesophilic bacteria will take over and generate additional heat until the thermophilic bacteria take over. When the bacteria's source of food (organics) has been depleted, the temperature will begin to fall until obtaining the ambient air temperature once again. The optimum temperature for rapid composting is in the range of 90°F and 140°F. "The rise and fall of temperature during the process will depend on the material being composted, the composting method used, and the water available for evaporative cooling" (Dickson, 1991).

A moisture content of 40-60% provides adequate moisture without limiting aeration. Less than 40% moisture results in a slowdown of the composting process, whereas a moisture content above 60% leads to the loss of nutrients, a reduction in air volume, and possible odors. A handful of compost should feel damp to the touch and when squeezed, produce approximately one or two drops of water (Dickson, 1991).

Mixing the pile, referred to as turning, fluffs up the material which increases the porosity. Turning enhances aeration in a compost pile and is usually accomplished with a front-end loader. Windrows should be turned whenever the temperature of the pile approaches 140°F. When equipment operators turn the windrows, they should move materials from the surface to the center of the windrow, lift the compost up and let it cascade down to help oxygenate the pile, and maintain the pile shape to retain moisture. Finished compost can be made in three months to two years with an average of 12 to 18 months utilizing yard waste. Timing depends on the type of waste and the ambient air temperatures, as cold weather will slow down the composting process.

#### Chemical Factor

The chemical factor of concern is the amount of oxygen found within the compost pile. Aeration replaces the oxygen-deficient air in the center of the pile. If the pile has good porosity and is not over-saturated with moisture, the air can easily find a path for air circulation. "Aeration occurs naturally when air warmed by the compost process, rises through the pile, drawing fresh air from the surroundings." Therefore, maintaining the proper moisture content and turning frequently will provide adequate oxygen content and air movement through the pile (Dickson, Et Al., 1991).



### Nutritional Factors

The carbon-to-nitrogen (C:N) ratio is very important to the survival of microbial activity. Microorganisms digest or oxidize carbon as an energy source and ingest nitrogen for protein synthesis. The ratio should approximate 30 parts carbon to 1 part nitrogen by weight. The C:N ratio for satisfactory decomposition can range from 25:1 to 40:1. A low C:N ratio results in too much nitrogen and a possible odor problem from the formation of ammonia gas. Although it can be difficult to maintain a perfect C:N ratio of 30:1, the operator can compensate for carbon or nitrogen losses by adding woody materials for loss of carbon and green wastes for nitrogen loss using such items as grass clippings, fresh weeds, kitchen refuse, and manure (Wirth, 1991).

### Environmental Concerns

#### Pathogens

The primary objective of temperature control is to ensure that high temperatures are maintained for a specified number of days necessary to kill off any pathogens (disease-causing organisms) present. The U.S. Environmental Protection Agency has found that to significantly reduce pathogens when using the in-vessel, static aerated pile, or windrow composting methods, the solid waste is maintained at minimum operating conditions of 104°F for five days. For four hours during this period the temperature exceeds 131°F. To kill any remaining

pathogens, the temperature of the pile is maintained at 131°F for an additional three days. Human, animal, and plant pathogens can be found in soil, animal waste, sewage sludges, and mixed municipal solid waste. The utilization of yard waste municipal composting helps to eliminate the necessity to treat any of these pathogens, although it is still wise to treat the compost as has been discussed (Wirth, 1991).

#### Heavy Metal Contamination of Compost

Heavy metals such as cadmium, zinc, nickel, copper, mercury, and lead, are most common in sewage sludge composting, therefore adding more depth to the delimitations stated previously. The general distribution of composted MSW has been impeded by reports suggesting that these materials can contain heavy metals at levels of concern for health risks. These metals can leach into ground water or be incorporated into food chain plants. Moreover, physical contact with MSW compost-amended products containing heavy metals raises health questions. Taking these concerns into account, guidelines for heavy metal content as a function of end use are being developed by state and federal agencies (Reinhart, 1993). Testing conducted on sewage sludge indicates that there is a potential health risk to humans.

In one instance, composting of sludge and yard waste mixtures was investigated during laboratory and field testing by the University of Central Florida:

A strong correlation between moisture content and windrow peak temperatures was observed. Odors were detected at cocomposting windrows when temperatures exceeded 129.2°F. The sludge to yard waste mixture ratio was found to affect resulting compost particle size and , consequently, oxygen transport. Compost quality was excellent, with pesticides below detection level and low concentrations of heavy metals.

Yard Waste, wastewater treatment facility sludge, and cocompost were analyzed for metals, pesticides, and nutrients. All pesticides tested were below the detection limit (0.05 mg/kg). The only metals found at significant concentration were copper and zinc. Both compost products met requirements for the highest quality product established by the state of Florida. (Reinhart, 1993, pp. 58,63)

#### Leachate Control

"Leachate is defined as any liquid that has percolated through solid waste and has extracted, dissolved or suspended material from it" (Wirth, 1991). The generation of leachate from solid waste composting must not be allowed to enter the ground or surface waters. This can be accomplished by designing diversion ditches on the site, liners, and indoor curing and storage. If such fluid is collected, the easiest way to handle it is to reintroduce it into the compost pile. The best way to eliminate the possible generation of leachate is by monitoring and maintaining proper moisture within the pile.

### Public Awareness and Education for Composting

The success of a municipal composting program relies on public acceptance and involvement, both of which result from public approval and support. The public must participate in the collection system. By implementing public education programs and encouraging homeowner input into the planning process, one can increase community support for a composting program (Cobb & Rosenfield, 1991). One approach to educational efforts is the "Don't Bag It" educational program. The thrust of this approach is to leave the grass clippings on the ground and not bag them for the landfill.

Initial training of the public on the requirements for composting indicates that the primary motivation appears to be the desire to learn the "whys" of yard waste reduction. Also, education about composting appears to be far more valuable than forcing people to participate. "If you want recycling to work, you must involve the whole community from the start," says Bill Schultz, city councilman in Kent, Ohio. "You've got to show how everyone will benefit. And let everyone have their say. Most of all, don't get in a hurry" (Logsdon, 1991).

The success of a composting program demands a great deal on "hands-on" experience and plenty of hand holding (Logsdon, 1991). This process demonstrates real people using real methods of waste reduction which is more effective than

pamphlets, booklets, and posters (Allaway, 1992). Composting appears to be the only viable alternative for areas with a lack of markets for recycling and a small population base.

### Summary

Composting is currently gaining popularity for reutilizing yard wastes into usable soil. There is a need for communities throughout the nation to reduce the amount of waste currently buried at their landfills. Although some inorganic refuse cannot be composted or recycled, a large quantity of waste can be composted. Previous generations have practiced composting not only as a necessity but also as a way of conserving the land. However, since the turn of the century, society has discarded its waste without regard for the environmental costs involved. Much of this behavior was due to lack of knowledge, greed, or misunderstanding. As a result of the Resource Conservation and Recovery Act, we must strive to reverse our current practices and conserve our decreasing natural resources. With time and education, composting can be an important method for managing solid waste.

Randall B. Monk, director of operations for the Solid Waste Composting Council based in Alexandria, Virginia states, "The one true path of composting is yet to be found, and probably doesn't exist. Very different communities have found their way with different approaches" (1992, p.49).

CHAPTER III  
RESEARCH METHOD  
Introduction

This research utilized a descriptive study using data to describe the characteristics of composting. This process allowed the researcher to become familiar with composting through the exploration of literature and to gain new insights, ultimately leading to specific criteria regarding composting characteristics. With this information, the researcher was then able to describe the characteristics of composting through qualitative analysis or verbal description documented through incidence and distribution from the literature.

To quantify the specific criteria that were derived from the initial and secondary review of literature, a survey was mailed to 29 municipalities throughout Montana, Idaho, Wyoming, and North Dakota that are involved with municipal composting. The survey requested the addressee to rank order each survey item. The results of the survey verified the ranking of those same criteria obtained from the review of literature.



### Review of Literature

Although composting has been utilized for many centuries, only in the 20th century has literature been widely available on this topic. The goal of this study was to review work available at the Montana State University library, at the environmental library in Taylor Hall at Montana State University, and the "Solid Waste Composting Council" based in Alexandria, Virginia.

Montana State University's library was the best source of information; however, all sources indicated that composting is a viable option for only part of the waste that currently enters landfills; however, such a process would help Montana meet its 1996 goal of a 25% reduction in the amount of solid waste that is either disposed of in a landfill or incinerated (Montana Session Laws, 1991).

### Selection of the Criteria

After the initial review of literature was completed, a list of composting criteria was from the key elements of discussion throughout the first two chapters of this paper. The next step was to justify these elements as important criteria to successful composting from the secondary review of literature, which consisted of 70 articles. The secondary review of literature was conducted to examine any correlation



between the initial review of literature and the additional 70 articles.

Data Display and Referencing From the Review of Literature

Nineteen types of criteria were discovered through the initial review of literature; they are listed in TABLE 1. An "OTHER/MISCELLANEOUS" criteria was added for subjects not covered under the initial review of literature.

TABLE 1

Composting factors discovered through the initial review of literature.

| CRITERIA                                  |
|-------------------------------------------|
| 1. PICK-UP/SORTING/SEPARATION             |
| 2. DISTRIBUTION MARKET/ FINISHED MATERIAL |
| 3. EDUCATION                              |
| 4. COMPOSTING SYSTEMS                     |
| 5. EQUIPMENT                              |
| 6. COST                                   |
| 7. OTHER/MISCELLANEOUS                    |
| 8. COLLECTION SYSTEMS                     |
| 9. LOCATION                               |
| 10. ODOR                                  |
| 11. QUALITY                               |
| 12. CAPACITY/QUANTITY                     |
| 13. LAWS                                  |
| 14. LABOR/WORKERS                         |
| 15. TRACKING WASTE                        |
| 16. YARD WASTES                           |
| 17. POPULATION                            |
| 18. ORGANIC MATTER                        |
| 19. ENVIRONMENT                           |

### Analysis of Data From the Review of Literature

Data generated by the additional review of 70 articles were totaled for each item to determine the following:

- \* Total number of responses for that column.
- \* Percent of responses based on total number of articles read.
- \* Ranking of each column from most frequent response to least frequent response (1 being most frequent and 20 being least frequent).
- \* The rank order from the most frequent response (first) to the least frequent response (last) (see TABLE 3).

### Criteria Survey

In order to verify the rank order of composting criteria developed from the review of literature, a questionnaire was sent to 29 municipalities involved in municipal composting in four states: Montana, Idaho, Wyoming, and North Dakota. The municipal landfill operators were asked to rank order the 19 criteria listed on TABLE 2 from most important criteria to least important criteria (see APPENDIX A).

TABLE 2  
S U R V E Y

NAME: \_\_\_\_\_

JOB TITLE: \_\_\_\_\_

NOTE: please note that the following criteria have been placed in alphabetical order and by no means reflects the criteria ranking in order of importance.

| CRITERIA                           | CRITERIA RANKING |
|------------------------------------|------------------|
| CAPACITY/QUANTITY                  |                  |
| COLLECTION SYSTEMS                 |                  |
| COMPOSTING SYSTEMS                 |                  |
| COST                               |                  |
| DISTRIBUTION MARKET/FINISHED MAT'L |                  |
| EDUCATION                          |                  |
| ENVIRONMENT                        |                  |
| EQUIPMENT                          |                  |
| LABOR/WORKERS                      |                  |
| LAWS                               |                  |
| LOCATION                           |                  |
| ODOR                               |                  |
| ORGANIC MATTER                     |                  |
| OTHER/MISCELLANEOUS                |                  |
| PICK-UP/SORTING/SEPARATION         |                  |
| POPULATION                         |                  |
| QUALITY                            |                  |
| TRACKING WASTE                     |                  |
| YARD WASTES                        |                  |

### Survey Data Analysis

Survey rankings were totaled for each criterion and divided by the sum total of responses to obtain a numerical mean ( $\bar{x}$ ) for that particular criteria. Each criteria from 1 to 19 was rank-ordered to determine the most important to the least important item for a successful municipal composting program.

### Summary

The comparison of criteria from the initial review of literature and the secondary review of literature will substantiate a list of criteria that are most important for successful composting. Finally, the survey of landfill operators will quantify and establish those criteria that municipalities involved with municipal composting feel are most important to least important for successful municipal composting.

CHAPTER IV  
PRESENTATION OF DATA

Introduction

The initial review of literature was conducted utilizing professional journals and books on composting. To substantiate these issues as common criteria necessary for successful composting, the secondary review of literature was conducted utilizing professional composting journals. These journals included BioCycle, Waste Age, Garbage, Resource Recycling, and Solid Waste & Power (see APPENDIX D). BioCycle was chosen as the primary source of information due to technical orientation and frequency of discussion on topics common to the purpose of this study. The frequency of discussion of topics in various issues of BioCycle indicated that the topics were, in fact, criteria due to repeated discussion throughout the journal. In order to assure up-to-date criteria verification, the latest issues of BioCycle were used; November, 1989 through March, 1993.

In order to quantify the criteria revealed in the review of literature, a questionnaire was sent to municipal composting operators in Montana, Idaho, Wyoming, and North

Dakota. The survey outcome indicated the relationship of criteria ranking of the municipal composting operators and the composting criteria obtained from the review of literature. The results of criteria agreement may be viewed in TABLE 4.

#### Data Summary From the Review of Literature

TABLE 3 indicates the verification of the criteria by listing the frequency of discussion about these criteria from all articles that were reviewed. The criteria appear in descending order as verified through 59 BioCycle articles and 11 articles from Waste Age, Garbage, Resource Recycling, and Solid Waste and Power.

The primary review of literature consisted of 15 books and journals on composting. The composting criteria were obtained from this initial literature review. The secondary review of literature consisted of 70 articles from 5 different journals which were used to qualify these criteria.



TABLE 3

Composting Criteria appearing in current literature.

| CRITERIA                                  | FREQUENCY<br>RESPONSE | PERCENT | CRITERIA<br>RANKING |
|-------------------------------------------|-----------------------|---------|---------------------|
| PICK-UP, SORTING &<br>SEPARATION          | 40                    | 57%     | #1                  |
| DISTRIBUTION MARKET/<br>FINISHED MATERIAL | 34                    | 49%     | #2                  |
| EDUCATION                                 | 29                    | 41%     | #3                  |
| COMPOSTING SYSTEMS                        | 29                    | 41%     | #4                  |
| EQUIPMENT                                 | 28                    | 40%     | #5                  |
| COST                                      | 23                    | 33%     | #6                  |
| OTHER/MISCELLANEOUS                       | 23                    | 33%     | #7                  |
| COLLECTION SYSTEMS                        | 20                    | 29%     | #8                  |
| LOCATION                                  | 20                    | 29%     | #9                  |
| ODOR                                      | 18                    | 26%     | #10                 |
| QUALITY                                   | 16                    | 23%     | #11                 |
| CAPACITY/QUANTITY                         | 16                    | 23%     | #12                 |
| LAWS                                      | 15                    | 21%     | #13                 |
| LABOR/WORKERS                             | 11                    | 16%     | #14                 |
| TRACKING WASTE                            | 10                    | 14%     | #15                 |
| YARD WASTES                               | 9                     | 13%     | #16                 |
| POPULATION                                | 6                     | 9%      | #17                 |
| ORGANIC MATTER                            | 6                     | 9%      | #18                 |
| ENVIRONMENT                               | 4                     | 6%      | #19                 |

The criteria and ranking in TABLE 3 indicate the most important composting criteria to a successful program. PICK-UP, SORTING, & SEPARATION was addressed most frequently in the journals (discussed in 40 articles out of the 70 articles read, or 57%) from the secondary review of literature.

ENVIRONMENT was ranked last because of infrequent discussion (discussed in 4 articles out of the 70 articles read, or 6%).

### Discussion of Criteria From the Review of Literature

The following section presents a narrative description of each composting criterion revealed through the initial review of literature and qualified through the secondary literature review.

#### Criterion #1 - Pick-up/Sorting/Separation

Pick-up/sorting/separation was discussed in 40 of the articles out of the 70 articles read, yielding a #1 ranking. Most communities surveyed which have a municipal composting program or have had one in the past find that the proper utilization of pick-up, sorting, and separation is one of the most important elements to be addressed.

The options that worked best for a community varied with the success of their composting program. Each community used various combinations of pick-up, sorting, and separation which depended upon how much the community itself was willing to participate in the process. Some communities chose to tackle all three areas without public help. This entailed pick-up of unsorted waste at curbside and then sorting through the waste and separating the compostable materials from the non-compostable materials at the facility. This procedure was

time consuming, expensive to operate, and required additional man-hours for each process.

The most frequently used system observed throughout the readings involved source separation of the compostables and non-compostables by the public or consumer. The options then varied from curbside pick-up to drop-off at a transfer station or at the facility. This system lowers the need for additional man-power for separation at the facility.

