



Environmental Protection Agency

Division of Solid and Infectious Waste Management

State Solid Waste Management Plan 2009



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Director's Comments

The passage of House Bill 592 in 1988 by Ohio's General Assembly forever changed how Ohio addresses the management of the solid waste that Ohioans generate. That landmark legislation provided the state of Ohio with the tools necessary to not just improve its solid waste management regulatory program, but also to conduct needed solid waste management planning. Today, I am proud to say that Ohio has a comprehensive regulatory program that has resulted in the safe management of solid waste from both environmental and human health perspectives. Even more exciting to me, however, are the great strides we have made as a state to divert material away from disposal in landfill to more appropriate management options like recycling and composting.

Since adoption of the 2001 State Solid Waste Management Plan, Ohio has achieved a number of notable solid waste related successes, including:

- In 2007, Ohio achieved a statewide reduction and recycling rate for the residential/commercial sector of almost 26 percent. Furthermore, 23 of Ohio's solid waste management districts achieved reduction and recycling rates of 25 percent or greater for the residential/commercial sector.
- Ohio's solid waste management districts provided at least one million additional people with the opportunity to recycle by ensuring that the necessary infrastructure is available.
- Through Ohio's scrap tire program, the State was able to remediate one of the biggest scrap tire accumulations in the nation – the Kirby Tire Recycling site in Wyandot County. Not only was this site completely remediated, but the project was completed years ahead of schedule. Furthermore, almost 88 percent of the unburnt tires removed from the site were recycled into usable products.

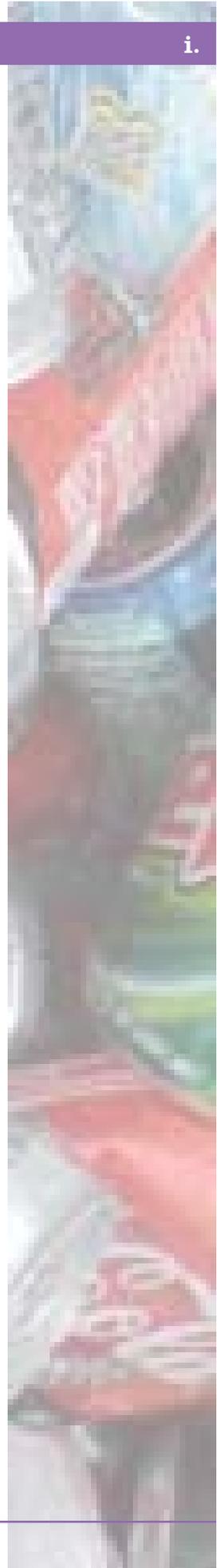
Even with Ohio's impressive reduction and recycling efforts, we continue to generate more and more waste. Too much of this waste is still making its way to landfills. Quite a bit of that waste is recyclable and has economic value. Thus, by disposing of waste we squander resources. Luckily, we can do more to divert waste into better management programs. Food waste and other organics can be composted; more paper and other fiber can be collected; waste can be used as alternative fuel sources. Making these options realities, however, requires Ohio's citizens, government officials, community leaders, solid waste management districts, solid waste professionals, and the business community to work together cooperatively, now more than ever, to create success in these tough economic times.

Each revision of the state plan gives us a chance to re-energize our efforts to reduce, reuse, and recycle waste. The goals established in this version of the state plan provide challenging yet realistic objectives for doing just that. These goals will help Ohio accomplish the purposes for the state plan as envisioned 20 years ago by the State's lawmakers when they adopted House Bill 592.

We have come a long way since 1988, but we can go even further. I challenge all of Ohio's residents and businesses to increase your recycling efforts so our state can become a leader in practices that reduce our reliance on landfills to manage our solid waste.



Chris Korleski, Director
Ohio EPA



Acknowledgments

Revising the state solid waste management plan requires many people to devote hours and hours of work to see the process through to completion. On behalf of the Division of Solid and Infectious Waste Management (DSIWM), I would like to thank all of the people who contributed to the effort. Special appreciation is extended to the former and current members of the Solid Waste Management Advisory Council (SWAC) who provided their time, attention, and input to make this, the third revision of the state plan, a document we can all be proud of. The SWAC's current members are listed in Appendix A.

In addition, there are numerous representatives from Ohio's solid waste management districts who provided valuable input and suggestions during the development of this document. I also appreciate the valuable contributions made by representatives from the Ohio Department of Natural Resources (ODNR). In particular, I would like to thank Chet Chaney for providing critical information for Chapter 9 as well as the other members of the Division of Recycling and Litter Prevention who provided input on behalf of ODNR.

Finally, there are many employees of the Ohio Environmental Protection Agency's Division of Solid and Infectious Waste Management (DSIWM) who devoted countless hours to this effort. A very special thank you is given to Ernie Stall, principal author and researcher of this document, for his many, many hours of work on this project. My appreciation is also extended to Andrew Booker, for providing leadership and direction, to Matthew Hittle for coordinating SWAC meetings, to Nick D'Amato for his technical expertise, to Deb Hoffman for proofreading draft chapters, and to Kevin Shoemaker and Channon Cohen for insight and general support. I also extend a thank you to former DSIWM employee Michelle Kenton for her contributions.

