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Leader's Guide and Script for Slide/Tape Set "Nonmetropolitan Solid Waste Management"

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FOREWORD

This slide/tape audio-visual presentation is concerned with improved solid waste management in the nonmetropolitan areas of Ohio. It is oriented to local officials and community leaders and attempts to present an overview of the solid waste problem and some options available for solving it. Alternative collection, storage, processing, transport, disposal and recovery systems are evaluated in terms of their cost and applicability to a variety of situations in nonmetropolitan Ohio as well as other states.

Solid waste (better known as garbage or trash) has been around a long time. Most of the solid waste of earlier times was organic and decomposable. As man's standard of living has improved, the amount and variety of the residuals (e.g., solid wastes) from man's production and consumption activities have also increased. Improper management of these increasing quantities of solid waste has resulted in some serious health, nuisance, air and water pollution, and energy conservation problems.

The population in metropolitan areas and the resulting solid waste is more concentrated and thus the problem tends to be more visible. Nonmetropolitan areas are less densely settled which on the surface may imply a less severe solid waste problem. However, much of the waste from metropolitan areas is actually disposed of in nonmetropolitan landfills. In addition, solid waste collection is relatively more costly in sparsely settled areas and this can lead to roadside dumping, burning, and other improper disposal methods.

Problems are being encountered at many of the so-called sanitary landfills due to inadequate daily cover and leachates seeping and flowing into underground and surface water supplies. There is also increased concern about the proper disposal of the increasing amount and variety of hazardous and/or chemical materials. The limited capacity of many existing landfills and the resulting search for suitable new sites has encountered increasing land costs and resistance from private landowners. These factors combined with the concern over exhaustion of nonrenewable resources has led to increased interest in material and energy recovery from solid waste.

This slide/tape presentation cannot provide answers to all these problems. At best, it can help develop an awareness of the solid waste problem and some viable options. More study and analysis will be needed before a specific community can wisely select a solid waste management system best suited to their situation. The list of reference materials at the end of this leader's guide may be helpful in that process. Current research by Mike McCullough, (a graduate student in resource economics at OSU), to develop a methodology for determining a least-cost county solid waste system should also be helpful.

The slide/tape runs a total of 30 minutes and is divided into four sections: The Problem, Storage and Collection, Disposal, and Recovery. The user may want to focus on one or more sections and supplementary resources may be helpful. The primary resource person, Dr. Fred Hitzhusen, extension resource economist at OSU, is available either by "telelecture" or in person. A panel of local and/or state level solid waste resource people (e.g., county sanitarian, Ohio EPA district sanitarian, a local hauler or landfill operator) can be used. In addition, suggested written materials are included in this leader's guide. The slide/tape set is available from Dr. John Stitzlein, Community and Natural Resource Development Program, 108 Ag. Adm. Bldg., OSU, Columbus, Ohio, 43210 (Ph. 614/422-8436).

NONMETROPOLITAN SOLID WASTE MANAGEMENT SCRIPT

The Problem

Slide #1

This presentation on solid waste management is divided into four sub-sets: (1) generation, (2) collection and storage, (3) disposal and (4) recovery. It is intended to provide nonmetropolitan community leaders with an overview of the solid waste problem and the available options for resolving this problem.

Slide #2

Most of the solid waste of earlier times was organic food, cloth, wood, etc. and was decomposable. The caveman dealt with the problem of solid waste accumulation by simply moving to a new cave.

Slide #3

As man's standard of living improved, stone and ceramic materials came into use followed by metals and glass and finally today's multitude of synthetics. The generation of solid waste has grown proportionately to over 200,000,000 tons annually in the United States or almost a ton per person per year. This slide depicts the make-up of the annual solid waste stream for a typical family of four.

Slide #4

The generation of solid waste has been increasing, in fact, this projection suggests that by 1980 per capita generation of solid waste will be 5-1/2 pounds per day. Some authors have argued that this cannot continue. Increased environmental awareness and support for recycling combined with the energy crisis and the concern for finite resources, may lead to a leveling off in the per capita generation of solid waste.

Slide #5 — The rural solid waste problem including the associated nuisance and health problems is evidenced by the increase in roadside dumping. This is particularly true since the passage of the Solid Waste Disposal and Anti-Stream Dumping Laws in 1967 and the more recent implementation of Ohio EPA open burning standards. The original legislation resulted in the closing of over 1300 rural township open dumps like this and the establishment of sanitary landfills in most counties.