A community must decide what type of disposal container the public will use. The most commonly used containers were either bio-degradable paper bags, bio-degradable plastic bags, or reusable rigid plastic containers. The public purchased the paper bags or plastic bags as required. The reusable rigid plastic container was a one-time purchase by the consumer and appeared to be the container of choice by the public. In one location there was a tendency to line the rigid container with a plastic bag which can be self defeating and may lead to a debagging process (Waste Age, July 1993). Recyclables that were extracted from the sorting process at the facilities were usually permanently discarded due to the lack of interest, money, or the time required to recycle.

#### Criterion #2 - Distribution Market/Finished Material

Of the 70 articles that were reviewed to qualify this topic, there were 34 responses yielding a #2 ranking.

Communities found it necessary to find a source for their finished compost whether it was available at no charge or at some established fee to cover some of the processing costs incurred by the composting facility. Many communities felt that sponsoring free access to finished compost helped to encourage public participation in the composting program.

The final use of the material was contingent upon the quality of the finished compost as discussed under Criteria #11. High quality compost was used for agriculture and landscaping and by sod farmers, nurseries, parks, golf courses, horticulturists, and silver culturists. Low quality compost which contained contaminants was limited much of the time to landfill cover, leading to composting limitations because the amount of compost generated is far greater than the amount of soil required for landfill cover.

### Criterion #3 - Education

Education was discussed in 29 articles of the 70 articles read, yielding a #3 ranking. Education was a very important ingredient to successful municipal composting; due to its extensive discussion, it was given priority over Composting Systems.

The education ranged from booklets and pamphlets to actual demonstrations to see how the composting process works. In one case, a hotline was installed for public questions concerning composting (Garbage, Nov./Dec. 1990). Education

will help the public realize the necessity of source separation of compostables and non-compostables leading to savings in man-power, time, and energy.

In one instance, the author indicated she was too busy to commit time and energy into participating in a municipal composting program. She suspected she was not the only one with these feelings (Garbage, July/Aug. 1990). This observation indicates the necessity to encourage participation in composting through education.

#### Criterion #4 - Composting Systems

Composting systems was discussed in 29 of the 70 articles read yielding a #4 ranking. As was stated in chapter II on composting processes, the process can either take place in an enclosed vessel or in windrows. Communities utilized the windrow process most frequently due to the low cost of setup and maintenance. However, due to objectionable odors created in the aerobic process, the windrows, in some cases, were completely enclosed in buildings which helped to control odors, temperatures, and moisture content. This is a nice feature for quality control but requires additional funding.

Static piles were utilized in some of the settings but require additional time to achieve the finished compost. This process may be desirable for communities that have ample room at the site, don't have the equipment necessary to turn the piles, or are in no hurry to complete the composting process.

#### Criteria #5 - Equipment

Equipment was discussed in 28 of the 70 articles, yielding #5 ranking. Equipment was very important to ease of operation for the composting facility but varied greatly with the size and amount of production achieved at the site.

In many cases, small composting operations used a front-end loader to move and to turn the aerobic windrow piles. Additional equipment sometimes included a grinder or shredder for reducing the size of incoming compost. Size reduction (pieces no larger than 2 inches in diameter) helps to speed up the composting process.

Depending on the magnitude of the operation and available capital, larger equipment can be purchased. A windrow turner allows greater ease in turning the windrows in less time, thereby reducing the amount of odor that is created.

Cities are giving greater thought to equipment selection due to the greater variety available. In one case, a composting operation modified machinery to serve the intended needs but still found it necessary to purchase three new front-end loaders (BioCycle, April 1992).

#### Criterion #6 - Cost

Cost was discussed in 23 of the 70 articles, yielding a #6 ranking. Due to extensive discussion, COST was given priority over Other/Miscellaneous. The cost of the operation can be attributed to the amount of money a local composting



facility has to spend on land, equipment, buildings, labor/work force, and technology.

Of particular interest in rural settings is the potential of on-farm composting. One scenario in Pennsylvania involved six barriers: getting the material to the farm, farmer reliability, Pennsylvania's Department of Environmental resources regulations, contamination, costs, and education. Overcoming the barriers included farmer compensation, resource coordination, and streamlining regulations (BioCycle, July 1992).

Many composting facilities felt additional expenses would result from separation and sorting at the composting facility as opposed to source separation by the consumer.

#### Criterion #7 - Other/Miscellaneous

Miscellaneous topics were discussed in 23 of the 70 articles, yielding a #7 ranking. This particular criterion covered aspects of each article deemed important by the author and did not fall under any of the aforementioned criteria headings.

Of interest is whether a facility should be privately or publicly owned. There was a greater inclination toward the privatized package due to the need for the community to meet state guidelines. Such communities therefore felt it would be more economically feasible to have a private contractor responsible for the establishment and operation of the



facility. In some cases, arrangements were made between the public and private sectors. The public sector provided the land, building permits, and collection services, and the private sector provided the equipment, personnel, plant operations, marketing, distribution and sales. The private sector can provide access to resources such as private capital, sophisticated and innovative technology, and an experienced management team. Above all, a privatized package can limit or minimize the risk a community might assume with a publicly owned and operated facility.

Another area addressed in this category was recycling. Many facilities do not recycle separated materials because economics and market conditions do not make this a viable option, especially for rural communities. As attitudes and technology improve, recycling may become a much more sought after additional option for composting facilities. One article stated that obtaining a 25% reduction in waste may require possible financial subsidies from the state or federal government (Waste Age, Nov. 1991).

#### Criterion #8 - Collection Systems

Collection systems were discussed in 20 of the 70 articles, yielding a #8 ranking. Due to the extensive discussion within each article concerning Collection Systems it was given priority over Location.

There were several different options utilized for

collection of compostable material: curbside pick-up at different time intervals, drop-off at transfer stations, drop-off at the composting facility, and a centralized drop-off site. The most popular response was curbside pick-up, but the intervals between pick-ups varied depending on the amount of compostable material generated. When intervals between pick-ups were two weeks or more, odor did not appear to be a problem due to the enclosed containers the material was stored while waiting for pick-up.

The storage containers used frequently by communities were bio-degradable plastic bags, bio-degradable paper bags, and reusable rigid plastic containers. The plastic bags, although bio-degradable, would still have to be opened manually or by machinery at the facility due to their slow rate of decomposition. Paper bags purchased by consumers do not require opening by the operators and are compostable. Rigid plastic containers are an aesthetically pleasing option, but many times the public may have a tendency to line the containers with plastic bags which is self-defeating and adds an additional step to the separation process.

#### Criterion #9 - Location

Location was discussed in 20 of the 70 articles, yielding a #9 ranking. Some composting facilities were located in close proximity to existing landfills because of the availability of land; the additional odor that was created was

not a problem due to the rural setting of the existing landfill.

"In smaller communities of less than 50,000 people, options for developing regional composting facilities should be assessed, especially where grass will be composted with leaves" (Waste Age, November 1991, p.94). Whatever location is chosen for the composting facility, a rural setting should be used whenever possible to hold down complaints often associated with composting facilities.

#### Criterion #10 - Odor

Odor was discussed in 18 of the 70 articles, yielding a #10 ranking. Odor is a very important aspect of composting that must be addressed by the community because objectionable odors can lead to failure and closing of a composting facility. To control odors, some facilities have erected structures around the windrows to help contain the odor problem, but in many cases, communities may not have the capital to spend for additional buildings and must therefore rely on windrows open to the elements. The most objectionable odors are held to a minimum in static piles, but they can become obnoxious during the warmer months or if the pile is turned or disturbed. In cases where the facility is located close to human activity, the turning operation is performed at night or early in the morning while people are still in bed. In one case, the windrows were turned during the day while

everyone was at work, but this would depend heavily upon the type of neighborhood and how many people remained home during the day. These procedures do help to hold down the number of complains that facilities have received (BioCycle, Feb. 1992).

Broward County, Florida had problems with odors in the past that resulted in the shutting down of a facility. When a new facility was opened in a new location, the residents were concerned about the odor potential. As a result, the facility created high berms around the parameter of the site and planted trees along the top of the berm. This helped to create a trough and eliminated the majority of cross-winds that otherwise carried the odors to surrounding neighborhoods (Waste Age, June 1991).

#### Criterion #11 - Quality

Quality was discussed in 16 of the 70 articles, yielding a #11 ranking. Due to the extensive discussion within each article concerning Quality it was given priority over Capacity/Quantity.

Quality is of importance with respect to its final use. One author found that with municipal solid waste composting (MSW), quality compost is of secondary importance and that most MSW composting facilities are primarily designed to minimize waste disposal.

In most situations, quality of compost is very important because contaminated compost has limited end use. States

regulate the amount of contaminants that the finished compost may contain. Facilities have found that the best solutions involve either curbside source separation, up-front processing which would require additional man-power and equipment, or elimination of possible contaminants by accepting yard waste only.

Maintaining high-quality compost benefits the facility and the user because of the ability to use the compost in any setting. See discussion under Criterion #2 - Distribution Market/Finished Material.

#### Criterion #12 - Capacity/Quantity

Capacity/quantity was discussed in 16 of the 70 articles, yielding a #12 ranking. Quantity is important to the final yield of finish material. The quantity needed should be thought of in terms of what the final goal is of the composting facility. Does the waste disposal process greatly affect the required quality and consistency of the finished material? Or is the finished compost the product of a manufacturing process to get rid of waste?

Rural communities do not have access to the quantity that larger communities would have. Therefore thought should be given to location of the facility. See Criterion #9, LOCATION, for additional information.

Criterion #13 - Laws

Laws were discussed in 15 of the 70 articles, yielding a #13 ranking. The laws that have been established for each state affect the magnitude and quality of the finished compost. There are several states besides Montana that have established a reduction goal of 25% in the amount of waste that currently enters the landfill. Although composting is a viable option for meeting this goal, it must be viewed in relationship to state rules and regulations which can affect all stated criteria.

Criterion #14 - Labor/Workers

Labor/workers was discussed in 11 of the 70 articles, yielding a #14 ranking. The labor that is required depends a great deal upon the magnitude of the operation, available equipment, capital and costs, and quantity of compostable material. Many small communities kept the work force to a minimum and in some cases required one or two full-time employees with the addition of some part-time help.

Criterion #15 - Tracking Waste

Tracking waste was discussed in 10 of the 70 articles, yielding a #15 ranking. It is important to track both the incoming and outgoing waste. To maintain the final compost quality, quantity, and marketability, more attention should be paid to the input rather than the output. It is much easier



and cheaper to modify separation strategies than it is to improve quality on the finished compost. Therefore, eliminating possible sources of hazardous waste from the composting waste stream through source separation is the most economically sound practice.

#### Criterion #16 - Yard Waste

Yard waste was discussed in 9 of the 70 articles, yielding a #16 ranking. Yard waste composting is a very popular form of composting due to the high quantities and the reduced chances of contaminants that are found in yard waste. It is still strongly suggested to test the yard waste for the presence of possible contaminants. Diluting the compost with non-contaminated materials does not reduce any hazardous metals that may be present in the finished compost. There is also emphasis on implementing a don't-bag-it program so cut lawns stay on the lawn rather than bagging the cut grass for disposal in the landfill.

#### Criterion #17 - Population

Population was discussed in 6 of the 70 articles, yielding a #17 ranking. Population can be important to the success of a composting facility in terms of the available quantity of compostable material. This particular criterion loses its importance when issues such as state rules and regulations, location of the facility, and market distribution



come into play. In cases of extreme rural settings, it may be more beneficial to combine a municipal composting program with a back-yard composting program.

#### Criterion #18 - Organic Matter

Organic matter was discussed in 6 of the 70 articles, yielding a #18 ranking. Many composting facilities found that the best alternative was the composting of organic matter only; inorganic matter was not included due to possible contamination. This can be achieved through source separation and some separation at the facility.

#### Criterion #19 - Environment

Environment was discussed in 4 of the 70 articles, yielding a #19 ranking. The environment or weather conditions did not appear to be a major issue with most composting facilities in respect to the actual composting process. Instead, the environment played a role only in making sure that the facility was accessible to equipment and carriers throughout the year via paved and packed roads.

Temperatures affect the biomass that is available for composting. Colder climates have reduced quantities for composting during the winter months as well as an increase in the time required to complete the composting process unless temperatures are maintained in the compost pile.

### Survey Procedure

In order to check for an agreement about the importance of composting criteria ranking between the literature and the municipal composting operators, a survey was conducted. The survey was assembled utilizing the criteria obtained from TABLE 1. The criteria were listed in alphabetical order so as to discourage the respondents from thinking there was any particular or preordained order. The Department of Solid Waste was then contacted in the states of Montana, Idaho, Wyoming, and North Dakota to obtain a list of municipal composters. The Montana Department of Health and Environmental Sciences (DHES) sent a list of local government compost programs throughout Montana that comprised 11 municipalities. Two surveys were sent to the Department of Solid Waste in Boise, Idaho. The Wyoming Department of Solid Waste listed four municipalities involved in a municipal composting program. The Department of Health in North Dakota provided a list of twelve municipalities involved in a municipal composting program. See APPENDIX B for the memo of conversation. See APPENDIX B for a list of the operators used for the survey.

### Development of the Instrument

The population surveyed for this study consisted of municipal composting operations in Montana and surrounding

states. Included in this population were municipalities involved with municipal composting from these states:

1. Montana
2. Idaho
3. Wyoming
4. North Dakota

The surveys were mailed on February 9, 1994. The respondents were asked to return the completed survey no later than February 21, 1994.

The reasons for selecting the population of this study were as follows:

1. To provide a representation of municipal composting operations that exist with environmental conditions similar to Montana; and
2. To provide a comparative representation of composting implementation between the states surrounding Montana.

No statistical analysis of data was used in reporting the results of the survey other than numerical tabulation of responses for all criteria. Data collected from the questionnaires reflect the ranking of what respondents felt were most to least important in implementing a successful municipal composting program. This ranking is reported on TABLE 4 under response totals (column x).

Data Summary From the Survey

The information presented in TABLE 4 contains the results that were derived from the survey and are listed under "RESPONSE TOTALS," "PERCENT," and "CRITERIA RANKING." The items listed under "CRITERIA" were obtained from the initial and secondary review of literature. The values indicated under the RESPONSE TOTALS were obtained by adding up the rankings given by respondents for each particular criterion. The standard mean ( $\bar{x}$ ) was calculated by dividing the response totals by 19; the percentages were then calculated by dividing the RESPONSE TOTALS by the total possible (19 ranking  $\times$  29 possible respondents = 551). The criteria ranking is based on the percentages. Therefore, the smaller the percentage, the higher a ranking the criteria received.

TABLE 4

Composting Criteria Verified from the survey.

| CRITERION                                 | RESPONSE<br>TOTALS / x | PERCENT | CRITERIA<br>RANKING |
|-------------------------------------------|------------------------|---------|---------------------|
| PICK-UP, SORTING &<br>SEPARATION          | 124 / 6.53             | 23%     | #6                  |
| DISTRIBUTION MARKET/<br>FINISHED MATERIAL | 224 / 11.79            | 41%     | #3                  |
| EDUCATION                                 | 107 / 5.63             | 19%     | #17                 |
| COMPOSTING SYSTEMS                        | 116 / 6.11             | 21%     | #5                  |
| EQUIPMENT                                 | 142 / 7.47             | 26%     | #9                  |
| COST                                      | 70 / 3.68              | 13%     | #1                  |
| OTHER/MISCELLANEOUS                       | 278 / 15.44            | 50%     | #19                 |
| COLLECTION SYSTEMS                        | 77 / 4.05              | 14%     | #2                  |
| LOCATION                                  | 109 / 5.74             | 20%     | #4                  |
| ODOR                                      | 130 / 6.84             | 24%     | #7                  |
| QUALITY                                   | 179 / 9.42             | 32%     | #13                 |
| CAPACITY/QUANTITY                         | 139 / 7.72             | 25%     | #10                 |
| LAWS                                      | 137 / 7.21             | 25%     | #8                  |
| LABOR/WORKERS                             | 169 / 8.89             | 31%     | #12                 |
| TRACKING WASTE                            | 225 / 11.84            | 41%     | #18                 |
| YARD WASTES                               | 204 / 10.74            | 37%     | #15                 |
| POPULATION                                | 205 / 10.79            | 37%     | #16                 |
| ORGANIC MATTER                            | 193 / 10.16            | 35%     | #14                 |
| ENVIRONMENT                               | 151 / 7.95             | 27%     | #11                 |

The ranking obtained from the survey indicates that the most important criterion to municipal composting operators is COST due to a low response total (70 RESPONSE TOTAL, 13%). OTHER/MISCELLANEOUS was ranked in last place because of the high response total (278 RESPONSE TOTAL, 50%).

#### Data Comparison of the Survey

The results of the criteria ranking from the review of literature and the criteria ranking from the survey are compared in TABLE 5. The findings of the two criteria rankings do not match for any of the criteria.