I also recognize and thank Bob Large and Karen Moore of DSIWM's Scrap Tire Unit and Angel Arroyo-Rodriguez and Joe Goicochea of DSIWM's Composting and Infectious Waste Unit for providing important information and reviewing portions of the document. DSIWM also thanks Cheryl Suttman of the Division of Air Pollution Control and Mike McCullough of the Division of Surface Water for providing information regarding the air pollution control and surface water protection programs.

Finally, my appreciation is also given to Pattie Rhodes-Mehrle from Ohio EPA's Public Interest Center for designing the final version of this state solid waste management plan and to Caroline Markworth, Mary McCarron, and Erika Wiggins for conducting public hearings.



Pamela S. Allen
Chief, Division of Solid and Infectious Waste Management
Ohio EPA

Forward

On August 20, 2009, the Solid Waste Management Advisory Council of Ohio (SWAC) considered and duly approved this update of the state solid waste management plan (state plan). On March 3, 2010, the Director of the Ohio Environmental Protection Agency (Ohio EPA) adopted this state plan. Before the state plan was approved and adopted, Ohio EPA held public hearings in five locations throughout Ohio. A hearing was held at each of Ohio EPA's district offices and at the central office. The locations and dates of these hearings were as follows:

- **Tuesday, July 21**
Ohio EPA, Northwest District Office
347 North Dunbridge Rd., Bowling Green, OH
(419) 352-8461
- **Wednesday, July 22**
Ohio EPA, Central Office
50 West Town Street, Suite 700, Columbus, OH
(614) 644-3020
- **Thursday, July 23**
Ohio EPA, Southwest District Office
401 E. Fifth St., Dayton, OH
(937) 285-6357
- **Wednesday, July 29**
Ohio EPA, Northeast District Office
2110 E. Aurora Rd., Twinsburg, OH
(330) 963-1200
- **Thursday, July 30**
Ohio EPA, Southeast District Office
2195 Front St., Logan, OH
(740) 385-8501

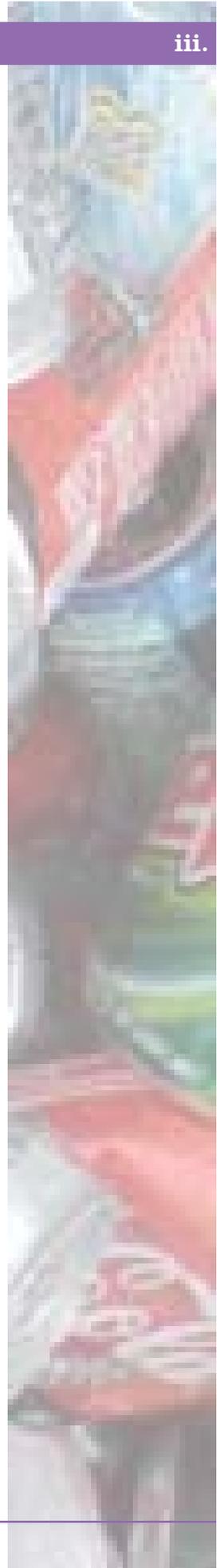
Ohio law requires the Director of Ohio EPA and SWAC to triennially review the state plan and prepare a revised state plan if conditions warrant such a revision. The most recent triennial review occurred in 2007. As a result of that process, Ohio EPA and SWAC began updating the state plan. This state plan represents the third revision to the initial state plan that was adopted in 1989 and the fourth version of the state plan to be approved by SWAC and adopted by Ohio EPA.

Any comments or questions concerning the state plan should be directed to:

Ohio EPA
Division of Solid and Infectious Waste Management
P. O. Box 1049
Columbus, Ohio 43215-1049

The Division of Solid and Infectious Waste Management can also be reached via telephone at (614) 644-2621 or toll free at (877) 372-2621, via facsimile at (614) 728-5351 and by visiting the Division's Web site at <http://www.epa.ohio.gov/dsiwm/>.

This document can be accessed through Ohio EPA's Web site at <http://www.epa.ohio.gov/dsiwm/pages/stateplan.aspx>.



List of Acronyms and Abbreviations Used in This Document

1989 State Plan is used when referring to the first state solid waste management plan that was adopted in 1989.

1995 State Plan is used when referring to the first revision of the state solid waste management plan that was adopted in 1995.

2001 State Plan is used when referring to the second revision of the state solid waste management plan that was adopted in 2001.

2009 State Plan is used when referring to this, the third revision, of the state solid waste management plan.

ABR — Adams-Brown Recycling Station.

ADR — Annual District Report.

AGO — the Office of the Ohio Attorney General.

Authority — Regional Solid Waste Management Authority.

BACT — Best Available Control Technology.

BAT — Best Available Technology.

BTA — Best Technology Available.

C&DD — Construction and Demolition Debris.

CFR — Code of Federal Regulations.

DHWM — Division of Hazardous Waste Management, a division of Ohio EPA.

Director — referring to the Director of Ohio EPA

DRLP — Division of Recycling and Litter Prevention, a division of ODNR.

DSIWM — Division of Solid and Infectious Waste Management, a division of Ohio EPA.

DSW — Division of Surface Water, a division of Ohio EPA.

E-Waste — referring to end of life and obsolete electronic devices, or Electronic Waste.

FGD — Flue Gas Desulfurization waste material, an air pollution control waste generated at coal-burning power plants.

FEMA — the Federal Emergency Management Agency.

Format — referring to the District Solid Waste Management Plan Format which is the document published by Ohio EPA for SWMDs to use when preparing solid waste management plans. The *Format* contains the instructions for preparing a solid waste management plan. The most recent version of the *Format* published by Ohio EPA is Version 3.0.