Slide #6 — Note the leachate problem at an open dump typical of many that operated at one time in rural Ohio. Actually, there are several so-called sanitary landfills around the state which would be more accurately termed open dumps.

Slide #7 — Roadside dumping is illegal which is the message of this roadside sign in Wayne County.

Slide #8 — This area is immediately adjacent to the sign. The sign served more as a magnet than a deterrent for the dumping. Unfortunately, this kind of scene is all too common in many rural areas in Ohio.

Alternative Solutions

As a result of this increasing problem of solid waste, many alternatives have been suggested for solution. Some are more practical than others. Some of the less practical alternatives include:

Slide #9	Volcano disposal
Slide #10	Sound destruction
Slide #11	Submarine sandwich industry
Slide #12	Lazar beam destruction
Slide #13	Sun disposal
Slide #14	Putting waste into orbit

Slide #15

It probably would not be difficult to get a majority of Ohio football fans to subscribe to this alternative.

Slide #16

A localized version of this alternative is the interest on the part of some counties to "export" their trash to adjacent counties.

Collection and Storage

Slide #17

There are several alternatives available to nonmetropolitan communities for collection and storage of solid waste. Solid waste storage involves temporarily placing garbage and other refuse in containers until it is collected. It is an important phase of the solid waste system from the standpoint of controlling disease carrying rats and flies. Storage containers include metal and plastic cans, plastic bags, lift-up or green boxes, large drop type refuse containers, and various types of compaction pits and trailers used in conjunction with transfer stations. Collection is by far the most expensive component and may account for as much as 80% of the total cost of solid waste management.

Slide #18

Door-to-door or "mailbox" collection with packer trucks is most common in concentrated population areas. This alternative is not as frequently used for picking up waste in sparsely settled unincorporated areas. The typical packer truck has 20 to 30 cubic yards of capacity and may be side-loaded, rear-loaded, or front loaded.

Slide #19

Pictured is the so-called "green box" system that was piloted in Plain and Clinton townships in Wayne County, Ohio five years ago. Small, two cubic yard boxes were placed at eight sites in the two townships. A local hauler contracted for the service, built the boxes and the service was run on a pilot basis for one year.

Slide #20

This shows the side-loading of the two cubic yard boxes. One of the problems with the original pilot project was that the boxes were too small and too few in number to accommodate the trash. The problems of vandalism and spillage at the multiple sites were also quite severe.

Slide #21

A subsequent Wayne County project in Baughman Township decided to locate several larger eight cubic yard boxes in one central location adjacent to the township garage.

Slide #22

This shows the larger boxes at the single Baughman Township site.

Slide #23

There are a few examples of larger 20-50 cubic yard drop type bulk containers in rural Ohio.

Slide #24 This so-called "blue box" system operated in Knox County, Ohio.

Slide #25 One of the advantages of the large bulk box is that "white goods" such as refrigerators and appliances, furniture and other large bulky items can be accommodated. In the small, 2 to 8 cubic yard boxes, bulky items normally have to be picked up by a separate truck and routing system. The disadvantage of the large bulk boxes is the lack of compaction which increases transport costs per ton of waste.

Slide #26 One of the large bulk boxes on the transfer truck.

Slide #27 Being unloaded from the truck.

Slide #28 And, deposited at the box site.

Slide #29 An example of a third general type of storage/collection alternative is this stationary, compactor system in Baughman Township in Wayne County. The advantage of this system over the previous loose bulk box system is that approximately four times the waste can be compacted in the same size bulk boxes. It is more costly because of the compaction unit and a more expensive box, but for those situations where it is necessary to haul the waste a considerable distance, this may be a lower cost and more desirable alternative than the loose box system. This particular compactor system is located at the township garage; it must be activated by key, and it is arranged so that those who work out of the township garage can activate it frequently to keep the compaction chamber empty. Residents of the township are able to use this system for everything but the largest bulky items.

Slide #30 Research underway in the Department of Agricultural Economics and Rural Sociology at The Ohio State University on the economics of solid waste management is comparing alternative systems. Based on capital outlay plus operating costs, this table ranks mailbox pickup, eight cubic yard boxes, 40 cubic yard uncompacted box, and 42 cubic yard compacted box for three levels of rural population and three average distances to a disposal or recovery site.