TABLE 5

Composting Criteria comparing the review of literature to the survey.

| CRITERION                          | CRITERIA RANKING |        |
|------------------------------------|------------------|--------|
|                                    | JOURNALS         | SURVEY |
| COST                               | #6               | #1     |
| COLLECTION SYSTEMS                 | #8               | #2     |
| DISTRIBUTION MARKET/FINISHED MAT'L | #2               | #3     |
| LOCATION                           | #9               | #4     |
| COMPOSTING SYSTEMS                 | #4               | #5     |
| PICK-UP/SORTING/SEPARATION         | #1               | #6     |
| ODOR                               | #10              | #7     |
| LAWS                               | #13              | #8     |
| EQUIPMENT                          | #5               | #9     |
| CAPACITY/QUANTITY                  | #12              | #10    |
| ENVIRONMENT                        | #19              | #11    |
| LABOR/WORKERS                      | #14              | #12    |
| QUALITY                            | #11              | #13    |
| ORGANIC MATTER                     | #18              | #14    |
| YARD WASTES                        | #16              | #15    |
| POPULATION                         | #17              | #16    |
| EDUCATION                          | #3               | #17    |
| TRACKING WASTE                     | #15              | #18    |
| OTHER/MISCELLANEOUS                | #7               | #19    |



## Criteria and State Law

### Introduction

It is important to address state law to observe any areas of conflict that would nullify or lower the effect of any of the criteria discussed. To accomplish this task, the pending Montana State Law on composting was reviewed as well as state law for North Dakota, Wyoming, and Idaho.

### Montana Law for Composting

Montana law on composting is in the draft stage and has not been enacted. Because these rules are currently in draft form, they are not included in Appendix E. Preliminary rules do specify treatments for different compostable materials, such as sludge and solid waste and yard waste. Sludge and solid waste rules and regulations are much more specific than for yard waste composting, thus adding credence to the ease of operation for a yard waste composting facility.

Section 5 under the pending Montana Composting Rules discusses the requirements for obtaining a permit for yard waste composting. This section addresses the engineering report to be submitted as part of the permit application process.

Section 6 under the pending Montana Composting Rules identifies the operational requirements of the facility. In no way do any of the points that are covered under Yard Waste Composting diminish or eliminate any of the aforementioned

nineteen points of criteria.

North Dakota Law for Composting

North Dakota composts yard waste only and not municipal solid waste. Currently, the state disposes of 85-90% of waste into the landfills. The state has gone from 42 landfills down to 11 landfills with the enactment of the R.C.R.A. rules going into effect on October 9, 1993 (extended to April 9, 1993).

State laws for yard waste composting in North Dakota state: "An owner or operator of a composting facility for grass and leaves shall:

- a. Direct surface water or storm water from composting and waste storage areas;
- b. Control surface water drainage to prevent leachate runoff;
- c. Store solid waste separated from compostable material in a manner that controls vectors and aesthetic degradation, and remove this solid waste from the site to an appropriate facility at least weekly;
- d. Turn the yard waste periodically to aerate the waste, maintain temperatures, and control odors; and
- e. Prevent the occurrence of sharp objects greater than one inch (2.54 centimeters) in size in finished compost offered for use." (NDCC 23-29-04, 1991, p. 4-

9,10)

North Dakota also encourages communities to work with

local landowners for direct application of compost to the land.

#### Wyoming Law for Composting

Wyoming currently has no laws that regulate composting. The state does ask potential commercial composting operations to submit a brief outline of the operation, but no permits are required at this time.

The state does promote recycling to help reduce the amount of garbage that currently enters the landfills. In 1990, Governor Sullivan asked a number of Wyoming people to help determine the steps that state government should take to stimulate recycling. This group issued their first report to the Governor that same year with recommendations for executive and legislative actions to promote recycling in Wyoming (See APPENDIX E).

Two main recommendations were made by the Committee. First, the Committee believes that community leaders should do formal planning to assure that the best and most cost-effective recycling systems are made available in their communities.

Second, the Committee believes that the Legislature, and the executive branch of government, should take a number of steps to help city and county governments identify markets for collected recyclable materials (See APPENDIX E).

Idaho Law for Composting

Idaho does not have any state regulations for composting. Each district within the state is encouraged to come up with its own plan for composting.

Summary

This chapter has presented data collected from the initial review of literature and verification of gathered criteria through the second review of literature, along with a rank order of composting criteria. The subsequent survey conducted with operators of municipal composting operations produced a distinctive rank ordering, setting it apart from the literature review ranking.

What can be said regarding state law for municipal composting in Montana, Idaho, Wyoming, and North Dakota is that the influence of these states, which are trying to encourage municipal composting, may initially be weak since only landfill reduction goals exist presently. The federal regulations continue to toughen the guidelines by requiring states to limit the kinds of waste currently entering the landfills.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

The purpose of this chapter is to summarize the findings of the literature research and the verification of those items or criteria deemed necessary for successful composting in rural communities within the state of Montana utilizing a survey of landfill operators in Montana, Idaho, Wyoming, and North Dakota.

#### Summary

The review of literature was conducted in two phases. Phase one was the initial review of literature which contributed to a list of criteria appearing frequently in preselected journals. Phase two was a secondary review of literature to verify those criteria found during the initial review of literature. These criteria were then rank ordered by frequency of response from most frequent to least frequent, thus indicating a degree of importance.

A survey of landfill operators was then conducted, they were asked to rank order the criteria from most important to least important regarding successful municipal composting. The selection of operators for the survey was based on rural environments similar to Montana's. Since caution is clearly warranted in using data from other communities to assess the potential cost-effectiveness of yard waste recycling programs in specific communities, or in regions of the country such as the western and central states, with different climate, demographics, and land use patterns (Waste Age, Nov. 1991, p.84), twenty-nine operators were chosen in the states of Idaho, Wyoming, North Dakota, and Montana. Of the twenty-nine operators, twenty responses were returned for survey ranking. The survey rankings do not match the rankings from the review of literature (see TABLE 5).

### Conclusions

The two criteria rankings do not match for any of the criteria, which clearly indicates that although a given criteria may have been widely discussed within a journal, it may not be as important in practical application by a municipal composting operator in a cold rural environment such as Montana. By definition alone, it is difficult to design an ideal collection and processing system. The design would be a function of each aspect of the 19 criteria discussed. The entire loop, from creation to solution, is constantly evolving (Howells, 1992).

A partial answer to designing of the perfect system may be found in carefully addressing each of the criteria. The tracking of attitudes, perspectives, and education about municipal composting operations in a rural environmental setting like Montana should yield a higher success rate.

### Recommendations

The ranking of the composting criteria is important to successful municipal composting programs in Montana and other states similar in climate, rural setting, and state wealth. Based on this research, the following recommendations are offered:

- (1) Since the two rankings did not agree, closer



tracking between the journals and those municipal compost operators in a rural setting may be necessary;

(2) Although a topic or criterion on composting may appear to be of concern, a publisher should strive to obtain an editorial balance among all regions involved in municipal composting;

(3) Composting is one of several options to help reduce the amount of waste that enters landfills daily. Therefore, each of these criteria should be thoroughly reviewed by any community interested in implementing a successful composting program for its municipality; and

(4) Eventually, a municipal composting plan or body of knowledge utilizing these criteria should be prepared for Montana landfill operators should they volunteer to meet the pending 1996 Montana state goal of 25% reduction in the volume of solid waste going into landfills.

#### Recommendations for Further Study

The composting criteria that has been qualified and quantified within this paper can now be used for the development and implementation of a decision-making model. The decision-making model would be a guide for helping state governments and municipal landfill operators design and develop a successful municipal landfill composting operation.

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**APPENDICES**



**APPENDIX A**  
**SURVEY INSTRUMENT**


**Department of Agricultural and Technology Education**

Cheever Hall  
 Montana State University  
 Bozeman, MT 59717-0374  
 406-994-3201 or 994-3691

City of Green River  
 Solid Waste Division  
 50 East 2nd North  
 Green River, Wyo 82935

February 9, 1994

Dear Mr. Morgan:

I am graduate student at Montana State University and am focusing my professional paper on what criteria should be addressed for a successful municipal composting program. I am seeking research information concerning municipal composting and your input is needed to complete the attached one-page survey. After an extensive review of literature, I have developed a list of criteria necessary for creating and implementing a successful municipal composting program. The objective is to rank the criteria in the order that you feel is the most important criteria to the least important criteria. Your rank ordering will help me to quantify the criteria within my professional paper.

The enclosed survey has two columns; one column lists the criteria and the second column is for your rank ordering. The smaller the number, the more important that criteria is to realizing a successful municipal composting program. For example: If you felt that COLLECTION SYSTEMS was the most important criteria to successful municipal composting than you would place a "1" next to COLLECTION SYSTEMS and if you felt that CAPACITY/ QUANTITY was the next most important criteria you would write a number "2" next to CAPACITY/QUANTITY and you felt that COMPOSTING SYSTEMS was less important than CAPACITY/QUANTITY than you would place a number "3" next to COMPOSTING SYSTEMS (please see the example below).

SURVEY EXAMPLE

| CRITERIA           | CRITERIA RANKING |
|--------------------|------------------|
| CAPACITY/QUANTITY  | 2                |
| COLLECTION SYSTEMS | 1                |
| COMPOSTING SYSTEMS | 3                |

Sincerely,

Brian S. Jones  
 graduate student, M.S.U.

## S U R V E Y

NAME: \_\_\_\_\_

JOB TITLE: \_\_\_\_\_

NOTE: please note that the following criteria have been placed in alphabetical order and by no means, reflects the criteria ranking in order of importance.

| CRITERIA                              | CRITERIA RANKING |
|---------------------------------------|------------------|
| CAPACITY/QUANTITY                     |                  |
| COLLECTION SYSTEMS                    |                  |
| COMPOSTING SYSTEMS                    |                  |
| COST                                  |                  |
| DISTRIBUTION MARKET/FINISHED MATERIAL |                  |
| EDUCATION                             |                  |
| ENVIRONMENT                           |                  |
| EQUIPMENT                             |                  |
| LABOR/WORKERS                         |                  |
| LAWS                                  |                  |
| LOCATION                              |                  |
| ODOR                                  |                  |
| ORGANIC MATTER                        |                  |
| OTHER/MISCELLANEOUS                   |                  |
| PICK-UP/SORTING/SEPARATION            |                  |
| POPULATION                            |                  |
| QUALITY                               |                  |
| TRACKING WASTE                        |                  |
| YARD WASTES                           |                  |

A list of each criteria with the accepted definitions common to composting literature is attached for any clarification you may need.

When you have finished ranking the criteria please place the survey ranking instrument in the enclosed envelope. If you would like a copy of the survey results, please check this line \_\_\_\_\_. Thank you for your participation. Please return this survey in the self-addressed, stamped envelope no later than 2-21-94.

## DEFINITIONS

**CAPACITY/QUANTITY**--the final goal of the composting facility will affect the kind of compost material accepted and the resulting yield.

**COLLECTION SYSTEMS**--how the compostable material is collected, ie: curbside pick-up, drop-off at transfer stations, drop-off at the site, a centralized drop-off site, etc. Also, what kind of containers are used.

**COMPOSTING SYSTEMS**--how the compostable material is composted at the site.

**COST**--start-up capital needed and the operating costs.

**DISTRIBUTION MARKET/FINISHED MATERIAL**--how the completed compost is distributed to the public and some of the popular uses for the finished material.

**EDUCATION**--how the public is educated will lead to a more successful participation in a municipal composting program for the community.

**ENVIRONMENT**--composting can be carried out in any natural environment within the lower 48 states and the environments' major role to a successful composting facility is to make sure that the facility is accessible to equipment and carriers throughout the year via paved and packed roads.

**EQUIPMENT**--some equipment accessibility is necessary for a successful municipal composting program and the magnitude of the program depends on what kind of equipment is needed.

**LABOR/WORKERS**--the labor that is required depends a great deal upon the magnitude of the operation, available equipment, capital and costs, and quantity of compostable material.

**LAWS**--the laws that have been established for each state affect the magnitude and quality of the finished compost.

**LOCATION**--where the municipal composting site is located.

**ODOR**--objectionable odors that can be created by the composting process and the impact it can have on the community and the success of the composting program.

**ORGANIC MATTER**--composting of organic matter only and does not include inorganic matter due to possible contamination.

**OTHER/MISCELLANEOUS**--items deemed important but does not fall under a specific category; ie: public or private ownership of the site, recycling at the site, etc.

**PICK-UP/SORTING/SEPARATION**--how and when the compost is picked up and sorted by the hauler or compost center. How the compostable material is separated from non-compostable material either by the public or hauler.

**POPULATION**--population is important to the success of a composting facility in terms of available quantity of compostable material

**QUALITY**--the importance of the quality with respect to its final use.

**TRACKING WASTE**--to maintain the final compost quality, quantity, and marketability more attention should be paid to the input rather than the output.

**YARD WASTES**--the use of yard wastes reduces the chances of contaminants that may otherwise be present in compostable material.

**APPENDIX B**  
**LIST OF PARTICIPANTS IN THE SURVEY**

To:

From: Brian Jones

Date: October 4, 1993

Subject: Composting in surrounding states

I called 307-777-7746 and talked spoke with Diana Gentry Hoggle from the Solid Waste Department. She stated that Wyoming does not have any composting guidelines established by the state. All the state asks for is if it is a commercial operation then send the state the who, what and where of the operation. No permits are required. She only knew of 6 composting operations in Wyoming and they were started in the past 2 years.

I called 208-555-1212 to get a listing for the Solid Waste Department in Idaho and was given the name of Carol Devenir at 208-384-3914, P.O. Box 500, Boise, ID 83701. She, in turn, gave me the number of the Central District Health Department at 208-327-7499 and I spoke with Ron Baird. He said there are no state regulations at this time but that each district was encouraged to come up with their own plan. He said it is hard to come up with the definition between what is commercial and non-commercial. Carol also gave me the number of Dave Neal at 208-853-1297.

I called 701-221-5166 to talk with Thomas Rich at the Department of Health but was transferred over to Bob Wetzch for information on composting for the state of North Dakota. He said that all the state composts is yard waste only and no M.S.W. Currently, the state disposes of 85-90% into the landfills. The state has gone from 42 landfills to 11 landfills with the enactment of the R.C.R.A. rules going into effect. All the state asks for in yard waste operations is to control the runoff. The state also encourages communities to work a deal with local land owners for direct application of compost to the land. I eventually talked with Robert Avalon who sent me a list of municipalities, population of 75,000 or less, participating in a municipal composting program.

I contacted the Department of Health and Environmental Sciences in Helena, Montana at 406-444-1430 and talked with Laura Dando who sent me a list of all municipalities participating in municipal composting within the state.