GTR — Ground Tire Rubber.

HDPE — High Density Polyethylene.

HHW — Household Hazardous Waste.

IAWG — Interagency Recycling Market Development Workgroup.

Interim Policy — referring to Ohio EPA's *Interim Policy on the Disposal of Municipal Incinerator Ash*.

ISW — Industrial Solid Waste.

JCARR — Joint Commission on Agency Rule Review.

LEED — Leadership in Energy and Environmental Design.

MRF — Material Recovery Facility.

MSW — Municipal Solid Waste.

OAC — Ohio Administrative Code.

OBM — Ohio Department of Budget and Management.

OCAPP — Office of Compliance and Pollution Prevention, an office of Ohio EPA.

ODA — Ohio Department of Agriculture.

ODAS — Ohio Department of Administrative Services.

ODNR — Ohio Department of Natural Resources.

ODOD — Ohio Department of Development.

ODOT — Ohio Department of Transportation.

Ohio EPA — Ohio Environmental Protection Agency.

OMEx — Ohio Materials Exchange.

ORC — Ohio Revised Code.

PAYT — Pay-As-You-Throw.

PCB — Polychlorinated Biphenyls.

PET and **PETE** — Polyethylene Terephthalate.

PPD — Pounds Per Person Per Day.

PTE — Passenger Tire Equivalent.

PTI — Permit-to-Install.

RCRA — Resource Conservation and Recovery Act.

Reduction/recycling rates — used when referring to Waste Reduction and Recycling Rates.

RSW — Residual Solid Waste.

State Plan — referring to the State Solid Waste Management Plan in general.

SWAC — Solid Waste Management Advisory Council.

SWACO — Solid Waste Authority of Central Ohio, the regional solid waste management authority for Franklin County.

SWANA — Solid Waste Association of North America.

SWMD — Solid Waste Management District.

TC — Toxicity Characteristic.

TCLP — Toxicity Characteristic Leaching Procedure.

TDF — Tire Derived Fuel.

U.S. EPA — United States Environmental Protection Agency.

USGBC — United States Green Building Council.

VOCs — Volatile Organic Compounds.

WRR — Waste Reduction and Recycling Rate.

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Executive Summary

In 1988, Ohio's General Assembly passed House Bill 592, a watershed legislative package that dramatically changed Ohio's existing solid waste program. This legislation established a comprehensive planning and regulatory process to ensure that adequate and environmentally sound solid waste management capacity is available to manage the waste Ohio generates. To help preserve that capacity and to recognize the inherent value in waste materials, House Bill 592 also initiated requirements to reduce Ohio's generation of waste and increase the State's efforts to recycle.

The statutory provisions enacted by House Bill 592 require the director of the Ohio Environmental Protection Agency (Ohio EPA) working with the Solid Waste Management Advisory Council (SWAC) to prepare and adopt a state solid waste management plan (state plan). In addition to other purposes, the state plan establishes Ohio's recycling goals. The solid waste statute further requires Ohio EPA and SWAC to triennially evaluate Ohio's progress toward achieving the goals of the state plan. If the findings of this evaluation indicate that modifications to the goals in the state plan are necessary, then Ohio EPA and SWAC are directed to prepare and adopt a revised state plan.

This document, the 2009 State Solid Waste Management Plan, represents the third revision and fourth iteration of the state plan. The original state plan was adopted in 1989. The first and second revisions were adopted in 1995 and 2001, respectively. The 1995 revision introduced significant changes to the initial goals that were established in 1989. The revision adopted in 2001 made minor adjustments to the goals from the 1995 revision to refine and further define the goals.

In addition to establishing recycling and reduction goals for Ohio's solid waste management districts (SWMDs), the state plan also establishes recycling and reduction strategies to be implemented at the state government level. These strategies are focused on efforts that Ohio's state agencies can take to further recycling and waste reduction efforts within the State.

Changes Introduced With This Revision

This version of the state plan contains a new chapter that addresses waste-to-energy technologies. These technologies have the potential to help Ohio further reduce its reliance on landfill facilities, reduce Ohio's emissions of methane, and provide alternative energy sources.

This state plan also recommends a number of new and changes to existing siting criteria for locating solid waste facilities. These new and changed siting criteria are explained in detail in Chapter 5 of this state plan.

This update to the state plan makes a number of changes to the goals that guide programming provided by the SWMDs. These changes include:

- Introduces a requirement for SWMDs to prepare and implement an outreach and marketing plan to guide the development of outreach programming to five target audiences.
- Requires all SWMDs to provide the following programs:
 - A web site,
 - An inventory of its recycling infrastructure,
 - A comprehensive resource guide; and,
 - A speaker/presenter.
- Introduces a new goal for SWMDs to measure the effects of their recycling and reduction programs on greenhouse gas emissions.
- Renames Goal 1 to the "Infrastructure Goal"
- Introduces the following new methodologies for calculating the population that has access to a drop-off recycling opportunity:
 - A tonnage model, and
 - A survey model.
- Introduces a number of other changes to the requirements that apply to demonstrating compliance with Goal 1 (the infrastructure goal).
- Recommends a number of new and changes to existing siting criteria for solid waste facilities.

Summary of Chapters

This version of the state plan consists of 10 chapters. Each chapter of this state plan is summarized below.