Mailbox service is more costly in every case but it is also more convenient to the residents. The three box systems have cleanup costs at the box sites included in the comparison. The 8 cubic yard box and 42 cubic yard compaction box systems also include the cost for bulk goods pickup, such as refrigerators, stoves, etc. since these items do not fit in the boxes.

The results show that the 40 cubic yard uncompacted box system is least expensive for an average haul distance of 5 miles for both the low and medium population. At the medium and high haul distance, the 8 cubic yard system is the least costly for both low and medium populations. At the high population value, the 42 cubic yard compaction system is the least costly for all three average haul distances.

Slide #31 Another alternative is this elementary type of transfer station located in Belmont County. This particular system involves a scale, a ramp, and a hopper whereby the waste is deposited into a compaction trailer and hauled to a strip mine for landfilling.

Slide #32 The scale and scale house of the Belmont County system.

Slide #33 The top view of the ramp and hopper area. One of the problems with this uncovered system is the spillage and the blowing waste, flies and rodents that may result. Ohio EPA and local health department approval may be a problem with this type of system. The addition of a metal building to enclose the hopper and the dumping area would probably allow this transfer station to be approved by Ohio EPA.

Slide #34 The transfer vehicle utilized by the Belmont County system. The trailer is a self-contained compaction unit so that it is possible to drop the trailer under the hopper, take a full trailer to the strip mine for landfilling, return and exchange trailers. Thus, one truck tractor can service two trailers.

Slide #35 Now, let's look at a more sophisticated and costly type of transfer station alternative. There are at least two of these in operation in nonmetropolitan areas of Ohio, one in Van Wert County and another in Lancaster, Ohio.

Slide #36 The scale house at the Van Wert transfer station facility.

Slide #37 The transfer station building housing a covered push-pit arrangement moves the waste into a stationary compactor which forces the waste into the transfer trailer for transport from Van Wert County to Fort Wayne, Indiana. Some of the waste is landfilled and some is recycled in Fort Wayne.

Slide #38 The inside of the transfer station including a large drop pit which will accommodate several vehicles, and two large hydraulic rams that push the waste across this pit and into the transfer vehicle below.

Slide #39 The lower level of the transfer station where the transfer vehicle is parked for loading.

Slide #40 The transfer trailer parked at the lower level of the station.

Slide #41 The transfer station in Lancaster, Ohio which is similar to the Van Wert County station. In this case, the waste is transported to a landfill in an abandoned strip mining area in an adjacent county. The major advantage of the covered compaction unit is that it contains the waste and provides for large scale compaction and transfer in situations where the county cannot landfill locally because of soil conditions, resistence to landfilling, or lower disposal (recovery) costs elsewhere. It is more costly than the Belmont County system. The capital outlay for the transfer station is $300-$350 thousand for the land, landscaping, building, compactors, etc. In Van Wert County, the operating costs of the transfer station plus transport cost totals between $10 and $11 per ton of waste handled.

Disposal

Slide #42 The primary methods of solid waste disposal include sanitary landfills, incineration, and disposal at the source. It may be possible for a few private households and commercial or industrial establishments to legally bury or burn their own solid waste, but the large size economies associated with sanitary landfills and EPA open-burning laws make this an unrealistic alternative for most solid wastes. Compared to sanitary landfills, incineration of solid waste is usually three to four times more costly. Incineration also leaves a residual ash which must be disposed of at a landfill and it may pollute the air.

Slide #43 This illustrates the general dilemma with respect to solid waste disposal. The amount of vacant land is declining, population and refuse is increasing and this is leading to a crunch situation.

Slide #44 There are some holdover problems from the era of open dumps to landfilling in sanitary landfills. Many people don't make the distinction. They think a dump is a dump regardless of the advances in covering and handling waste in a sanitary landfill.

Slide #45 A major problem with landfilling is finding an environmentally suitable and socially acceptable location. Nobody wants the landfill near their home.

Slide #46 Many fear that their property will lose its value. In rural areas, if the landfill is properly operated, there should be no negative effects on property values. In fact, if the landfilling is occurring in an area that was previously heavily eroded or stripmined, it is likely that the landfilling can increase the value of the landfill site as well as adjacent property. On the other hand, landfilling in a congested urban area can have a negative impact on property values, at least until the landfilling is completed. Frequently, the landfill site can be reclaimed for higher value use after the landfilling is completed.