## COMPOST PROGRAMS

MONTANA

- 
- |                                                                                                         |                                                                                                           |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1. City of Bozeman<br>Roger Sicz<br>P.O. Box 640<br>Bozeman, MT 58715<br>(406)586-3321                  | 7. City of Sidney<br>Scott Vanas<br>2140 West Holly<br>Sidney, MT 59270<br>(406)798-3352                  |
| 2. City of Great Falls<br>Martin Basta<br>1025 25th Avenue NE<br>Great Falls, MT 59403<br>(406)771-1401 | 8. Butte-Silver Bow<br>Gary Keeler<br>Courthouse<br>Butte, MT 59701<br>(406)723-8262                      |
| 3. City of Scobey<br>Lane Drury<br>Landfill Supervisor<br>Scobey, MT 59263<br>(406)783-5396             | 9. City of Big Timber<br>Kevin Hutchins<br>Landfill Supervisor<br>Big Timber, MT 59011<br>(406)932-5611   |
| 4. Flathead County<br>Gary Stempin<br>P.O. Box 168<br>Kalispell, MT 59901<br>(406)752-1174              | 10. City of Libby<br>Ron Anderson<br>418 Mineral Avenue<br>Libby, MT 59923<br>(406)293-7781               |
| 5. Musselshell County<br>Transfer Station<br>506 Main Street<br>Roundup, MT 59072                       | 11. City of Livingston<br>Ken Kastelitz<br>414 East Calendar St.<br>Livingston, MT 59047<br>(406)222-2005 |
| 6. Valley Co. Refuse Dist.<br>Jenny Reinhart<br>P.O. Box 534<br>Glasgow, MT 59230<br>(406)228-8221      |                                                                                                           |

IDAHO

- 
- |                                                                                    |                                                                                               |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 12. Ada County<br>Dave Neal<br>650 Main Street<br>Boise, ID 83702<br>(208)853-1297 | 13. Solid Waste Division<br>Carol Devenir<br>P.O. Box 500<br>Boise, ID 83701<br>(208)384-3914 |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|



WYOMING

- 
- |                                                                                                                    |                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <p>14. City of Gillette<br/>Karen Redfield<br/>P.O. Box 3003<br/>Gillette, WYO 82717<br/>(307)686-5279</p>         | <p>16. Campbell Engineering<br/>Dennis Holm<br/>500 S. Gillette Ave.<br/>Suite 145<br/>Gillette, WYO 82716</p>    |
| <p>15. City of Green River<br/>Wiley Morgan<br/>50 East 2nd North<br/>Green River, WYO 82935<br/>(307)875-5000</p> | <p>17. City of New Castle<br/>Tom Khomgphand<br/>#10 West Warwick<br/>New Castle, WYO 82701<br/>(307)746-2882</p> |

NORTH DAKOTA

- 
- |                                                                                                               |                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <p>18. City of Fargo<br/>Ron Olson<br/>2301 8th Ave. N.<br/>Fargo, N.D. 58102</p>                             | <p>24. City of Grand Forks<br/>Dick Newman<br/>P.O. Box 1518<br/>Grand Forks, N.D. 58206</p>                     |
| <p>19. City of Bismarck<br/>Bob Gausvik<br/>P.O. Box 5503<br/>Bismarck, N.D. 58502<br/>(701)222-6471</p>      | <p>25. City of Minot<br/>Alan Walters<br/>515 2nd Ave. S.W.<br/>Minot, N.D. 58701<br/>(701)857-4750</p>          |
| <p>20. City of Dickinson<br/>Ken Kussy<br/>P.O. Box 1037<br/>Dickinson, N.D. 58601<br/>(701)264-7744</p>      | <p>26. City of Mandan<br/>Tom Little<br/>205 2nd Ave. N.W.<br/>Mandan, N.D. 58554<br/>(701)667-3210</p>          |
| <p>21. City of Jamestown<br/>Robin Bobzein<br/>203 1st St. W.<br/>Jamestown, N.D. 58401<br/>(701)252-5900</p> | <p>27. City of West Fargo<br/>Don Wald<br/>800 4th Ave. E.<br/>W. Fargo, N.D. 58078<br/>(701)282-3843</p>        |
| <p>22. City of Williston<br/>Monte Meiers<br/>P.O. Box 1306<br/>Williston, N.D. 58802<br/>(701)572-8161</p>   | <p>28. City of Devilslake<br/>Glenn Olsen<br/>P.O. Box 1048<br/>Devilslake, N.D. 58301<br/>(701)662-4098</p>     |
| <p>23. City of Wahpeton<br/>Mary Adrick<br/>120 4th St. N.<br/>Wahpeton, N.D. 58075<br/>(701)624-8448</p>     | <p>29. City of Valley City<br/>Leroy Neubauer<br/>P.O. Box 390<br/>Valley City, N.D. 58072<br/>(701)845-1700</p> |

**APPENDIX C**

**GRAPHICAL PRESENTATION OF DATA FROM THE SURVEY**

# LITERATURE & SURVEY

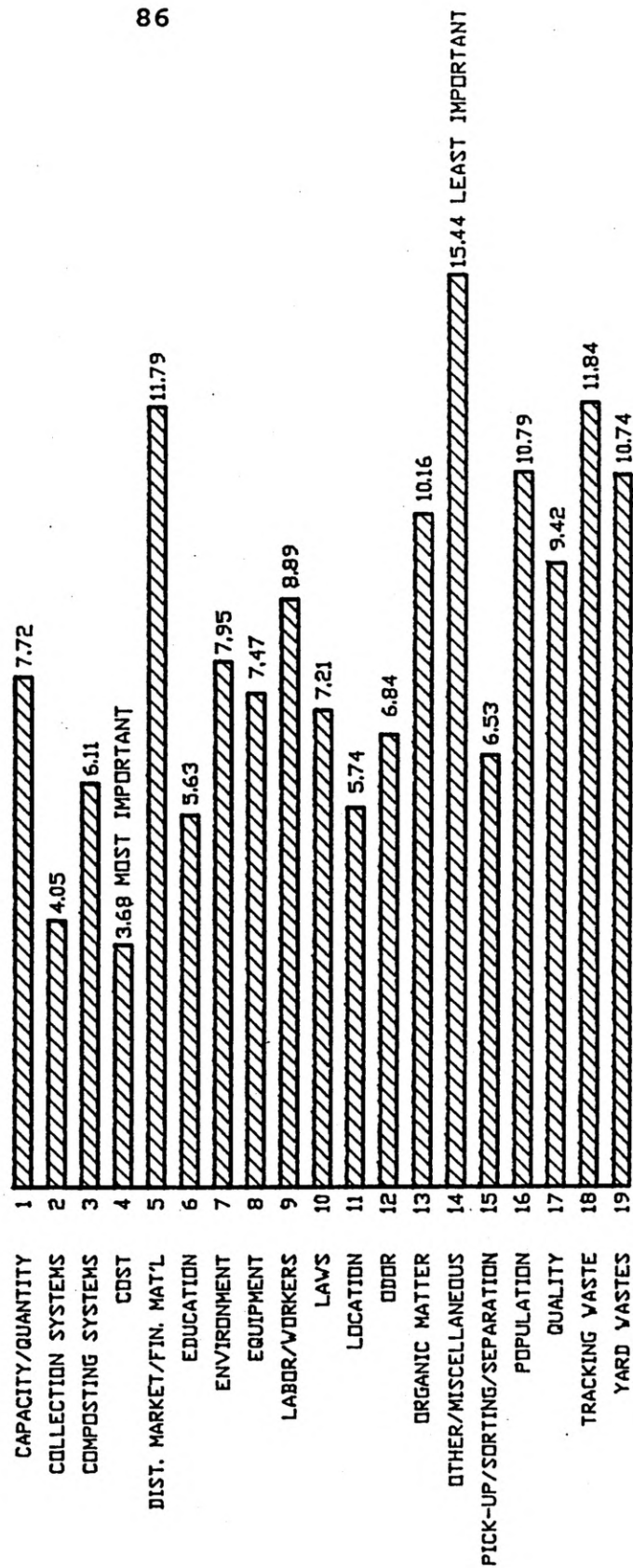
## RANK ORDERING

| CRITERIA                   | 1  | NUMBER OF RESPONSES |    |   |    |    |    |   |   |   |    |    |    |    |    |    |    |    |    |    | TOTAL | TOTAL<br>19 | TOTAL<br>551 |    |    |    |    |     |       |      |     |
|----------------------------|----|---------------------|----|---|----|----|----|---|---|---|----|----|----|----|----|----|----|----|----|----|-------|-------------|--------------|----|----|----|----|-----|-------|------|-----|
|                            |    | 1                   | 2  | 3 | 4  | 5  | 6  | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |       |             |              | 20 | 21 | 22 | 23 | 24  | 25    | 26   | 27  |
| CAPACITY/QUANTITY          | 1  | 8                   | 9  | 2 | 9  | 14 | 15 |   |   |   |    |    |    | 1  | 3  | 1  | 12 | 11 | 1  | 2  | 16    | 2           | 14           | 9  |    | 10 |    |     | 139   | 7.72 | 25% |
| COLLECTION SYSTEMS         | 2  | 6                   | 4  | 3 | 12 | 2  | 2  |   |   |   |    |    |    | 2  | 9  | 3  | 1  | 1  | 2  | 5  | 6     | 1           | 4            | 6  |    | 7  | 1  | 77  | 4.05  | 14%  |     |
| COMPOSTING SYSTEMS         | 3  | 5                   | 7  | 3 | 11 | 3  | 4  |   |   |   |    |    |    | 2  | 1  | 1  | 11 | 12 | 3  | 13 | 10    | 7           | 5            | 3  |    | 11 | 4  | 116 | 6.11  | 21%  |     |
| COST                       | 4  | 9                   | 8  | 1 | 2  | 4  | 8  |   |   |   |    |    |    | 2  | 2  | 1  | 10 | 2  | 1  | 1  | 4     | 5           | 1            | 4  |    | 2  | 2  | 70  | 3.68  | 13%  |     |
| DIST. MARKET/FIN. MAT'L    | 5  | 18                  | 16 | 2 | 17 | 12 | 16 |   |   |   |    |    |    | 3  | 15 | 2  | 18 | 8  | 3  | 16 | 17    | 10          | 11           | 19 |    | 18 | 3  | 224 | 11.79 | 41%  |     |
| EDUCATION                  | 6  | 4                   | 1  | 1 | 10 | 5  | 1  |   |   |   |    |    |    | 2  | 18 | 1  | 9  | 3  | 1  | 8  | 3     | 15          | 3            | 11 |    | 6  | 5  | 107 | 5.63  | 19%  |     |
| ENVIRONMENT                | 7  | 10                  | 10 | 2 | 4  | 17 | 11 |   |   |   |    |    |    | 1  | 6  | 1  | 13 | 9  | 2  | 14 | 7     | 8           | 6            | 10 |    | 14 | 6  | 151 | 7.95  | 27%  |     |
| EQUIPMENT                  | 8  | 11                  | 12 | 1 | 14 | 16 | 7  |   |   |   |    |    |    | 3  | 4  | 1  | 8  | 4  | 2  | 15 | 11    | 9           | 7            | 5  |    | 5  | 7  | 142 | 7.47  | 26%  |     |
| LABOR/WORKERS              | 9  | 12                  | 11 | 2 | 15 | 18 | 6  |   |   |   |    |    |    | 2  | 10 | 1  | 7  | 5  | 2  | 9  | 15    | 4           | 10           | 14 |    | 15 | 11 | 169 | 8.89  | 31%  |     |
| LAWS                       | 10 | 1                   | 17 | 2 | 1  | 7  | 17 |   |   |   |    |    |    | 2  | 5  | 1  | 17 | 6  | 3  | 3  | 1     | 18          | 9            | 16 |    | 1  | 10 | 137 | 7.21  | 25%  |     |
| LOCATION                   | 11 | 2                   | 5  | 1 | 3  | 8  | 13 |   |   |   |    |    |    | 2  | 8  | 1  | 6  | 7  | 13 | 10 | 9     | 11          | 2            | 8  |    | 3  | 9  | 109 | 5.74  | 20%  |     |
| ODOR                       | 12 | 3                   | 6  | 2 | 5  | 15 | 14 |   |   |   |    |    |    | 1  | 7  | 1  | 3  | 14 | 2  | 11 | 8     | 6           | 8            | 12 |    | 4  | 8  | 130 | 6.84  | 24%  |     |
| ORGANIC MATTER             | 13 | 7                   | 15 | 2 | 8  | 13 | 10 |   |   |   |    |    |    | 1  | 17 | 1  | 4  | 13 | 2  | 17 | 13    | 12          | 19           | 15 |    | 12 | 12 | 193 | 10.16 | 35%  |     |
| OTHER/MISCELLANEOUS        | 14 | 14                  | 19 | 1 | 18 | 19 | 19 |   |   |   |    |    |    | 3  | 19 | 2  | 19 | 15 | 19 | 19 | 16    | 20          |              |    |    | 19 | 18 | 278 | 15.44 | 50%  |     |
| PICK-UP/SORTING/SEPARATION | 15 | 13                  | 2  | 3 | 13 | 6  | 3  |   |   |   |    |    |    | 2  | 11 | 1  | 2  | 10 | 2  | 12 | 5     | 3           | 12           | 1  |    | 8  | 15 | 124 | 6.53  | 23%  |     |
| POPULATION                 | 16 | 19                  | 18 | 3 | 16 | 1  | 18 |   |   |   |    |    |    | 2  | 12 | 3  | 16 | 19 | 2  | 4  | 2     | 17          | 15           | 7  |    | 17 | 14 | 205 | 10.79 | 37%  |     |
| QUALITY                    | 17 | 15                  | 3  | 2 | 6  | 11 | 12 |   |   |   |    |    |    | 2  | 16 | 1  | 5  | 16 | 2  | 6  | 14    | 13          | 13           | 13 |    | 16 | 13 | 179 | 9.42  | 32%  |     |
| TRACKING WASTE             | 18 | 16                  | 13 | 2 | 13 | 10 | 5  |   |   |   |    |    |    | 3  | 13 | 3  | 14 | 17 | 3  | 18 | 18    | 16          | 17           | 18 |    | 9  | 17 | 225 | 11.84 | 41%  |     |
| YARD WASTES                | 19 | 17                  | 14 | 1 | 7  | 9  | 9  |   |   |   |    |    |    | 1  | 14 | 1  | 15 | 18 | 1  | 7  | 12    | 14          | 18           | 17 |    | 13 | 16 | 204 | 10.74 | 37%  |     |

# BAR CHART

## RANKING OF CRITERIA FROM THE SURVEY

### CRITERIA



**APPENDIX D**  
**JOURNAL MISSION STATEMENTS**

# WHY **YOU** SHOULD ADVERTISE IN **BioCycle**

- 1** BioCycle has the highest paid circulation of any magazine serving the composting and recycling industries.
- 2** BioCycle readers are responsible for buying equipment and services.
- 3** BioCycle's editorial content is thorough, tested and trusted.
- 4** BioCycle delivers quality respondents.
- 5** BioCycle introduces new professionals to recycling, composting and biosolids reuse industries through aggressive marketing programs.


**BioCycle**

# **PUBLISHER'S STATEMENT**

---

For over 33 years, **BioCycle** has been a major force in creating the most dynamic segment of waste management — the composting and recycling industry. This monthly magazine is recognized worldwide as the authoritative voice on turning residential, industrial and agricultural residuals into marketable end products yielding economic and environmental benefits.

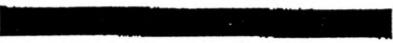
Every issue of **BioCycle** reports on the most effective systems and technologies for collecting, processing, composting and marketing segments of the waste stream — from curbside pickup to materials recovery facilities...yard trimmings composting to land application... biosolids management to plastic recycling. Timely reports, research findings, project results and analyses make **BioCycle** the "prime information source" for decision makers, facility managers, and project developers.

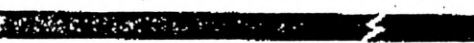
The information contained in each issue of **BioCycle** has become the standard reference for waste management professionals interested in the most current industry data. Annual highlights include:

- **The State of Garbage in America** — This two-part report is the definitive source of statistical information on solid waste generation, disposal and regulatory initiatives in the United States. It is widely quoted in the media and used extensively in the government and private sectors.
- **Annual Surveys and Special Reports** — Published throughout the year, the surveys provide the most up to date information on biosolids composting, residential recycling, yard trimmings composting, materials recovery facilities and MSW and source separated composting.
- **Project Reports** — Of special interest to **BioCycle** readers and advertisers are the in-depth, issue-oriented reports on key recycling and composting projects in the United States, Canada and foreign countries.
- **Significant Trends** — Each issue of the magazine reports on trends affecting every aspect of the industry — organics recycling, cocollection of garbage and recyclables, the expanding role of landfills as MRF and composting sites, markets for recyclables and biosolids reuse.

# **CIRCULATION STATEMENT**

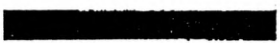
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**Paid subscribers**  **15,160**

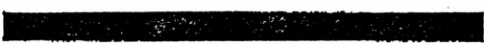
**Pass along readership**  **57,608**  
(3.8 readers per copy)

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**New England**  
Connecticut, Maine, Massachusetts,  
New Hampshire, Rhode Island, Vermont  **8%**

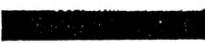
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**Middle Atlantic**  
New Jersey, New York, Pennsylvania  **14%**

---

**East North Central**  
Illinois, Indiana, Michigan, Ohio,  
Wisconsin  **15%**

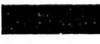
---

**West North Central**  
Iowa, Kansas, Minnesota, Missouri,  
Nebraska, North Dakota, South Dakota  **6%**

---

**South Atlantic**  
Delaware, District of Columbia, Florida,  
Georgia, Maryland, North Carolina,  
South Carolina, Virginia, West Virginia  **12%**

---

**East South Central**  
Alabama, Kentucky, Mississippi,  
Tennessee  **3%**

---

**West South Central**  
Arkansas, Louisiana, Oklahoma, Texas  **6%**

---

**Mountain**  
Arizona, Colorado, Idaho, Montana,  
Nevada, New Mexico, Utah, Wyoming  **5%**

---

**Pacific**  
Alaska, California, Hawaii, Oregon,  
Washington  **13%**

---



**BioCYCLE**

# READER AND ADVERTISER TESTIMONIALS

"Jacksonville has aggressively attacked its solid waste stream by utilizing recycling and composting alternatives. BioCycle has proven to be a valuable reference that the city has used in achieving these results. This information provides the tools necessary for any local government to undertake an integrated solid waste reduction program."

Scott Kelly,  
Chief, Solid Waste Division,  
Jacksonville, Florida

"I consider the monthly score-board a valuable asset in the composting industry. We read every issue and then save it for future reference."

Jan Allen,  
Cedar Grove Composting, Inc.,  
Seattle, Washington

"A very targeted and effective medium. Their focus on composting makes BioCycle an integral part of our marketing program."