Chapter 1- Introduction

This chapter provides the context in which House Bill 592 was developed and adopted as well as the current state of solid waste management in Ohio. In the mid to late 1980s, Ohio faced a wide array of significant solid waste management issues. These issues were due in part to the lack of a comprehensive regulatory structure for overseeing solid waste disposal facilities and partly due to the lack of planning for how to manage Ohio's solid waste. These issues included decreasing landfill capacity, increasing amounts of imported waste, environmental degradation from landfill facilities, lack of solid waste management planning, and desire for local control over the flow of solid waste.

Ohio Revised Code (ORC) Section 3734.50, as established by House Bill 592, requires the state plan to:

- Reduce reliance on the use of landfills for management of solid waste;
- Establish objectives for solid waste reduction, recycling, reuse, and minimization and a schedule for implementing those objectives;
- Establish restrictions on the types of solid wastes disposed of by landfilling for which alternative management methods are available (such as yard waste);
- Establish general criteria for the location of solid waste facilities;
- Examine alternative methods for disposal of fly ash and bottom ash resulting from the burning of mixed municipal solid waste;
- Establish a statewide strategy for managing scrap tires;
- Establish a strategy for legislative and administrative actions that can be taken to promote markets for products containing recycling materials; and,
- Establish a program for the proper separation of household hazardous waste (HHW).

Each state plan contains chapters devoted to each of the bulleted topics above.

House Bill 592 also required all 88 counties in Ohio to form SWMDs either individually or in combination with one or more other counties. As of 2009, Ohio had 52 SWMDs. Each SWMD is required to prepare a solid waste management plan that demonstrates how the SWMD will achieve the goals of the state plan. Each SWMD is further required to obtain local approval of the plan through a ratification process, submit the plan to Ohio EPA for review and approval, and annually review implementation of the plan. SWMDs are required to revise their solid waste management plans on a regular schedule that is established in the statute.

Chapter I also contains information regarding the planning process at the local level, what constitutes solid waste, the generation and disposal of solid waste in Ohio, the affects of coal-fired power plants on generation and disposal, available capacity at and types of landfills for disposing of solid waste, and imports and exports of solid waste.

Chapter 2- Implementing the 2001 State Solid Waste Management Plan (2001 State Plan)

Since the 2001 State Plan was adopted, all 52 of Ohio's SWMDs either obtained approval for a revised solid waste management plan or, in some cases, were issued an updated solid waste management plan prepared by Ohio EPA. 40 SWMDs are operating under solid waste management plans with Goal 1 (i.e. providing access to recycling infrastructure) as the primary goal. These SWMDs represent 70 of Ohio's 88 counties. The remaining 12 SWMDs have solid waste management plans that demonstrate compliance with Goal 2 (i.e. waste reduction and recycling percentages).

In order to demonstrate compliance with Goal 1, SWMDs implemented or will implement the following recycling opportunities:

- At least 214 new drop-off recycling locations;
- At least 21 new curbside recycling programs; and,
- At least 12 curbside recycling programs were upgraded to make participating in those programs easier.

In total, these new and upgraded programs provide/will provide at least 1,110,000 additional people with access to recycling opportunities

In 2007, Ohio achieved a statewide reduction and recycling rate of almost 41 percent. The State achieved its highest reduction and recycling rate in 2002 at almost 45 percent.

In 2007, individual SWMDs achieved waste reduction and recycling rates that were quite varied as is demonstrated in the following bullet points:

- For the residential/commercial sector, the waste reduction and recycling rates ranged from a low of a little more than three percent to a high of more than 40 percent.
- 23 SWMDs achieved residential/commercial sector waste reduction and recycling rates of 25 percent or greater.
- 36 SWMDs achieved industrial sector waste reduction and recycling rates of 66 percent or better.

The waste reduction and recycling rates for all 52 SWMDs are presented in Appendix B.

The 52 SWMDs implemented a wide variety of strategies, programs, and activities to achieve the goals of the 2001 State Plan. Some of these strategies, programs, and activities are described in Chapter 2.

Chapter 3 - Goals for Solid Waste Reduction, Recycling, Reuse, and Minimization

This chapter establishes nine goals that SWMDs will be required to pursue in their solid waste management plans. These nine goals are as follows:

Goal 1

Recycling Infrastructure – The SWMD shall provide its residents and commercial businesses with access to opportunities to recycle solid waste. At a minimum, the SWMD must provide access to recycling opportunities to 90 percent of its residential population in each county and ensure that commercial generators have access to adequate recycling opportunities.

Goal 2

Waste reduction and recycling rates - The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/commercial sector and at least 66 percent of the solid waste generated by the industrial sector.

Goal 3

Outreach and Education – Minimum Required Programs - The SWMD shall provide the following required programs:

- A web site;
- A comprehensive resource guide;
- An inventory of available infrastructure; and,
- A speaker or presenter.

Goal 4

Outreach and Education - The SWMD shall provide education, outreach, marketing, and technical assistance regarding reduction, recycling, composting, reuse, and other alternative waste management methods to identified target audiences using best practices.

Goal 5

Restricted Solid Wastes, Household Hazardous Waste (HHW) and Electronics - The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, HHW, and electronics.