Slide #47 People fear blowing trash, rodents, flies and odors but if the landfill is properly operated, these are not problems. Most states including Ohio have fairly stringent laws regarding the operation of sanitary landfills and the federal government has recently established regulations which when implemented will make sanitary landfill operations even more strict. Open dumps are illegal in Ohio.

Slide #48 The dumping of sewage septage, chemicals, other types of hazardous wastes is prohibited in Ohio unless it is a designated spot for this purpose. However, rumors of this kind of dumping persist and that does not enhance the image of the sanitary landfill.

Slide #49 This picture is an attempt at humor by an artist in the U.S. EPA depicting the size of a mythical landfill rat. I expect most of us can remember times from our childhood when we either had friends or we ourselves went to the dump to shoot rats. Many people still believe that rats run rampant in landfills. In the case of a well-operated sanitary landfill this perception is completely unjustified.

Slide #50 Of course, all of this suggests that site selection is very important in establishing a suitable sanitary landfill operation. Many factors must be considered.

Slide #51 In addition to socio-economic factors, there are several factors that relate to the physical environment. Included are geological, hydrological, and meterological considerations. These factors are specified in regulations of the Ohio Environmental Protection Agency under Ohio Revised

Code Section 3734. Applications for landfill sites are handled by EPA in cooperation with local health departments and Soil Conservation Service personnel.

Slide #52 The meterological factors include precipitation, evapotranspiration, and atmospheric pressure.

Slide #53 Hydrologic factors include ground water presence and position, ground water movement, surface water and ground water interrelationships. If the ground water is susceptibl to the leachates from the landfill, ground water supplies can be polluted.

Slide #54 The geological factors or soil characteristics relate primarily to the type and sequence of soils, mineral and organic composition and permeability of soils. The degree of permeability is related to the movement of the leachates or pollutants from the landfill into underground water supplies. The ideal is to have heavy clay soil substrata that serves as a sort of envelope around the landfill and contains the leachates.

Slide #55 There are many areas of Ohio as shown by dark shading on this map that are problematic from both the hydrological and geological standpoint. In those areas it is more difficult to get approval of a sanitary landfill site and sanitary landfilling may be more costly.

Slide #56 This is the entrance to the sanitary landfill in Crawford County, Ohio which utilizes the trench method of landfilling. Other alternatives include the area and ramp variation methods. In all methods the solid waste is dumped, spread, compacted, and covered with soil at the end of each day.

Slide #57 The scale house and office for the Crawford County sanitary landfill.

Slide #58 This shows preparation of a trench for the landfilling operation in Crawford County.

Slide #59 Another view of the trench area. Only the amount of area required for immediate landfilling is trenched. This keeps the torn-up land area to a minimum. Generally, this landfill is recognized as being well operated, a good example of a trench landfill.

Slide #60 The compaction equipment operating in the trench landfill to assure that each day's solid waste is compacted and covered.

Slide #61 This average cost curve for the trench method illustrates the substantial size economies associated with landfilling. This evidence from Indiana combined with research on transport costs suggests that most counties would be most efficiently served with one sanitary landfill. Unfortunately, 29 of 61 nonmetropolitan counties in Ohio have from two to six sanitary landfills.

Slide #62

This shows a ramp variation landfill operation in Belmont County which is an attempt to reclaim an abandoned stripmine area. The same rules apply in terms of compaction and daily coverage with soil.

Slide #63

This depicts a former landfill site that has now been reclaimed for a playground. One of the limitations of former landfill areas is that soft spots may limit the establishment of multi-story structures. However, the sites can often be used for recreation areas such as ball diamonds, golf courses, and playgrounds. In the more rural areas of the state, many abandoned strip mines can be returned to livestock forage lands or woodlands as a result of a well run landfilling operation.

Slide #64

This shows a solid waste incinerator, which is not a very desirable alternative. Disadvantages include air pollution and dwindling supplies and resulting increased price of natural gas used to fire the incinerator.