Jim Wahl,  
Fecon Inc.,  
Fairfield, Ohio

"BioCycle is the best magazine covering composting and recycling in the world. Year after year, BioCycle Conferences continue to be the best forum for ideas and information on composting. The top people and hottest issues are always front and center in the magazine and at BioCycle Conferences"

John Madole,  
Ceres, Inc.,  
St. Paul, Minnesota

"A valuable work tool for all professionals in the recycling and composting industry. The publication provides up-to-date, reliable information on equipment, projects and insights into other operations that help in the decision-making process."

Tom Lehmann,  
Sanitation Dept.,  
St. Petersburg, Florida

"BioCycle has always been the first resource I turn to when researching composting issues. Now, with its expanded focus on traditional materials recovery and recycling, I use BioCycle even more."

Ellyn Hae,  
Recycling By Nature, Inc.,  
Carmel, California

"If any publication can claim to be the bible of the composting industry, it is BioCycle - which was there 'at the beginning.' Today there is an expanding recognition of the economic and environmental feasibility of organic recycling. BioCycle continues to make a major contribution to that public understanding."

Archie Albright,  
International Process Systems,  
Newport Beach, California

"BioCycle is an invaluable resource for tracking the technologies and business directions of organic composting worldwide. It's a 'must read' for anyone in the composting business."

Sharon Barnes,  
Barnes Nursery, Inc.,  
Huron, Ohio

"With its ongoing coverage of new and active composting and recycling facilities, informative regional conferences, and competitive advertising prices, BioCycle magazine offers an extremely good exposure value for the advertising dollar."

Tiny Andrews,  
Amadas Industries,  
Suffolk, Virginia

# DOVETAIL

P U B L I S H E R S

## GARBAGE Mission Statement

GARBAGE is independently published and has no ties to any political movement, industry, membership group, or activist organization. Furthermore, the editors endeavor to present topics of environmental concern from a journalistic perspective, rather than an advocacy perspective.

The mission of the magazine is

... to follow in the tradition of a journal—looking to expert sources, providing depth of coverage, introducing the affiliations of all writers, offering analysis and perspective, and soliciting counterpoints.

... to predict and then research the important stories and controversies.

... to allow for skepticism (on all points of view), but with insight and a dose of humor.

... to allow science to speak, and allow policy to speak—and endeavor to explain which is which.

Finally, GARBAGE provides a forum where sometimes discordant groups—scientists, industry leaders, environmentalists, journalists, and public servants—may speak on the record before a diverse readership. Through presentation of a range of topics and opinions, the editors try to speak to the intrinsically human needs that gave rise to the modern environmental movement, while not ignoring science, while not discounting history, and while paying heed to risk assessment, prioritization, and economics.

---

# DOVETALE

P U B L I S H E R S

**GARBAGE** is a truly independent magazine, supported by its readers (no paid advertising). This breakthrough environmental publication offers quarterly news analysis on consumer sentiment, corporate programs, legislation, and media trends. Differing sides of environmental debates are presented, not as a shouting match, but as a forum for better understanding and possible consensus. **GARBAGE** eschews ideology to bring out the reasonable concerns and articulate voices on all sides of debate.

## 1993-1994 SUBSCRIPTION AGENCY DATASHEET

Resource Recycling, Inc.  
 P.O. Box 10540  
 Portland, OR 97210 USA  
 (503) 227-1319  
 (503) 227-6135 fax

Title: Resource Recycling ISSN No.: 0744-4710

Frequency: Monthly Format: Magazine

Volume No.: 1994 issues will be Vol. XIII-1 to Vol. XIII-12

Contact: Sheila Payne, Circulation Director

Guarantee: A refund of the remaining balance due on the subscription is granted on request with no questions asked.

Description: Resource Recycling is North America's largest, most comprehensive recycling magazine. This English-language periodical covers all aspects of post-consumer waste recycling, including market development projects, legislation, technological innovations and trade organization activities.

Back Issues: Some back issues are available for \$4 U.S. each.

|                |                      |                     |
|----------------|----------------------|---------------------|
| U.S. Rates:    | <u>Regular rates</u> | <u>Agency price</u> |
|                | 1-year: \$42 U.S.    | 1-year: \$36 U.S.   |
|                | 2-year: \$68 U.S.    | 2-year: \$58 U.S.   |
|                | 3-year: \$92 U.S.    | 3-year: \$78 U.S.   |
| Foreign Rates: | <u>Regular rates</u> | <u>Agency price</u> |
|                | 1-year: \$55 U.S.    | 1-year: \$48 U.S.   |
|                | 2-year: \$94 U.S.    | 2-year: \$80 U.S.   |
|                | 3-year: \$131 U.S.   | 3-year: \$112 U.S.  |

The magazine is mailed at second-class postage rates. Airmail rates are available on request.

4.

## Editorial Coverage and Calendar

### Solid Waste TECHNOLOGIES

RECYCLING • COMPOSTING •  
WASTE-TO-ENERGY • LANDFILLING •  
AIR POLLUTION CONTROL • GAS-TO-ENERGY

### 1994 Editorial Calendar

| Issue                      | Special Emphasis                              | Special Subject         | Recycling Emphasis     | Ad Order Deadline | Show and Special Distributions Planned                                                                                                                                                                          |
|----------------------------|-----------------------------------------------|-------------------------|------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jan./Feb. Vol. 8 No. 1     | O&M                                           | Scrap Tire Management   | C&D Debris Recycling   | December 22       | SWANA's Recycling Symposium, Baltimore, Md.                                                                                                                                                                     |
| March/April Vol. 8 No. 2   | Air Quality                                   | Landfill Technology     | Composting             | February 11       | SWANA's Landfill Gas Symposium, Long Beach, Calif.;<br>Municipal Waste Management Association Annual Conference, Washington, D.C.                                                                               |
| May/June Vol. 8 No. 3      | WTE Outlook                                   | Sludge Management       | MRF Design/Engineering | April 1           | New England Resource Recovery Conf., Portland, Maine<br>MSWMA's Waste Expo '94, Dallas, Tex.<br>AWMA 87th Annual Meeting, Cincinnati, Ohio<br>ASME Biennial National Waste Processing Conference, Boston, Mass. |
| July/August Vol. 8 No. 4   | Retrofitting                                  | Landfill Gas            | Recycling Equipment    | May 27            | National Association of Counties, Las Vegas, Nev.<br>SWANA's 32nd Annual Meeting, San Antonio, Tex.                                                                                                             |
| Sept./Oct. Vol. 8 No. 5    | WTE Equipment                                 | Ash Handling/Management | MRF Awards             | July 22           | 13th National Recycling Congress, Portland, Oregon                                                                                                                                                              |
| Nov./Dec. Vol. 8 No. 6     | WTE Design/Engineering                        | Geosynthetics           | Collection Practices   | September 9       | Power Gen '94, Orlando, Fla.<br>National League of Cities, Minneapolis, Minn.                                                                                                                                   |
| Special Issue Vol. 8 No. 7 | 1995 Industry Sourcebook & Project Spotlights |                         |                        | November 4        | Distribution at conferences throughout the year.                                                                                                                                                                |

# 2.

## Readership Profile and Circulation

*Solid Waste Technologies* goes to over 16,000 readers. Each issue goes to key public and private sector professionals. That is a guaranteed, sworn-to circulation.

The readership profile shows that readers' activities extend into all the key areas of the industry.

### Readership Profile\*

| Readers employed by:                                                | Percent |
|---------------------------------------------------------------------|---------|
| Public Works/Engineering/<br>Solid Waste Managers                   | 28%     |
| Private Engineering/Consulting Services                             | 26%     |
| MSW Service Providers<br>(hauling, landfill, recycling, collection) | 20%     |
| Plant/Facility Operations                                           | 14%     |
| Community Recycling Officials                                       | 11%     |
| Development/Construction/Rehab Firms                                | 12%     |

\*Based on July 1993 independently conducted readership study. Total is greater than 100% as some readers work in more than one area.

## Mission Statement

Disposal of solid waste poses major problems for communities nationwide. *Solid Waste Technologies* is dedicated to providing useful information to problem-solvers and decision-makers to help them solve their waste disposal problems.

*Solid Waste Technologies* aims to be a leading source of relevant, reliable information...information to help community leaders, officials, consultants, and others involved with municipal solid waste disposal.

Integrated solid waste management is the most practical approach to community waste disposal today. *Solid Waste Technologies* covers all categories of this important strategy, namely:

- source reduction,
- recycling,
- waste-to-energy,
- landfilling.

Articles are written by the industry's foremost experts to provide reliable, practical information on current approaches to solid waste management. The articles describe up-to-date experiences and solutions... solutions that optimize the use of technological, financial, and human resources. Advanced technology is often involved, and *Solid Waste Technologies* goes to extra efforts to ensure that the articles are both useful and understandable.

*Solid Waste Technologies* continually seeks input from industry specialists and feedback from readers in order to guide the magazine toward being a practical resource for devising solutions to our solid waste problems.

## Solid Waste TECHNOLOGIES

RECYCLING • COMPOSTING •  
WASTE-TO-ENERGY • LANDFILLING •  
LANDFILL GAS-TO-ENERGY

ICI Publications  
10 Archibald Street  
Kansas City, MO 64111  
Phone 816-931-1311  
Fax 816-931-2015

**BUSINESS PUBLICATION  
CIRCULATION STATEMENT  
FOR THE 6 MONTH PERIOD ENDED  
JUNE 1993**

No attempt has been made to rank the information contained in this report in order of importance, since BPA International believes this is a judgment which must be made by the user of the report.

BPA International  
270 Madison Avenue  
New York, NY 10016-0699  
(212) 779-3200  
FAX (212) 725-1721

**Waste  
Age**

National Solid Waste Management  
Association  
1750 Rhode Island Avenue N.W.  
Suite 1000  
Washington, DC 20036  
(202) 651-0708

Official Publication of: None  
Established: 1969  
Issues Per Year: 12

171, 201, 100-33  
COMPARABLE

**BPA  
INTERNATIONAL**

**FIELD SERVED**

WASTE AGE serves private contracting firms, governmental entities, consulting engineers, industrial plants, retailing firms, and hospitals as well as equipment dealers, distributors, and manufacturers.

**DEFINITION OF RECIPIENT QUALIFICATION**

Qualified recipients are owners, managers, other titled and non-titled personnel, and company copies of private refuse firms, municipal, county, state and federal government officials, corporate executives and engineers. Also qualified are consultants in the waste field.

To: Brian Jones

From: Randy Woods

For lack of an actual mission statement, you can use this description of our audience, at least, coupled with mission statements from our three-tiered association that follows.

Hope it helps!

- R. J. K. K. K.  
Associate Editor  
202/244-4700

**AVERAGE NON-QUALIFIED CIRCULATION**

| NON-QUALIFIED<br>Not Included Elsewhere            | Copies       |
|----------------------------------------------------|--------------|
| Advertiser and Agency .....                        | 715          |
| Related or Occasional .....                        | .            |
| Allocated for Trade Shows<br>and Conventions ..... | 610          |
| All Other .....                                    | 2,593        |
| <b>TOTAL</b>                                       | <b>3,918</b> |

**1. AVERAGE QUALIFIED CIRCULATION BREAKOUT FOR PERIOD**

| QUALIFIED CIRCULATION                                              | Total Qualified |              | Qualified Non-Paid |             | Qualified Paid |            |
|--------------------------------------------------------------------|-----------------|--------------|--------------------|-------------|----------------|------------|
|                                                                    | Copies          | Percent      | Copies             | Percent     | Copies         | Percent    |
| Single .....                                                       | 37,072          | 100.0        | 36,827             | 99.5        | 165            | 0.5        |
| Group .....                                                        | .               | .            | .                  | .           | .              | .          |
| Association .....                                                  | .               | .            | .                  | .           | .              | .          |
| Bulk .....                                                         | .               | .            | .                  | .           | .              | .          |
| <b>TOTAL QUALIFIED CIRCULATION</b>                                 | <b>37,072</b>   | <b>100.0</b> | <b>36,827</b>      | <b>99.5</b> | <b>165</b>     | <b>0.5</b> |
| Non-qualified paid subscriptions<br>and/or non-paid requests ..... | 1,918           |              |                    |             |                |            |
| Single Copy Sales .....                                            | .               |              |                    |             |                |            |
| <b>TOTAL CIRCULATION</b>                                           | <b>38,990</b>   |              |                    |             |                |            |

**2. QUALIFIED CIRCULATION BY ISSUES WITH REMOVALS AND ADDITIONS FOR PERIOD**

| 1993 Issue     | Qualified Non-Paid | Qualified Paid | Total Qualified | Number Removed | Number Added |
|----------------|--------------------|----------------|-----------------|----------------|--------------|
| January .....  |                    |                | 36,636          | 2,007          | 732          |
| February ..... |                    |                | 36,608          | 208            | 250          |
| March .....    |                    |                | 37,065          | 156            | 573          |
| April .....    |                    |                | 37,551          | 546            | 1,012        |
| May .....      |                    |                | 37,365          | 2,711          | 2,525        |
| June .....     |                    |                | 37,135          | 3,214          | 2,964        |
| <b>TOTALS</b>  |                    |                |                 | <b>8,842</b>   | <b>8,076</b> |

WASTE AGE  
JUNE 1993



# The New NSWMA Organizational Structure

*Environmental Industry Associations • National Solid Wastes Management Association • Hazardous Waste Management Association • Waste Equipment Technology Association*

**O**n Dec. 13, 1993, the Board of Directors of the National Solid Wastes Management Association approved the adoption of a new organizational structure. This new structure consists of an umbrella organization and three separate associations, which are designed to better address the specialized needs and diverse interests of the membership. Each new association has its own board of governors and a dedicated staff position of executive vice president.

"We have taken the first steps of a new beginning,"

Lonnie Poole, CEO, Waste Industries, Inc., (Raleigh, N.C.), and outgoing NSWMA Chairman said after the vote. "This new structure streamlines our organization for faster, better service to members. It makes us more inclusive and representative of member interests. And it will help us be proactive rather than reactive."

New EIA Chairman Lee Brandsma announced, "We have prepared the organization to more effectively serve our state chapters, equipment and service companies, hazardous waste firms, and all the other segments of the industry we represent."

## Environmental Industry Associations

**T**he Environmental Industry Associations (EIA) is an international member-directed trade association dedicated to the advancement of safe and environmentally protective management of wastes through the private waste services industry.

EIA is the umbrella organization for three constituent groups—the National Solid Wastes Management Association (NSWMA), the Hazardous Waste Management Association (HWMA), and the Waste Equipment Technology Association (WASTEC)—that reflect the specialized and diverse business interests of EIA members.

EIA owns and operates enterprise activities such as *Waste Age*, *WasteExpo*, and insurance programs, and will be associated with a new research foundation. The EIA is a resource for the delivery of member services through the three associations by the provision of 1) a stable base and support from enterprises and dues; 2) support for federal and state government affairs, public and legal affairs, personnel, and administration; 3) support for the research, educational, and informational needs of the associations through the foundation; and 4) promotion of the public image of the waste services industry.

The EIA Board of Trustees consists of seven voting and two non-voting members (the EIA Executive Director/CEO and the EIA Foundation representative). No member firm shall have more than two persons serving concurrently on the Board of Trustees. The voting members of the Board of Trustees for the Environmental Industry Associations are:

**Lee Brandsma (Chairman)** (for NSWMA) Groot Industries, Elk Grove Village, Ill.  
**William F. Leone (Secretary/Treasurer)** (for NSWMA) Waste Services, Inc., Rockaway Beach, N.Y.  
**Robert C. Duncan (for NSWMA)** J.C. Duncan Companies, Arlington, Texas  
**Charles S. Wilson (At-Large member)** Truk-Away of Rhode Island, Inc., Warwick, R.I.  
**Ronald McCracken (for WASTEC)** Bes-Pac, Inc., Easley, S.C.  
**Richard J. Pastor (for HWMA)** EnviroSafe Management Svc., Inc., King of Prussia, Pa.  
**William P. Hulligan (for WMTX Technologies)** WMNA—Midwest Group, Westchester, Ill.

## Organizational Structure *continued...*

### National Solid Wastes Management Association (NSWMA)

**T**he newly reconstituted National Solid Wastes Management Association (NSWMA) is a constituent body of the EIA and is a member-directed organization dedicated to advancing the safe and environmentally protective management of non-hazardous wastes through the private waste services industry. NSWMA membership is comprised of firms that provide solid waste services, including collection, recycling, materials processing, disposal, medical waste services, street cleaning, incineration, and those entities that provide professional, environmental, financial, and legal services to waste service entities.

NSWMA is organized to provide and maintain a leadership position as the voice of the non-hazardous waste services industry with and before government, industry, state, and local arenas; develop and advocate standards,

policies, and programs that promote the cost-effective management of solid waste to protect human health and the environment; develop and sponsor programs to inform, educate, and assist the private solid waste services industry in good waste management practices; foster a positive image of the solid waste services industry as responsible, concerned, and successful business enterprises; and develop and provide a system of organized, reliable, and accessible data and information regarding the management of solid wastes.