Goal 6

Economic Incentives - The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

Goal 7

Measure Greenhouse Gas Reduction – The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Goal 8

Market Development - The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Goal 9

Reporting - The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

This chapter also establishes a statewide recycling and reduction goal of 50 percent. In order to facilitate achieving Ohio's goals, this state plan establishes the following 11 strategies to be implemented by Ohio's government agencies:

Strategy 1 - Continue to provide financial assistance through the Ohio Department of Natural Resources (ODNR).

Strategy 2 - Explore means of obtaining improved reporting on the part of industrial generators.

Strategy 3 - Study existing curbside recycling programs to determine factors that make curbside programs successful as well as define typical costs and potential participation rates.

Strategy 4 - Publish the Facility Data Report every other year and Solid Waste Management in Ohio - Recycling, Reduction, Waste Generation & Disposal every three years. In years when full reports are not published, Ohio EPA will make the data used for both reports available.

Strategy 5 - Ohio EPA and ODNR will work with the Ohio Department of Administrative Services to incorporate recycling services into the service contracts for Ohio's state government agency office buildings.

Strategy 6 - Ohio EPA and ODNR will coordinate solid waste planning between both agencies.

Strategy 7 - Ohio EPA will conduct an annual survey of material recovery facilities (MRFs) and distribute the results of the survey to appropriate SWMDs.

Strategy 8 - ODNR and Ohio EPA will continue to investigate and support programs to divert organic materials from disposal in landfill facilities.

Strategy 9 - To the extent possible, the State will support the development of and facilitate the implementation of technologies that use waste to produce energy. To fulfill this strategy, Ohio EPA will investigate developing rules to govern permitting and operating waste-to-energy facilities. Ohio EPA will further investigate ways of overcoming the environmental regulatory barriers that are discussed in Chapter 10.

Strategy 10 - Ohio EPA will monitor and evaluate the impacts of landfills in Ohio on greenhouse gas emissions.

Strategy 11 - Ohio EPA will continue to explore ways to reduce fugitive landfill gas emissions and increase Ohio's utilization of landfill gas for energy recovery.

Chapter 4 - Restrictions on the Types of Solid Waste Disposed of in Landfills and Burned in incinerators

Restricting wastes from disposal avoids potential environmental problems by managing high volume, potentially harmful, and difficult to manage wastes through more appropriate options. Restrictions on how certain waste materials can be managed are also a means of preserving landfill capacity. Furthermore restrictions are a tool for recovering value from waste.

Ohio's solid waste regulations mandate the following restrictions:

- **Yard Waste:** Ohio's current yard waste restriction bans source-separated yard waste from being disposed of in solid waste landfill facilities and burned in incinerator facilities. Details regarding the yard waste restriction are provided in Appendix E.

- **Scrap tires:** Ohio's scrap tire restriction bans all whole and shredded scrap tires from being disposed of in landfill facilities (except for landfills or landfill units specifically designed to accept only scrap tires).
- **Lead-acid batteries.** With the adoption of legislation in 2008, Ohio's lead-acid battery restriction applies to disposing of batteries in both landfill and incinerator facilities.

Ohio's past experiences with restricting materials from disposal led the State to focus on making sure alternative management options are available rather than outright bans. Thus, this revision of the state plan does not recommend new material restrictions. Instead, this state plan directs Ohio and the SWMDs to develop alternative strategies for waste streams that can be properly managed through a method other than disposal. Such a focus places a strong emphasis on educating residents regarding alternative management options for specific non-restricted waste streams (such as major appliances, electronic equipment and used oil).

Chapter 5 - Revised General Criteria for the Location of Solid Waste Facilities

Prior to the passage of House Bill 592 and the first state plan, Ohio's solid waste regulatory system provided few, formally established requirements governing the appropriateness of a particular location for constructing and operating a solid waste facility. The 1989 State Plan recommended a relatively comprehensive set of criteria to guide siting solid waste facilities. Following adoption of the 1989 State Plan, Ohio promulgated regulations that made the recommendations requirements.

Because Ohio's siting criteria were considered to be comprehensive, past revisions of the state plan did not recommend significant changes to the criteria. Instead, the state plan recommended adjustments to refine the existing siting criteria. The existing siting criteria for all types of solid waste facilities are summarized in Appendix G.

This revision of the state plan recommends possible new and changes to existing siting criteria that Ohio EPA will evaluate during the rule development and adoption process for the siting criteria rules. The bullet points below list these proposed new and changes to siting criteria:

- **Streamway (new)** – If adopted, this criterion would require a setback from a streamway that takes into account the natural fluctuations in the stream's channel over time. This criterion is intended to protect both the solid waste facility and the stream from impacts resulting from channel fluctuations.

- **Easements (new)** – If adopted, this possible criterion would prohibit the limits of waste placement and all containment structures from being located in a utility easement, a right-of-way for a public road or a railroad, and a stream culvert.
- **Floodplain (change)** – If adopted, this change would extend the setback from floodplains to those floodplains that have not been mapped by the Federal Emergency Management Agency.
- **Sand and Gravel Pits and Limestone and Sandstone Quarries (change)** – If adopted, this change would define acceptable conditions for locating solid waste facilities in these areas.
- **Underground Mine (change)** – If adopted, this change would define what constitutes the angle of draw.
- **Isolation Distance (change)** – If adopted, this change would define a relationship between the amount of isolation distance between the bottom of a recompacted liner and top of the underlying aquifer and the required complexity of the liner system for a landfill facility.