Resource Recovery

Slide #65

Resource recovery from solid waste has been limited in the past because of inadequate economic incentives. However, increasing concern over the environmental consequences of landfill leachates, air pollution from high sulphur coal, and the price increases of many exhaustible resources have heightened interest in resource recovery. The primary types of resource recovery are material such as metal, glass and paper, energy including dry or solid, gas and liquid fuel, and composting. Solid waste resource recovery operations typically involve grinding or shredding of the waste and separation by liquid slurry or an air classifier. The lighter components such as paper, plastic, and most food remnants become a fuel usually for steam generation. The heavier components such as glass, metal, and heavier plastics are run through a magnetic separator for further sorting before reuse. The keys to economically feasible resource recovery appear to be a relatively large volume of solid waste supplied on an uninterrupted basis over an extended time period.

Slide #66

Franklin, Ohio has been operating a 150 ton per day capacity EPA solid waste recovery demonstration plant since 1968. The plant utilizes a slurry technique for separating the waste and combining it with sewage sludge. One of the problems of this operation has been an inadequate volume of solid waste to operate at or near capacity. The drop charge of $6.50 per ton is higher than the user charges at sanitary landfills in the area. As a result, most of the solid waste from the rural areas in smaller communities surrounding Franklin goes to landfills.

Slide #67

This is a composting operation. Composting has generally not been economically feasible at least as a separate operation. Of the 14 or 15 major composting operations that have been started, only two or three remain in operation. If composting is to be feasible, it generally must be combined with a total recovery concept.

Slide #68

The first comprehensive solid waste resource recovery system in a nonmetropolitan area of the United States is located in Ames, Iowa. A few years ago city and county officials were concerned with their existing landfilling problems and the difficulty of finding additional landfill space. They estimated that costs of landfilling were going to increase dramatically and they were concerned about burying finite resources. This led to the establishment of the solid waste recovery system at Ames, Iowa in 1975.

Slide #69 In the foreground is the processing facility for preparing the waste for burning and separating out the recoverable elements. The Ames steam-electric power plant is in the background.

Slide #70 The recovery system at Ames, Iowa involves the processing or separating facility which receives about 150 tons per day or 55,000 tons annually of solid waste from the City of Ames and Story County. The county, including the City of Ames, has a population of about 69,000 people. Ferrous metal and aluminum are separated and sold. The solid waste combustible portion is mixed with coal to fire the utility boilers. Wood chips from the solid waste stream are sold to local nurserymen for mulch and to farmers for livestock bedding.

Slide #71 This shows the operating hours, charges, and rules for using the Ames facility. There is a minimal user charge for vehicles depositing at the facility. This charge does not cover the full cost of the operation of the facility. Each of the political subdivisions of Story County makes a contribution in excess of $3.00 per capita--which is the major source of operating reserve for the facility. The user charge at the processing facility is simply to discourage people from bringing small, partial loads and tying up the equipment.

Slide #72 The internal area of the processing plant where the waste is dumped from the private vehicles and packer trucks.

Slide #73 Another internal view with the control room in the background. The control room has access to the dumping and scale area, and the internal processing area of the plant.

Slide #74 This shows a frontend loader moving the waste from the holding area onto a conveyor which in turn takes the waste to a primary shredder.

Slide #75 This is a view of the processing area of the plant, showing the separation of the ferrous metal and aluminum. These recovered metals are sold through secondary markets in Iowa and adjacent states.

Slide #76 This shows the ferrous metal and aluminum materials loaded and ready for transport to market.

Slide #77 The wood chipping operation. The large logs and other kinds of trimming that would be too bulky to handle in the primary shredders are run through a chipper. The chips are then sold in the Ames area.

Slide #78 This is the Orrville Municipal Power Plant located in Orrville, Ohio in Wayne County. A preliminary economic feasibility study has been completed on the Orrville plant and the results are promising. It would appear that cases like Ames, Iowa and Orrville, Ohio are very close to an economic situation where solid waste resource recovery will compete with the full cost of current landfilling alternatives. This conclusion has been documented in a recently completed two year study of solid waste resource recovery in the North Central United States.

Slide #79 In conclusion, solid wastes are a symbol or the residual of production and consumption of an affluent society. As long as these residuals are not imposing any environmental and nuisance problems or externalities, they are not perceived as a problem. However, the evidence suggests that solid wastes have reached an accumulation point where they are a problem demanding resolution. Historically, we have tried to bury these wastes in dumps or landfills. In some cases, land disposal may continue to be the best alternative. Increasingly, it will be necessary to do two things: reduce the amount of waste we generate, and recover or recycle more of the waste that we do generate.

Suggested Reference Materials

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