Voting seats on the NSWMA Board of Governors are held by representatives from state chapters and from national companies. No more than 20% of the Board of Governors is to consist of representatives from any single member.

#### *The members of the NSWMA Board of Governors are:*

Arizona Chapter—Tony Ciofalo (Chairman), Allied Waste Industries, Scottsdale, Ariz.  
 Carolinas Chapter—Robert Shepard, Fennell Container Co., North Charleston, S.C.  
 Connecticut Chapter—Joseph R. Ravalese, Tobacco Valley Sanitation Service South, Windsor, Conn.  
 Florida Chapter—Andy Crawford, Southland Waste Systems, Jacksonville, Fla.  
 Georgia Chapter—Tom Bowen, United Waste Service, Inc., Atlanta  
 Illinois Chapter—Thomas J. Yonker, Homewood Disposal Service, East Hazelcrest, Ill.  
 Indiana Chapter—Carl M. Hornberger, National Serv-All, Inc., Fort Wayne, Ind.  
 Iowa Chapter—David G. Bergan, Waste Systems Corp., Des Moines, Iowa  
 Kentucky Chapter—David Hyman, Industrial Disposal Co., Louisville, Ky.  
 Maryland/Delaware Chapter—E. Thomas Harvey III, Harvey & Harvey, Wilmington, Del.  
 Massachusetts Chapter—Richard Gaguon, Commercial Disposal Co., West Springfield, Mass.  
 Michigan Chapter—Paul T. Sgriccia, City Management Corp., Detroit  
 Minnesota Chapter—Larry Knutson, Knutson Services, Inc., Rosemount, Minn.  
 Missouri Chapter—Daniel E. Imig, Waste Management, Inc., Maryland Heights, Mo.  
 New Jersey Chapter—George A. Lohman, J. DiRese &

Sons, Inc., Cresskill, N.J.  
 New York Chapter—Joseph Fiorillo, Suburban Carting Corp., Mamaroneck, N.Y.  
 Ohio Chapter—Mark Peterson, Laidlaw Waste Systems, Columbus, Ohio  
 Pennsylvania Chapter—Scott R. Wagner, (Vice Chairman) York Waste Disposal, York, Pa.  
 Rhode Island Chapter—Tom McCaughey, McCaughey Standard, Pawtucket, R.I.  
 Texas Chapter—Robert C. Duncan, J.C. Duncan Companies, Arlington, Texas  
 Virginia Chapter—Danny Holly III, Holly's Inc. Disposal Service, Suffolk, Va.  
 West Virginia Chapter—Larry D. Brown, Weston Transfer, Inc., Weston, W. Va.  
 Wisconsin Chapter—George Evenhouse, Lloyd Brothers Trucking, Schofield, Wis.  
 Attwoods, Inc.—(To be designated)  
 Laidlaw, Inc.—Ronald J. Poland  
 Mid-American Waste Systems, Inc.—Christopher L. White  
 WMX Technologies Inc.—Patrick J. Banfield

#### Non-Voting:

NSWMA Trustee—Lee Brandsma  
 NSWMA Trustee—William F. Leone  
 NSWMA Trustee—Robert C. Duncan  
 EIA Executive Director/CEO—Eugene J. Wingerter  
 Executive Vice President—Sheila M. Prindville

## Hazardous Waste Management Association (HWMA)

**T**he Hazardous Waste Management Association (HWMA) is a constituent body of the EIA and is dedicated to the safe and environmentally protective handling of chemical wastes and industrial by-products. It is organized into three institutes: The Chemical Waste Transportation Institute (CWTI); The Institute for Chemical Waste Management (ICWM); and The Remedial Contractors Institute (RCI).

HWMA members are entities involved in the storage, treatment, disposal, or recycling of hazardous waste or PCBs; the recycling of hazardous waste or industrial secondary materials; the transportation of chemical waste, including hazardous waste, industrial waste, special or "state designated" waste, and PCBs; the remediation of hazardous waste and industrial waste sites or spills; oil spill response; and the provision of professional, technical, financial, and legal services to these entities.

During 1994, the HWMA will work to ensure that legislation and regulations affecting the "identification" and "categorization" of hazardous waste are environmentally protective and can be effectively implemented by member-companies. Other major HWMA efforts will support the simplification and speed-up of Superfund site cleanups, the elimination of state and local provisions complicating the intrastate and interstate transportation of hazardous waste, and the development of timely and reliable data related to environmental equity.

The HWMA Board of Governors consists of seven voting members—four elected from the ICWM, two from the CWTI, and one from the RCI—and two or three non-voting members—the HWMA representative of the EIA Board of Trustees, the EIA Executive Director/CEO, and the HWMA Executive Vice President.

*Officers are to be elected in January 1994 by HWMA's Board of Governors. Current Institute chairmen are:*

**Stephen C. Hansen** (for CWTI), Heritage Transport, Inc., Indianapolis

**Richard J. Pastor** (for ICWM), EnviroSAFE Management Services, Inc., King of Prussia, Pa.

**Randall M. Walters** (for RCI), OHM Corp., Findlay, Ohio

**Non-Voting:**

**Eugene M. Wingerter**, EIA Executive Director/CEO

**Douglas MacMillan**, HWMA Executive Vice President

## Organizational Structure *continued...*

### Waste Equipment Technology Association (WASTEC)

**T**he Waste Equipment Technology Association (WASTEC) is a constituent body of the EIA and is dedicated to the development and utilization of equipment technologies in the safe and environmentally responsible management of wastes.

The goals of WASTEC are to provide a leadership position as the voice of the equipment technology sector; develop standards, policies, and programs to promote the proper design, manufacture, application, maintenance, marketing, and use of waste services equipment technology for the protection of human health and the environment; develop and sponsor related educational and information programs; develop and promote a positive image of the technology sector as responsible, concerned,

and successful business enterprises; develop and provide a system of organized, reliable, and accessible data, statistics, and information regarding equipment technologies for the management of wastes; and develop membership services and materials for manufacturers, distributors, and technical consultants.

The WASTEC Board of Governors consists of five voting members—four from the members of the Committee of Manufacturers and one from the members of the Committee of Distributors—and three non-voting members—the elected representative of the EIA Board of Trustees, the EIA Executive Director/CEO, and the WASTEC Executive Vice President.

#### *The members of the WASTEC Board of Governors are:*

Michael D. Lynn (Chairman), Labrie Equipment,  
Jacksonville, Fla.  
Sidney Wildes, Harris Waste Management Group,  
Peachtree City, Ga.  
Ted Flood, International Baler, Jacksonville, Fla.  
Jim Cunningham, Diversified Industries, Inc.,  
Springdale, Ark.  
Thomas P. Stevens, Thomas P. Stevens, Inc., Sterling  
Heights, Mich.

#### *Non-Voting:*

Ronald McCracken (EIA representative for WASTEC)  
Eugene J. Wingerter, EIA Executive Director/CEO  
Jack Legler, WASTEC Executive Vice President

**APPENDIX E**  
**STATE LAWS**

**MONTANA LAW**

# INTEGRATED WASTE MANAGEMENT

75-10-801. Short title. This part may be cited as the "Montana Integrated Waste Management Act".

75-10-802. Definitions. As used in this part, the following definitions apply:

(1) "Composting" means the controlled biological decomposition of organic matter into humus.

(2) "Department" means the department of health and environmental sciences provided for in 2-15-2101.

(3) "Integrated waste management" means the coordinated use of a priority of waste management methods, including waste prevention, as specified in 75-10-804.

(4) "Postconsumer material" means only those paper products generated by a consumer that have served their intended end uses and have been separated or diverted from the solid waste stream.

(5) "Recycling" means all activities involving the collection of recyclable material, including but not limited to glass, paper, or plastic; the processing of recyclables to prepare them for resale; the marketing of recovered material for use in the manufacture of similar or different products; and the purchase of products containing recycled material.

(6) "Special waste" means solid waste that has unique handling, transportation, or disposal requirements to ensure protection of the public health, safety, and welfare and the environment.

(7) "Waste reduction" means practices that decrease the weight, volume, or toxicity of material entering the solid waste management stream after consumer or commercial use but prior to incineration or disposal.

75-10-803. Solid waste reduction target. It is the goal of the state, by January 1, 1996, to reduce by at least 25% the volume of solid waste that is either disposed of in a landfill or incinerated.

75-10-804. Integrated waste management priorities. It is the policy of the state to plan for and implement an integrated approach to solid waste management, which must be based upon the following order of priority:

- (1) reduction of waste generated at the source;
- (2) reuse of waste;
- (3) recycling of waste;
- (4) composting of biodegradable waste; and
- (5) landfill disposal or incineration.

75-10-805. State government source reduction and recycling program. (1) In order to progress toward achieving the waste reduction target identified in 75-10-803, each state agency, the legislature, and the university system shall:



(a) prepare a source reduction and recycling plan by January 1, 1992, to reduce the solid waste generated by state government. This plan must be submitted to the department and must include, at a minimum, provisions for the composting of yard wastes and the recycling of office and computer paper, cardboard, used motor oil, and other materials produced by the state for which recycling markets exist or may be developed.

(b) establish and implement a source reduction and recycling program by July 1, 1992; and

(c) apply computer technology to reduce the generation of waste paper through:

(i) the use of electronic bulletin boards;

(ii) the transfer of information in electronic rather than paper form; and

(iii) other applications of computer technology.

(2) The plan must be evaluated every 5 years and updated as necessary.

75-10-806. State government procurement of recycled supplies and materials. (1) The department of administration shall write purchasing specifications that incorporate requirements for the purchase of materials and supplies made from recycled materials if the use is technologically practical and reasonably cost-effective. By January 1, 1992, these requirements must be incorporated into the purchase of:

(a) paper and paper products;

(b) plastic and plastic products;

(c) glass and glass products;

(d) automobile and truck tires;

(e) motor oil and lubricants; and

(f) other materials and supplies as determined by the department of administration.

(2) It is the goal of the state that by January 1, 1996, 95% of the paper and paper products used by state agencies, universities, and the legislature must be made from recycled material that maximizes postconsumer material content.

(3) Prior to January 1, 1996, the state shall, to the maximum extent possible, purchase for use by state agencies paper and paper products that contain postconsumer material rather than new material.

(4) To the extent practical, guidelines for the recycled material content of paper should be consistent with nationwide standards for recycled paper.

(5) The department and the department of administration shall establish a joint recycling market development task force. Task force membership must include but is not limited to representatives of the recycling industry, wholesalers, state agencies, and citizen and environmental organizations, as well as other interested persons. The task force shall:

(a) assist the department of administration in developing purchasing specifications as required in subsection (1);

(b) develop additional mechanisms for state government to develop markets for recycled materials;



(c) identify procurement barriers that discriminate against the purchase of supplies and products that contain recycled material; and

(d) develop recommendations for an informational program designed to educate state employees on how to reduce waste and recycle in the workplace.

75-10-807. Requirement to prepare and implement state solid waste management plan. (1) As a basis for developing an integrated waste management program and ensuring adequate disposal capacity, the department shall prepare and implement a state solid waste management plan in accordance with this part.

(2) The plan must be comprehensive and integrated and must include at least the following elements:

(a) a capacity assurance element that identifies existing disposal capacity, estimates waste generation rates, and determines the disposal capacity needed for the future and that assesses the potential effect of interstate disposal on capacity;

(b) an element that incorporates federal regulations 40 CFR, parts 257 and 258;

(c) an element that identifies the role of each of the components of the integrated waste management priorities contained in 75-10-804 in meeting the solid waste reduction target in 75-10-803;

(d) a technology assessment element that assesses the availability and practicality of alternative technologies for solid waste management;

(e) an education and public information element that identifies existing education and information programs and describes how the state will increase the awareness and cooperation of the public in environmentally safe solid waste management;

(f) a special waste and household hazardous waste element that identifies types and quantities of wastes that create special disposal problems and recommends methods for reducing, handling, collecting, transporting, and disposing of those wastes and that identifies existing and future strategies for managing those wastes;

(g) an element that identifies the needs of rural communities and management strategies to address those needs;

(h) an element that identifies mechanisms to ensure proper training of landfill operators; and

(i) a timeline and implementation strategy for each of the plan elements.

(3) The plan must be developed with the involvement of local officials, citizens, solid waste and recycling industries, environmental organizations, and others involved in the management of solid waste.

(4) The department shall conduct hearings as provided in 75-10-111.

(5) The plan must be evaluated every 5 years and updated as necessary.

Sample Policy Statement

POLICY MEMO #

Waste Reduction and Recycling

In accordance with the Integrated Waste Management Act  
(75-10-801 MCA through 75-10-807 MCA)

1. Each agency shall:
  - implement a source reduction and recycling program by July 1, 1992. At a minimum, the plan must account for the composting of yard waste and the recycling of office and computer paper, cardboard, and used motor oil.
  - reduce paper use through computer technology and other methods
2. Specifications shall be written by the Department of Administration for the purchase of materials and supplies made from recycled materials if the use is technologically practical and reasonably cost-effective. These requirements must be incorporated into state government purchase of paper, plastic, and glass products, automobiles and truck tires, and motor oil and lubricants, and other materials and supplies as determined by the Department of Administration.
3. It is the state's goal that by 1996, 95% of the paper and paper products used by state agencies must be made from recycled material that maximizes postconsumer content. Before 1996, the state shall, to the maximum extent possible, purchase paper and paper products that contain postconsumer material rather than new material.

Policy

This waste reduction and recycling policy has been drafted to provide uniform standards throughout the (agency/building).

The waste reduction plan will consist of a variety of waste reducing and recycling measures. It will take into account the composting of yard waste, recycling of office paper, computer paper, cardboard, and if feasible, the collection of used motor oil from agency vehicles. As part of the plan, our (agency/building) will purchase, when available, paper, plastic, and glass items made of recycled materials, as well as motor oil and retread tires in appropriate applications.

The duties and responsibilities involved in the implementation and operation of the plan will be an official function of the waste reduction coordinator. A permanent waste reduction committee consisting of 5 or more staff members will be

formed to assist the coordinator in performing many of the implementation activities.

Workers will participate in the waste reduction measures implemented by the coordinator and committee responsible for the waste reduction plan.

Copier paper and bond paper containing recycled material are available through the Department of Administration's Central Stores program. The copier paper, bond paper, and any other recycled products will be used in appropriate applications.

The (agency/division/unit) purchasing staff will serve as an information resource to workers regarding the availability of specific supplies containing recycled material through the Central Stores program.

## Sub-Chapter 4

## License and Operation Fees

16.14.401 PURPOSE (1) The purpose of this subchapter is to establish solid waste management system licensing requirements and fee schedules provided for in 75-10-115, and 204, MCA. (History: Sec. 75-10-115, 75-10-204, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.402 AUTHORITY (1) Authority for rules promulgated in this subchapter is provided for in 75-10-115, 204, and 221, MCA, under which the department may establish and collect fees for the management and regulation of solid waste disposal. These fees may include:

(a) A license application fee that reflects the cost of reviewing a new solid waste management system or substantial change to an existing facility;

(b) An annual license renewal fee that reflects a minimal base fee related to the fixed costs of an annual inspection and license renewal based upon the following formula:

(i) for a major facility with a planned capacity of more than 25,000 tons of solid waste a year, \$3,500;

(ii) for an intermediate facility with a planned capacity of more than 5,000 tons of solid waste a year but not more than 25,000 tons a year, \$3,000;

(iii) for a minor facility with a planned capacity of not more than 5,000 tons a year, \$2,500; and

(c) A volume-based fee on solid waste disposal. (History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.403 DEFINITIONS Unless the context requires otherwise, in this sub-chapter the following definitions apply:

(1) "Board" means the board of health and environmental sciences provided for in 2-15-2104, MCA.

(2) "Co-composting" means the simultaneous composting of two or more diverse waste streams.

(3) "Composting" means the controlled biological decomposition of organic solid waste under aerobic conditions.

(4) "Container site" means a facility for the collection of solid waste generated by more than one household or firm, generally open to the public, in refuse container(s) with a total site capacity of more than ten (10) cubic yards.

(5) "Department" means the department of health and environmental sciences provided for in Title 2, chapter 15, part 21.

(6) "Dispose" or "disposal" means the discharge, injection, deposit, dumping, spilling, leaking, or placing of any solid waste into or onto the land so that the solid waste or any constituent of it may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

(7) "Facility" means a manufacturing, processing or assembly establishment; a transportation terminal, or a treatment, storage or disposal unit operated by a person at one site. This definition does not include infectious waste incinerators or other facilities that:

(a) control the generation, transportation, treatment, storage or disposal of infectious waste, as that term is defined in 75-10-1003(4), MCA;

(b) are owned by and operated as a part of a profession, occupation, or health care facility that generates infectious waste and that is licensed by a board or department of the state; and

(c) do not control the treatment, storage or disposal of non-infectious solid waste.