Chapter 6 - Management of Ash Resulting from the Burning of Mixed Municipal Solid Waste

When House Bill 592 was passed, Ohio's solid waste management community anticipated that incinerating solid waste would be an important component of Ohio's overall waste management system. As a result, the General Assembly wanted to foster diverting incinerator ash from disposal through uses for the ash. In 2009, there was only one operating incineration facility in Ohio that was licensed to burn solid waste. That facility burns primarily infectious waste with a very small quantity of solid waste. As a result, there is currently a very small quantity of ash from incinerator facilities that needs to be managed.

Given the absence of large, publicly-owned municipal solid waste incinerators in Ohio, the management of municipal solid waste combustion ash is not a pressing issue for Ohio at this time. Furthermore, Ohio EPA does not expect incineration to become a significant solid waste management option in the near future due to the expense of upgrading existing incinerator facilities to meet current air emission standards and the time required to issue a permit to install for a new facility. Consequently, this state plan version does not recommend developing alternative methods of disposing of municipal solid waste incineration ash.

This state plan does include, for the first time, a chapter that discusses potential waste-to-energy technologies being evaluated by the waste industry. See Chapter 10 for more information about this topic.

Chapter 7 - A Statewide Strategy for Managing Scrap Tires

When House Bill 592 was passed, Ohio lacked a regulatory program to ensure that scrap tires were managed properly. The result was large accumulations of illegally disposed scrap tires. In 1993, Ohio's General Assembly adopted legislation establishing Ohio's scrap tire law. As a result of that legislation, Ohio's scrap tire program has made tremendous progress toward resolving most of Ohio's scrap tire management problems. In fact, Ohio's scrap tire program is so successful that in 2006 it was recognized by both environmental professionals and the tire industry for outstanding achievement. The Rubber Manufacturers' Association ranked Ohio's scrap tire program as the seventh best program out of the 50 states.

Ohio's scrap tire regulatory program governs the management of scrap tires from the time a tire becomes a scrap tire until the scrap tire is recycled, converted into energy, or properly disposed of. Thus, with minor exceptions, anyone wanting to transport scrap tires or operate a scrap tire facility in Ohio must first obtain all of the necessary authorizations.

Ohio's scrap tire law provides a source of revenue to fund Ohio EPA's scrap tire program, to provide funding for scrap tire abatement efforts, and to allow the Ohio Department of Natural Resources (ODNR) to award grants to encourage recycling and other uses of scrap tires. The source of revenue is a \$1.00 dollar per tire fee that is assessed on the first sale (i.e. wholesale) of new tires.

In addition to Ohio EPA's program, Ohio's SWMDs provide programs for ensuring that scrap tires are managed properly. These programs typically consist of residential collection events, education and technical assistance, abatement activities, and funding for local scrap tire enforcement.

Chapter 8 - A Program for Managing Household Hazardous Waste

Household hazardous waste (HHW) is any material discarded from the home that may, because of its nature, pose a threat to human health or the environment when handled improperly. Although HHW can have many of the same properties as industrial hazardous waste, because of the low percentage of waste stream generated from each household, it is specifically excluded from regulation as a hazardous waste by both the federal and Ohio's hazardous waste programs.

SWMDs are required, in their solid waste management plans, to provide a strategy to address HHW. The specific strategy chosen is left to SWMD's discretion. Thus, as would be expected, there is a wide range of strategies being implemented by Ohio's SWMDs. Some SWMDs focus their attention on preparing and distributing literature regarding alternatives to hazardous materials and proper ways of managing HHW. Other SWMDs provide technical assistance to home owners via telephone hotlines. Still other SWMDs host collection programs for collecting HHW from residents.

In 2008, 32 SWMDs representing 58 counties provided collection programs for their residents. Of those 32 SWMDs:

- 23 SWMDs offered temporary collection events (typically one or two day events);
- One SWMD offered a year-round, permanent collection program;
- Seven SWMDs offered semi-permanent collection programs (i.e. available less than year-round but longer than temporary events);
- Two SWMDs provided both semi-permanent and temporary collection programs; and
- Six SWMDs offer collection programs at SWMD-owned/operated facilities.

Managing end-of-life electronic equipment continues to be a topic of concern on both state and national levels. Electronic waste (or e-waste) is one of the fastest growing sources of waste in the United States. This is largely driven by the rapidly increasing rate of obsolescence for consumer electronics. According to U.S. EPA electronics represent the largest contributors of heavy metals to the waste stream. Furthermore, the volume of obsolete electronics being disposed of consumes significant disposal capacity.

At this time, the burden for collecting end-of-life consumer electronics from residents for recycling falls primarily on the public sector. More than half of Ohio's SWMDs provide recycling opportunities for end-of-life electronics. In 2008, 39 of Ohio's SWMDs offered collection programs for end-of-life electronics. Of those 39 SWMDs:

- 23 SWMDs offered temporary collection events;
- Six SWMDs offered permanent collection programs; and,
- 10 SWMDs offered semi-permanent collection programs.

In 2009, complications associated with managing e-waste were compounded due to the switch from analog broadcasting of television programming to strictly digital signals. The Consumer Electronics Association estimated that as many as 15 million television sets could become unwanted by 2010. Because there was no organized management program for unwanted televisions, solid waste professionals were concerned that most of those televisions would be disposed of in landfill facilities. Some of Ohio's SWMDs do provide collection programs for televisions. However, collecting and managing televisions can be a costly endeavor, and there are few outlets for recycling televisions.