(8) "Household hazardous waste" means products commonly used in the home that due to corrosivity, ignitability, reactivity, toxicity, or other chemical or physical properties are dangerous to human health or the environment. Household hazardous waste includes but is not limited to cleaning, home maintenance, automobile, personal care, and yard maintenance products.

(9) "Household waste" means any solid waste derived from households, including single and multiple residences, hotels, and motels, crew quarters, campgrounds and other public recreation and public land management facilities.

(10) "MSW composting" means municipal solid waste composting and is the controlled degradation of municipal solid waste. This includes the composting of municipal solid waste after some form of preprocessing to remove non-compostable inorganic materials.

(11) "Municipal solid waste landfill" means any publicly or privately owned landfill or landfill unit that receives household waste or other types of waste, including commercial waste, nonhazardous sludge, and industrial solid waste. The term does not include land application units, surface impoundments, injection wells, or waste piles.

(12) "Person" means an individual, firm, partnership, company, association, corporation, city, town, local governmental entity, or any other governmental or private entity, whether organized for profit or not.

(13) "Post-consumer recycling" means the reuse of materials generated from residential and commercial waste, excluding recycling of material from industrial processes that



## SOLID WASTE MANAGEMENT

16.14.403

has not reached the consumer, such as glass broken in the manufacturing process.

(14) "Recyclables" are materials that still have useful physical or chemical properties after serving their original purpose and that can, therefore, be reused or remanufactured into additional products.

(15) "Recycling" means the process by which materials otherwise destined for disposal are collected, reprocessed or remanufactured, and reused.

(16) "Residue" is the materials remaining after processing, incineration, composting, or recycling have been completed. Residues are usually disposed of in sanitary landfills.

(17) "Resource recovery" means the recovery of material or energy from solid waste.

(18) "Resource recovery facility" means a facility at which solid waste is processed for the purpose of extracting, converting to energy, or otherwise separating and preparing solid waste for reuse.

(19) "Resource recovery system" means a solid waste management system which provides for the collection, separation, recycling, or recovery of solid wastes, including disposal of nonrecoverable waste residues.

(20) "Reuse" is the use of a product more than once in its same form for the same purpose; e.g., a soft drink bottle is reused when it is returned to the bottling company for refilling.

(21) "Solid waste" means all putrescible and nonputrescible wastes, including but not limited to garbage; rubbish; refuse; ashes; sludge from sewage treatment plants, water supply treatment plants, or air pollution control facilities; construction and demolition wastes; dead animals, including offal; discarded home and industrial appliances; and wood products or wood byproducts and inert materials. "Solid waste" does not mean municipal sewage, industrial wastewater effluents, mining wastes regulated under the mining and reclamation laws administered by the department of state lands, slash and forest debris regulated under laws administered by the department of state lands, or marketable byproducts.

(22) "Solid waste management system" means a system which controls the storage, treatment, recycling, recovery, or disposal of solid waste. Such a system may be composed of one or more solid waste management facilities. This term does not include hazardous waste management systems.

(23) "Source reduction" is the design, manufacture, acquisition, and reuse of materials so as to minimize the quantity and/or toxicity of waste produced. Source reduction prevents waste either by redesigning products or by otherwise changing societal patterns of consumption, use, and waste

generation.

(24) "Source separation" is the segregation of specific materials at the point of generation for separate collection. Residences source separate recyclables as part of a curbside recycling program.

(25) "Substantial change" means any change in the operation, ownership, or siting of a facility in which review by the department takes more than 24 hours.

(26) "Storage" means the actual or intended containment of wastes, either on a temporary basis or for a period of years.

(27) "Transfer station" means a solid waste management facility that can have a combination of structures, machinery, or devices, where solid waste is taken from collection vehicles (public, commercial or private) and placed in other transportation units for movement to another solid waste management facility.

(28) "Transport" means the movement of wastes from the point of generation to any intermediate points and finally to the point of ultimate storage or disposal.

(29) "Treatment" means a method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any solid waste so as to neutralize the waste or so as to render it safer for transport, amenable for recovery, amenable for storage, or reduced in volume.

(30) "Yard waste" means leaves, grass clippings, prunings, and other natural organic matter discarded from yards, gardens, parks, etc. (History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, Sec. 75-10-115, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.404 APPLICABILITY (1) Except as provided in 75-10-214, MCA, this subchapter applies to any person disposing of solid waste or operating or maintaining a solid waste management system involved in the storage, treatment, recycling, recovery, or disposal of solid waste. (History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

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16.14.405

16.14.405 ANNUAL OPERATING LICENSE REQUIRED (1) Except as provided in 75-10-214, MCA, no person may dispose of solid waste or operate or maintain a solid waste management system after July 1, 1991 without an operating license from the department. The license period shall be for a base year from July 1 of one year through June 30 of the subsequent year.

(a) All license holders shall file an annual report with the department by April 1 of each year. The report shall be filed on a form available from the department.

(b) The department shall mail invoices for license renewal fees to license holders by June 15 of each year. License renewal fees will be calculated in accordance with Table 1, "Annual License Fee Schedule". Any solid waste management facility that does not fit into one of the categories listed in Table 1 shall be assessed fees no greater than major Class II landfill facilities. Payment of renewal fees may be submitted to the department quarterly, with the first payment due on or before July 31 of each base year. Failure to submit payments when due shall subject the license holder to the provisions of 75-10-116, MCA.

(c) The annual license fee specified in Table I will be pro-rated by quarter for the year in which a license is originally issued.

(2) The department will mail application forms to renewal applicants. Application for renewal of a solid waste management system license shall be submitted to the department by April 1 of each year. Applicants failing to submit the relicensing application and appropriate fees within the specified time shall be subject to the provisions of 75-10-116, MCA.

(3) Upon payment of the transfer fee shown in Table 2, "License Transfer Fee", the department will issue a new operating license to a person acquiring rights of ownership, possession or operation of a licensed solid waste management system. Any solid waste management facility that does not fit into one of the categories listed in Table 2 shall be assessed transfer fees no greater than major Class II landfill facilities. Department approvals on operating plans are not transferable prior to licensing.

(4) License fees will end when the department declares the facility "closed". The license fee will be prorated on a quarterly basis by the department for the year of closure.

(5) Except for prorated fees when the department declares a facility "closed", license fees are not refundable.



TABLE 1. ANNUAL LICENSE FEE SCHEDULE

| <u>FACILITY</u>                    | <u>ANNUAL<br/>LICENSE FEE</u> | <u>DISPOSAL<br/>FEE/TON</u> |
|------------------------------------|-------------------------------|-----------------------------|
| Major Class II Landfill            | \$3,500                       | \$0.31                      |
| Intermediate Class II Landfill     | 3,000                         | 0.31                        |
| Minor Class II Landfill            | 2,500                         | 0.31                        |
| Major Class III Landfill           | 1,000                         |                             |
| Minor Class III Landfill           | 500                           |                             |
| Major Incinerator                  | 3,500                         | 0.31                        |
| Intermediate Incinerator           | 3,000                         | 0.31                        |
| Minor Incinerator                  | 2,500                         | 0.31                        |
| Container System (Initial Site)    | 360                           |                             |
| Each Additional Container Site     | 50                            |                             |
| Transfer Station (>10,000 tons/yr) | 1,050                         |                             |
| Transfer Station (<10,000 tons/yr) | 400                           |                             |
| Large Composter Operation          | 1,500                         |                             |

TABLE 2. LICENSE TRANSFER FEE

| <u>FACILITY</u>                    | <u>TRANSFER FEE</u> |
|------------------------------------|---------------------|
| Major Class II Landfill            | \$500               |
| Intermediate Class II Landfill     | 400                 |
| Minor Class II Landfill            | 300                 |
| Major Class III Landfill           | 200                 |
| Minor Class III Landfill           | 150                 |
| Major Incinerator                  | 500                 |
| Intermediate Incinerator           | 400                 |
| Minor Incinerator                  | 300                 |
| Container System (Initial Site)    | 100                 |
| Each Additional Container Site     | 40                  |
| Transfer Station (>10,000 tons/yr) | 400                 |
| Transfer Station (<10,000 tons/yr) | 250                 |
| Large Composter Operation          | 400                 |

TABLE 3. APPLICATION REVIEW FEE SCHEDULE

| <u>FACILITY</u>                    | <u>APPLICATION REVIEW FEE</u> |
|------------------------------------|-------------------------------|
| Major Class II Landfill            | \$10,000                      |
| Intermediate Class II Landfill     | 7,500                         |
| Minor Class II Landfill            | 5,000                         |
| Major Class III Landfill           | 3,000                         |
| Minor Class III Landfill           | 2,000                         |
| Major Incinerator                  | 10,000                        |
| Intermediate Incinerator           | 7,500                         |
| Minor Incinerator                  | 5,000                         |
| Container System (Initial Site)    | 1,000                         |
| Each Additional Container Site     | 100                           |
| Transfer Station (>10,000 tons/yr) | 7,000                         |
| Transfer Station (<10,000 tons/yr) | 4,000                         |
| Large Composter Operation          | 3,000                         |
| Other Class II Materials           | 5,000                         |

## SOLID WASTE MANAGEMENT

16.14.407

(History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.406 VOLUME-BASED DISPOSAL FEE (1) Except as provided for in 75-10-214, MCA, and in fee Tables 1, 2 and 3, any person licensed to dispose of or incinerate solid waste shall submit to the department an annual fee of \$0.31 per ton of solid waste incinerated or disposed of at the licensed facility. This volume-based fee shall be submitted to the department in addition to license fees subject to the same schedule as the license fees.

(2)(a) The volume-based fee will be calculated by using one of the following methods:

- (i) actual weight of waste managed;
- (ii) estimated weight based upon the volume of waste managed;
- (iii) estimated weight based upon service area population; or
- (iv) special situations (e.g. two or more landfills servicing the same area and population, incinerator ash disposed of in a landfill, acceptance of out-of-district wastes, acceptance of special wastes, etc.).

(b) For the purpose of estimating weight based upon the volume of waste managed, the following formulas apply:

- (i) one cubic yard of loose refuse (residential or commercial) shall equal 300 pounds; and
- (ii) one cubic yard of compacted refuse (e.g. packer truck) shall equal 700 pounds.

(c) For solid waste management systems that choose not to weigh or measure the volume of waste managed, the following formulas shall be used for the purpose of estimating weight based upon service area population:

| POPULATION                               | TONS PER YEAR |
|------------------------------------------|---------------|
| Greater than 5,000                       | 1.04          |
| 1,000 - 5,000                            | 0.59          |
| Less than 1,000 and unincorporated areas | 0.41          |

(History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, Sec. 75-10-115, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.407 ANNUAL REPORTING; COMPOSTING; SPECIAL WASTES

(1) Any person owning or operating facilities that dispose of solid waste through landfilling or incineration shall submit to the department by April 1 of each year, on a form provided by the department, the following information:

- (a) Service areas and population of those areas;

(b) Total tonnage of solid waste received and disposed of during the previous year. Facilities that do not operate scales and that measure the volume of waste received and disposed of will use the following conversions to determine tonnage:

(i) loose refuse (residential and commercial) = 300 pounds per cubic yard;

(ii) compacted refuse (packer truck) = 700 pounds per cubic yard.

(c) Facilities that do not operate scales and that do not measure the volume of waste received and disposed of shall estimate the total tonnage of waste received and disposed of in the manner provided in ARM 16.14.406(2)(c)].

(2) All large composter operations must be licensed by the department. For the purposes of licensing fees the following definitions apply:

(a) A small composter operation must meet all the following criteria:

(i) under two acres active working area;

(ii) the operation must accept yard waste only;

(iii) the operation must accept less than 10,000 cubic yards annually; and

(iv) less than 1000 tons annual production.

(b) Large composter operations include all composter operations which do not meet the above criteria and specifically include the following:

(i) co-composters; and

(ii) any facility that accepts sewage sludge for composting.

(3) Small composter operations which accept waste from more than one source are required to register with the department on a form provided by the department. Small composter operations which accept waste from more than one source are not required to be licensed, but may be inspected by the department and must be conducted in accordance with guidelines issued by the department.

(4) Any person owning or operating a licensed facility that disposes of Group II solid wastes through landfilling will not be charged additional fees for composting operations conducted on the same site as the licensed facility. Composting operations must be included in the facility's approved plan of operation.

(5) The storage, treatment, recycling, recovery, or disposal of used tires must be at a licensed solid waste management facility. Class III facilities that are licensed exclusively for tires must keep records of the number of tires accepted by the facility. For the purpose of fee determinations the following conversion factor will apply:

(a) the average tire weighs 20 pounds.

## SOLID WASTE MANAGEMENT

16.14.408

(6) For the purpose of fee determination, Class III solid waste management facilities are divided into the following categories:

(a) Major facility--disposes of 1000 tons or more of material per year.

(b) Minor facility--disposes of less than 1000 tons of material per year. (History: Sec. 75-10-115, 75-10-204, 75-10-221, MCA; IMP, 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.408 APPLICATION REVIEW FEES - INITIAL LICENSE OR SUBSTANTIAL CHANGE TO AN EXISTING FACILITY (1) Application for an initial license for a solid waste management system or substantial change to an existing solid waste management system may be submitted at any time during the license base year. Licenses issued during the base year shall expire at the end of that license base year. The applicant for initial licensing of a facility shall submit the appropriate fees as shown in Table 3, "Application Review Fee Schedule" of ARM 16.14.405. Any solid waste management system that does not fit into one of the categories shall be assessed fees no greater than major Class II landfill facilities.

(2) Application for substantial change to an existing solid waste management system shall be subject to the fee schedule established for review of new or substantially changed applications contained in Table 3, "Application Review Fee Schedule". (History: Sec. 75-10-115, 75-10-204, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)

16.14.409 CONSOLIDATION OF LICENSES; FEES FOR CONSOLIDATED LICENSES (1) More than one solid waste management facility may be licensed as a part of the same solid waste management system, subject to the following limitations:

- (a) No more than one landfill may be consolidated under one solid waste management system license;
- (b) No more than one incinerator may be consolidated under one solid waste management system license;
- (c) A landfill and an incinerator may not be consolidated under the same license;
- (d) All solid waste management facilities consolidated under one solid waste management system license must manage the same or primarily the same solid waste stream;
- (e) All solid waste management facilities consolidated under the same solid waste management system license must be owned or operated by the same person; and
- (f) All solid waste management facilities consolidated under the same solid waste management system license must be included in the solid waste management system's approved plan of operation.

(2) The limitations provided in (1)(a), (b), and (c) above do not apply to facilities co-located at a single site or at contiguous sites.

(3) Except as otherwise provided in ARM 16.14.407(4) and in subsection (4) below, solid waste management systems containing more than one solid waste management facility shall be subject to fees equal to the sum of the following:

(a) the applicable fees calculated in accordance with Tables 1, 2 and 3 of ARM 16.14.405 for the facility which the department, after consultation with the applicant or licensee, determines to be the major facility included under the license; and

(b) one-half of the applicable fees calculated in accordance with Tables 1, 2 and 3 of ARM 16.14.405 for all other facilities consolidated under the same license.

(4) The department will not assess the \$0.31 per ton disposal fee of Table 1, ARM 16.14.405, for the landfill disposal of incinerator residues in the case where the incinerator facility and the landfill facility are both under a solid waste management system license, or licenses, held by a single person and the per ton fee is assessed for all of the solid wastes received for treatment by the incinerator facility. (History: Sec. 75-10-115, 75-10-204, MCA; IMP, Sec. 75-10-115, 75-10-204, 75-10-221, MCA; NEW, 1992 MAR p. 1377, Eff. 6/26/92.)



## CHAPTER NO. 222

[HB 160]

AN ACT ESTABLISHING A SOLID WASTE REDUCTION TARGET; ESTABLISHING INTEGRATED WASTE MANAGEMENT PRIORITIES; ESTABLISHING A STATE GOVERNMENT SOURCE REDUCTION AND RECYCLING PROGRAM; DIRECTING THE DEPARTMENT OF ADMINISTRATION TO DEVELOP PROCUREMENT GUIDELINES FOR RECYCLED MATERIALS; AUTHORIZING THE PREPARATION OF A STATE SOLID WASTE MANAGEMENT PLAN; AND AMENDING SECTION 75-10-104, MCA.

## STATEMENT OF INTENT

A statement of intent is required for this bill because the department of health and environmental sciences will need to promulgate rules in order to implement this bill. It is the intent of the legislature that these regulations reflect an emphasis on integrated waste management and achieving the 25% waste reduction goal by 1996. In addition, the regulations must be designed to protect the public health, safety, and welfare and the environment. It is also the intent of the legislature that state government assume a leadership role in the development and implementation of source reduction and recycling programs and in the establishment of markets for the purchase and use of recyclable materials.