Chapter 9 - Recycling Market Development

Ensuring that there are outlets for recyclable materials is essential to the success of recycling programs. Thus, it is critical that Ohio focus attention on creating markets that can use recyclable materials to produce new products. The price for a recyclable commodity is a strong driving force for influencing the amount of that commodity that is recycled. Furthermore, the value of potentially recyclable materials is dependent upon the demand for the materials. Demand is affected by the number and types of manufacturing operations that use recycled materials, and so on.

Prices for recovered materials have fluctuated widely since the 2001 State Plan was adopted. Prices began rising in 2006 to all-time highs in 2008. In late 2008, prices plunged sharply in the fallout from global economic problems. These price fluctuations result in significant effects to the stability of recovered material commodity markets.

ODNR, DRLP continued to administer the Market Development Grant program. In 2008, ODNR distributed a total of more than \$2.2 million to eight recipients. Appendix J contains lists of grant recipients from the 2007 and 2008 grant rounds.

This state plan update recommends that future grant funding be targeted to establishing infrastructure and markets for the following materials:

- Construction and Demolition Debris (C&DD)
- End-of-Life Consumer Electronics
- Glass
- Organic Material (i.e. Food Scraps)
- Paper and Fiber-based Materials
- Plastics
- Scrap Tires

The 2001 State Plan contained six state strategies for market development. These strategies were to be implemented by state of Ohio government agencies to help further developing Ohio's markets for recovered materials. As is explained in Appendix K, Ohio made progress toward implementing all six strategies.

Chapter 9 establishes six state market development strategies to be implemented with this state plan update.

Although Goal 7 is an optional goal, many SWMDs do provide programs geared toward market development. Many of these programs focus on raising awareness of the “Buy Recycled” message. A few SWMDs provide funding for projects that directly create opportunities to use recovered materials. A few of these funding programs, including the Adams-Browning Recycling Station’s Glass reFactory, the Solid Waste Authority of Central Ohio’s Columbus Transformation Center, and the Lorain County SWMD’s Recycling Revolving Loan Fund are explained in Chapter 9.

Chapter 10 - Waste-to-Energy

Recently, there has been a resurgence of interest in technologies that use waste to produce energy and reduce the amount of waste being disposed of in landfill facilities. A number of factors brought about this renewed interest. These factors include:

- Increasing costs for fossil fuels;
- Search for renewable and sustainable alternatives for fossil fuels; and,
- Interest in minimizing the production of greenhouse gases.

In response to this interest, ODNR, working with a number of partners and sponsors, offered the *First Annual Partnerships in Emerging Technology Conference* in October 2008. This conference provided attendees with an overview of various emerging technologies. Many of these technologies are discussed in this new chapter of the state plan.

U.S. EPA recognizes, in its waste management hierarchy, that technologies for recovering energy from waste are preferable to simply incinerating waste or disposing of waste in landfills. This is due to the benefits associated with waste-to-energy technologies. Chief among these benefits are lower pollution emissions, creation of alternatives to fossil fuels, and reduced reliance on landfills.

The following technologies are discussed in Chapter 10:

- Bioreactors:
 - Anaerobic digestion; and
 - Converting biomass to energy;
- Production of Syngas:
 - Pyrolysis;
 - Starved oxygen gasifiers; and
 - Conversion of syngas to biofuel;
- Use of syngas to produce energy;
- Collection and utilization of landfill gas;
- Co-firing of coal and municipal solid waste; and
- Incineration with energy recovery.

Ohio’s environmental laws and regulations were not designed with the recent advancements in waste management technologies in mind. As a result, there are a number of obstacles that these laws and regulations potentially pose for implementing new waste-to-energy technologies. In particular, the following regulatory programs have the potential to affect the use of waste-to-energy technologies:

- Solid waste program
- Air pollution control program
- Water pollution control program
- Hazardous waste program

Streamlining the permitting process is something that Ohio EPA is working toward in order to make regulatory obstacles less of an issue.

Chapter 1 Introduction

The information presented in this introductory chapter provides an overview of Ohio's solid waste management regulatory and planning programs. The remaining chapters of this document provide information regarding Ohio's efforts to implement the requirements established by House Bill 592 for the state solid waste management plan (state plan).

In the late 1980s, Ohio faced multiple solid waste management issues that motivated Ohio's General Assembly to evaluate and modernize Ohio's outdated solid waste regulatory structure. The result was House Bill 592, a landmark legislative package that forever changed Ohio's solid waste management program. The new solid waste law instituted a much more stringent regulatory program for solid waste disposal facilities. House Bill 592 also required Ohio to minimize its reliance on landfills for managing solid waste by increasing efforts to reduce, reuse, and recycle. To fully understand the extent to which House Bill 592 revolutionized Ohio's solid waste program, it is helpful to have a basic historic perspective of solid waste regulation in Ohio.

History of Ohio's Solid Waste Regulatory Program

Ohio's first solid waste law was adopted in 1967, and the State's first solid waste regulations were adopted in 1968. At that time, the Ohio Department of Health and local health departments were responsible for implementing Ohio's solid waste regulatory program. While the initial legislation established several important provisions that are found in Ohio's current solid waste regulatory program (such as prohibiting open dumping and open burning of garbage), the overall scope of both the statute and the rules was limited.

In 1972, the Ohio Environmental Protection Agency (Ohio EPA) was created, and the primary authority for Ohio's solid waste program was delegated to the new agency. However, health departments are still involved in implementing and enforcing the regulations.