*Be it enacted by the Legislature of the State of Montana:*

Section 1. Short title. [Sections 1 through 7] may be cited as the "Montana Integrated Waste Management Act".

Section 2. Definitions. As used in [sections 1 through 7], the following definitions apply:

- (1) "Composting" means the controlled biological decomposition of organic matter into humus.
- (2) "Department" means the department of health and environmental sciences provided for in 2-15-2101.
- (3) "Integrated waste management" means the coordinated use of a priority of waste management methods, including waste prevention, as specified in [section 4].
- (4) "Postconsumer material" means only those paper products generated by a consumer that have served their intended end uses and have been separated or diverted from the solid waste stream.
- (5) "Recycling" means all activities involving the collection of recyclable material, including but not limited to glass, paper, or plastic; the processing of recyclables to prepare them for resale; the marketing of recovered material for use in the manufacture of similar or different products; and the purchase of products containing recycled material.

(6) "Special waste" means solid waste that has unique handling, transportation, or disposal requirements to ensure protection of the public health, safety, and welfare and the environment.

(7) "Waste reduction" means practices that decrease the weight, volume, or toxicity of material entering the solid waste management stream after consumer or commercial use but prior to incineration or disposal.

Section 3. Solid waste reduction target. It is the goal of the state, by January 1, 1996, to reduce by at least 25% the volume of solid waste that is either disposed of in a landfill or incinerated.

Section 4. Integrated waste management priorities. It is the policy of the state to plan for and implement an integrated approach to solid waste management, which must be based upon the following order of priority:

- (1) reduction of waste generated at the source;
- (2) reuse of waste;
- (3) recycling of waste;
- (4) composting of biodegradable waste; and
- (5) landfill disposal or incineration.

Section 5. State government source reduction and recycling program. (1) In order to progress toward achieving the waste reduction target identified in [section 3], each state agency, the legislature, and the university system shall:

- (a) prepare a source reduction and recycling plan by January 1, 1992, to reduce the solid waste generated by state government. This plan must be submitted to the department and must include, at a minimum, provisions for the composting of yard wastes and the recycling of office and computer paper, cardboard, used motor oil, and other materials produced by the state for which recycling markets exist or may be developed.
- (b) establish and implement a source reduction and recycling program by July 1, 1992; and
- (c) apply computer technology to reduce the generation of waste paper through:
  - (i) the use of electronic bulletin boards;
  - (ii) the transfer of information in electronic rather than paper form; and
  - (iii) other applications of computer technology.
- (2) The plan must be evaluated every 5 years and updated as necessary.

Section 6. State government procurement of recycled supplies and materials. (1) The department of administration shall write pur-

chasing specifications that incorporate requirements for the purchase of materials and supplies made from recycled materials if the use is technologically practical and reasonably cost-effective. By January 1, 1992, these requirements must be incorporated into the purchase of:

- (a) paper and paper products;
- (b) plastic and plastic products;
- (c) glass and glass products;
- (d) automobile and truck tires;
- (e) motor oil and lubricants; and
- (f) other materials and supplies as determined by the department of administration.

(2) It is the goal of the state that by January 1, 1996, 95% of the paper and paper products used by state agencies, universities, and the legislature must be made from recycled material that maximizes postconsumer material content.

(3) Prior to January 1, 1996, the state shall, to the maximum extent possible, purchase for use by state agencies paper and paper products that contain postconsumer material rather than new material.

(4) To the extent practical, guidelines for the recycled material content of paper should be consistent with nationwide standards for recycled paper.

(5) The department and the department of administration shall establish a joint recycling market development task force. Task force membership must include but is not limited to representatives of the recycling industry, wholesalers, state agencies, and citizen and environmental organizations, as well as other interested persons. The task force shall:

- (a) assist the department of administration in developing purchasing specifications as required in subsection (1);
- (b) develop additional mechanisms for state government to develop markets for recycled materials;
- (c) identify procurement barriers that discriminate against the purchase of supplies and products that contain recycled material; and
- (d) develop recommendations for an informational program designed to educate state employees on how to reduce waste and recycle in the workplace.

Section 7. Requirement to prepare and implement state solid waste management plan. (1) As a basis for developing an integrated waste management program and ensuring adequate disposal capacity, the department shall prepare and implement a state solid waste management plan in accordance with [sections 1 through 7].

(2) The plan must be comprehensive and integrated and must include at least the following elements:

- (a) a capacity assurance element that identifies existing disposal capacity, estimates waste generation rates, and determines the disposal capacity needed for the future and that assesses the potential effect of interstate disposal on capacity;
  - (b) an element that incorporates federal regulations 40 CFR, parts 257 and 258;
  - (c) an element that identifies the role of each of the components of the integrated waste management priorities contained in [section 4] in meeting the solid waste reduction target in [section 3];
  - (d) a technology assessment element that assesses the availability and practicality of alternative technologies for solid waste management;
  - (e) an education and public information element that identifies existing education and information programs and describes how the state will increase the awareness and cooperation of the public in environmentally safe solid waste management;
  - (f) a special waste and household hazardous waste element that identifies types and quantities of wastes that create special disposal problems and recommends methods for reducing, handling, collecting, transporting, and disposing of those wastes and that identifies existing and future strategies for managing those wastes;
  - (g) an element that identifies the needs of rural communities and management strategies to address those needs;
  - (h) an element that identifies mechanisms to ensure proper training of landfill operators; and
  - (i) a timeline and implementation strategy for each of the plan elements.
- (3) The plan must be developed with the involvement of local officials, citizens, solid waste and recycling industries, environmental organizations, and others involved in the management of solid waste.
- (4) The department shall conduct hearings as provided in 75-10-111.
- (5) The plan must be evaluated every 5 years and updated as necessary.
- Section 8. Section 75-10-104, MCA, is amended to read:
- "75-10-104. Duties of department. The department shall:
- (1) prepare a state solid waste management and resource recovery plan as required by [section 7] for submission to the board;
  - (2) prepare rules necessary for the implementation of this part for submission to the board, including but not limited to rules:



- (a) governing the submission of plans for a solid waste management system;
- (b) governing procedures to be followed in applying for and making loans;
- (c) governing agreements between a local government and the department for grants or loans under this part;
- (d) establishing, for the purpose of determining the solid waste management fee to which a facility is subject under 75-10-115, methods for determining or estimating the amount of solid waste incinerated or disposed of at a facility;
- (e) providing procedures for the quarterly collection of the solid waste management fee provided for in 75-10-115; and
- (f) providing guidelines for a waiver of fees for certain incineration or disposal of solid waste, as provided for in 75-10-115(2); and
- (g) providing guidelines for integrated waste management;
- (3) provide financial assistance to local governments for front-end planning activities for a proposed solid waste management system which is compatible with the state plan whenever financial assistance is available;
- (4) provide technical assistance to persons within the state for planning, designing, constructing, financing, and operating:
- (a) a solid waste management system in order to insure ensure that the system conforms to the state plan;
- (b) integrated waste management programs; and
- (c) collection, disposal, reduction, and educational programs for household hazardous waste and conditionally exempt small quantities of hazardous waste as defined in Rule 16.44.402, Administrative Rules of Montana;
- (5) provide front-end organizational loans for the implementation of an approved solid waste management system whenever funds for loans are available;
- (6) enforce and administer the provisions of this part;
- (7) administer loans made by the state under the provisions of this part; and
- (8) approve plans for a proposed solid waste management system submitted by a local government; and
- (9) serve as a clearinghouse for information on waste reduction and reuse, recycling technology and markets, composting, and household hazardous waste disposal, including chemical compatibility.

Section 9. Codification instruction. [Sections 1 through 7] are intended to be codified as an integral part of Title 75, chapter 10, and the provisions of Title 75, chapter 10, apply to sections 1 through 7.

Approved March 20, 1991.

## CHAPTER NO. 223

[H.B. 193]

AN ACT RELATING TO THE EXEMPTIONS FROM STATE INHERITANCE TAXES; ELIMINATING THE 10-YEAR TIME PERIOD REQUIREMENT FOR AN ACKNOWLEDGED PARENT-CHILD RELATIONSHIP BETWEEN A NONLINEAL DESCENDANT AND A DECEDENT; REQUIRING THAT THE RELATIONSHIP MUST BEGIN ON OR BEFORE THE CHILD'S 18TH BIRTHDAY; CLARIFYING THAT THE RELATIONSHIP MAY BE ONE OF A STEPCHILD TO A STEP-PARENT; AMENDING SECTION 72-16-313, MCA; AND PROVIDING A RETROACTIVE APPLICABILITY DATE.

Be it enacted by the Legislature of the State of Montana:

Section 1. Section 72-16-313, MCA, is amended to read:

"72-16-313. Exemptions of spouse and other relatives. (1) The clear value of all property distributed or passing to decedent's surviving spouse is exempt.

(2) The clear value of all property distributed or passing to the following is exempt:

(a) any child or lineal descendant of the decedent. A determination as to establishment of the parent and child relationship or establishment of a person as a lineal descendant must be made in accordance with the rules for determining relationship for purposes of intestate succession under Title 72, chapter 2, part 2.

(b) any child to whom such *the* decedent for not less than 10 years, prior to such the transfer, stood in the mutually acknowledged relation relationship of a parent or stepparent, provided such the relationship began at on or before the child's 18th birthday and was continuous for 10 years.

(3) The following amounts are exempt:

(a) property of the clear value of \$7,000 transferred to each of the persons who have attained majority described in 72-16-321(1); and

(b) property of the clear value of \$1,000 transferred to each of the persons described in 72-16-321(2)."

WYOMING LAW

# Guide to Recycling in Wyoming

*A Project of The Wyoming Outdoor Council*

Printed on Recycled Paper



## Governor's Committee on Recycling

In 1990, Governor Sullivan asked a number of Wyoming people to help determine the steps that state government should take to stimulate recycling. This group, the Governor's Committee on Recycling (GCR), issued their first report to the Governor that same year with recommendations for executive and legislative actions to promote recycling in Wyoming.

Since that time, most of the recommendations in the first report have been accomplished. However, most Wyoming communities still do not have access to the kinds of solid waste recycling systems that the people desire, and people in some communities don't have any opportunity to recycle locally.

On the bright side, new community recycling systems have come to several Wyoming communities, and still others have improved and expanded existing recycling systems. There is still much work to be done to make recycling an integral part of our solid waste management systems in each Wyoming community.

This year's report reflects the recommendations of a second, enlarged Governor's Committee on Recycling. The Committee has been enlarged to include more business and industry representation, while maintaining the strong presence of city and county officials, environmental groups, and interested citizens.

The Committee's deliberations benefit from the experiences of several cities, counties, towns, and private businesses in starting and sustaining community recycling

systems. It reflects a new focus on actions that the state, local government, and business should take to improve the public's access to recycling opportunities all across Wyoming.

Two central recommendations were made by the Committee. First, the Committee believes that community leaders should do formal planning to assure that the best and most cost-effective recycling systems are made available in their communities. The Committee members strongly recommended that this planning start soon, because of the pending impact of new federal sanitary landfill rules on many of the smaller landfills serving communities throughout Wyoming.

Second, the Committee believes that the Legislature, and the executive branch of government, should take a number of steps to help city and county governments identify markets for collected recyclable materials. Some city and county leaders are reluctant to commit to new solid waste recycling programs, unless they can be assured of stable access to markets for the recyclable materials they collect. The Committee made a number of recommendations to improve community access to markets for these materials.

The report contains an ambitious set of recommendations, which are too numerous to list here. It is encouraged to look at the entire report.

*Taken from the Executive Summary of the Recommendations Report on Recycling, made to Governor Sullivan, January 1992. To receive a copy of the full report, for information on the Governor's response, and for details of future meetings, contact Dianna Gentry Hogle at 777-7746.*



NORTH DAKOTA LAW

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energy conversion facilities; waste from crude oil and natural gas exploration and production; waste from mineral and ore mining, beneficiation, and extraction; and waste generated by surface coal mining operations. The term does not include municipal waste or industrial waste.

17. "Storage" means the containment and holding of solid waste after generation for a temporary period, at the end of which the solid waste is processed for resource recovery, treated, disposed of, or stored elsewhere.

18. "Transport" means the offsite movement of solid waste.

Source: S.L. 1975, ch. 233, § 2; 1987, ch. 311, § 2; 1991, ch. 277, § 3; 1993, ch. 54, § 106; 1993, ch. 111, § 3.  
Note.  
Section 23-29-03 was amended twice by the 1993 Legislative Assembly. Pursuant to section 1-02-09.1, the section is printed above to harmonize and give effect to the changes made in section 3 of chapter 111, S.L. 1993, and section 106 of chapter 54, S.L. 1993.

**23-29-04. Powers and duties of the department.** The department shall have the responsibility for the administration and enforcement of this chapter. It shall have the power and its duties shall be to:

1. Administer the state solid waste management program pursuant to provisions of this chapter.
2. Provide technical assistance on request to political subdivisions of the state and cooperate with appropriate federal agencies in carrying out the duties under this chapter, and may, on request, provide technical assistance to other persons.
3. Encourage and recommend procedures for the utilization of self-funding solid waste management systems and intermunicipal agencies in accomplishing the desired objective of this chapter.
4. Promote the planning and application of resource recovery facilities and systems which preserve and enhance the quality of air, water, and all resources.
5. 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.
6. Survey the solid waste management needs within the state and maintain and upgrade the North Dakota solid waste management plan.
7. 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 this chapter.
8. 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.
9. Establish the procedures for permits governing the design, construction, operation, and closure of solid waste management facilities and systems.
10. 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 of this chapter.

11. Adopt rules to establish categories and classifications of solid waste and solid waste management facilities based on waste type and quantity, facility operation, or other facility characteristics and to limit, restrict, or prohibit the disposal of solid wastes based on environmental or public health rationale.
12. Adopt rules to establish standards and requirements for each category of solid waste management facility.
13. 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.
14. 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.

Source: S.L. 1975, ch. 233, § 3; 1987, ch. 311, § 3; 1991, ch. 277, § 4, 5; 1993, ch. 111, § 4.  
The 1993 amendment of this section became effective April 2, 1993.

**23-29-06. District solid waste management — Penalty.**

1. All land in this state must be within a solid waste management district.
2. The boundaries of each district must be established pursuant to chapter 54-40.1 and as delineated by executive order of the governor number 1978-12, affirmed by executive order number 1986-4.
3. The governing board of each solid waste management district must include a representative of each county within the district, one representative from cities within each county within the district, a representative of each city in the district which has a population of more than ten thousand, a representative of the licensed disposal facilities within the district, and a representative of the waste haulers within the district. Members representing political subdivisions must be appointed by the subdivisions involved. The members representing licensed disposal facilities and waste haulers must be



**23-29-04. Powers and duties of the department.** The department shall have the responsibility for the administration and enforcement of this chapter. It shall have the power and its duties shall be to:

1. Administer the state solid waste management program pursuant to provisions of this chapter.
2. Provide technical assistance on request to political subdivisions of the state and cooperate with appropriate federal agencies in carrying out the duties under this chapter, and may, on request, provide technical assistance to other persons.
3. Encourage and recommend procedures for the utilization of self-financing solid waste management systems and intermunicipal agencies in accomplishing the desired objective of this chapter.
4. Promote the planning and application of resource recovery facilities and systems which preserve and enhance the quality of air, water, and all resources.
5. 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.
6. Survey the solid waste management needs within the state and maintain and upgrade the North Dakota solid waste management plan.
7. 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 this chapter.
8. 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.
9. Establish the procedures for permits governing the design, construction, operation, and closure of solid waste management facilities and systems.
10. 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 of this chapter.
11. Adopt rules to establish categories of solid waste and solid waste management facilities based on waste type, facility operation, or other facility characteristics.

12. Adopt rules to establish standards and requirements for each category of solid waste management facility.
13. 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.
14. 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.

Source: S.L. 1975, ch. 233, § 3; 1987, ch. 311, § 3; 1991, ch. 277, §§ 4, 5.

enactment of subsections 11, 12, 13 and 14 of this section by sections 4 and 5 of chapter 277, S.L. 1991, became effective on July 7, 1991, 90 days after filing, pursuant to N.D. Const., Art. IV, § 13.

**Effective Date.**

The 1991 amendment of subsection 8 and

**23-29-05. Local government ordinances.** Any political subdivision of the state may enact and enforce a solid waste management ordinance if such ordinance is equal to or more stringent than this chapter and the rules adopted pursuant to this chapter.

Source: S.L. 1975, ch. 233, § 4; 1991, ch. 277, § 6.

tion 6 of chapter 277, S.L. 1991, became effective on July 7, 1991, 90 days after filing, pursuant to N.D. Const., Art. IV, § 13.

**Effective Date.**

The 1991 amendment of this section by sec-

**23-29-05.1. Littering and open burning prohibited — Penalty.**

1. No person may discard and abandon any litter, furniture, or major appliances upon public property or upon private property not owned by that person, unless the property is designated for the disposal of