In 1976, Ohio adopted revisions to the original solid waste regulations. Among other changes, these revisions established the requirements that an owner or operator of a solid waste facility obtain approval for a facility plan (the precursor to a permit-to-install (PTI)) and an annual license to operate the facility. The regulations also enacted restrictions on establishing solid waste disposal facilities in unacceptable locations and basic engineering and operating standards for solid waste disposal facilities.

Although the 1976 regulations resulted in an improved solid waste regulatory program, the scope of those regulations was still limited. The 1976 regulations remained effective and unchanged until they were significantly revised as required by House Bill 592 and adopted in 1990.

Ohio once again adopted significant changes to its solid waste regulations in 1994 as the result of federal regulations that were adopted by the United States Environmental Protection Agency (U.S. EPA). These regulations required best-available technology (BAT) in the design and construction of solid waste landfill facilities.

There have been numerous amendments to the statutory provisions governing the solid waste management regulatory and planning programs that were originally established by House Bill 592. While some amendments have altered the original statutory provisions, the intent and fundamental requirements of House Bill 592 remain in place.

Why House Bill 592 Was Passed

In the mid to late 1980s, Ohio faced a number of significant solid waste management issues. These issues were due, in part, to the lack of a comprehensive regulatory structure for overseeing solid waste disposal facilities and partly due to the lack of planning for how to manage Ohio's solid waste. These issues included the following:

- Decreasing number of operating solid waste landfills resulting in a shortage of available disposal capacity;
- Lack of planning and standards for locating new disposal facilities;
- Increasing amounts of out-of-state waste being brought into Ohio, particularly from distant east-coast states;
- Groundwater contamination from poorly located, designed, and operated landfill facilities;
- Explosions and other threats from migrating methane gas;
- Lack of consistent and effective enforcement of the solid waste regulations;
- Desire for local control over the flow of solid waste;

- Limited public involvement in the process for locating and permitting landfills; and
- Poor operating history of many of Ohio's disposal facilities.

To resolve these issues, Ohio's General Assembly quickly introduced and passed House Bill 592. House Bill 592 took effect on June 24, 1988 and resulted in a comprehensive revision to Ohio's 1967 solid waste law.

House Bill 592 required all of the following:

- Required the director of Ohio EPA to adopt comprehensive regulations governing solid waste disposal facilities. These regulations were required to address, among other things, BAT design requirements, financial responsibility, closure of facilities, and post-closure care. The rules became effective on March 1, 1990. Although the rules have been revised several times since, the rules retain the basic components required by House Bill 592;
- Created the Solid Waste Management Advisory Council (SWAC);
- Required the director of Ohio EPA, with the advice of SWAC, to prepare and adopt a state solid waste management plan;
- Required the board of county commissioners of each of Ohio's 88 counties to establish a solid waste management district (SWMD), either individually or jointly with one or more other counties;
- Required each SWMD, working through a policy committee, to prepare, adopt, ratify, and submit a solid waste management plan to Ohio EPA for approval; and
- Required owners and operators of solid waste facilities in operation prior to January 1, 1980 to incorporate best available technology (BAT) into their facilities.
- Establish restrictions on the types of solid waste disposed of by landfilling for which alternative management methods are available (addressed in Chapter 4);
- Establish revised general criteria for locating solid waste facilities (addressed in Chapter 5);
- Examine alternative methods for disposing of fly ash and bottom ash resulting from burning mixed municipal solid waste (MSW) (addressed in Chapter 6);
- Establish a statewide strategy for managing waste tires (addressed in Chapter 7);
- Develop specific recommendations for legislative and administrative actions to promote markets for products containing recycled materials and to promote the use by state government of products containing recycled materials (addressed in Chapter 9); and
- Establish a program for the proper separation and disposal of hazardous waste generated by households (addressed in Chapter 8).

Solid Waste Management Districts

The solid waste law created by House Bill 592 requires the board of county commissioners of each county in Ohio to be a member of a SWMD, either individually or in conjunction with one or more other counties. Ohio's 88 counties are currently organized into 52 SWMDs. Of those 52 SWMDs, 37 are single county SWMDs and 15 are joint SWMDs consisting of two or more counties. The number of counties in the joint county SWMDs ranges from two to six counties. The map in Figure 1-1 delineates the jurisdictions of the 52 SWMDs.

Boards of county commissioners have the option of forming either a SWMD or a regional solid waste management authority (authority). Ohio EPA uses SWMD when referring to both SWMDs and authorities. Of the 52 SWMDs, five are authorities.

The primary difference between a SWMD and an authority is the composition of the governing body. A SWMD is governed by a board of directors and a policy committee. The policy committee is responsible for developing a solid waste management plan. The board of directors consists of the boards of county commissioners of all counties that make up the SWMD and is responsible for ensuring that the SWMD's solid waste management plan is implemented. The policy committee is composed of members representing a variety of interested parties, one from each member county, as is shown in Figure 1-2.

Requirements for the State Plan

The Ohio Revised Code (ORC) requires the state plan to be prepared by Ohio EPA, with the advice of SWAC. As stipulated in ORC Section 3734.50, the state plan must address eight specific mandates:

- Reduce reliance on the use of landfills for the management of solid waste;
- Establish objectives for solid waste reduction, recycling, reuse, and minimization (addressed in Chapter 3);

**Figure 1-1:
Ohio's Solid Waste Management Districts**

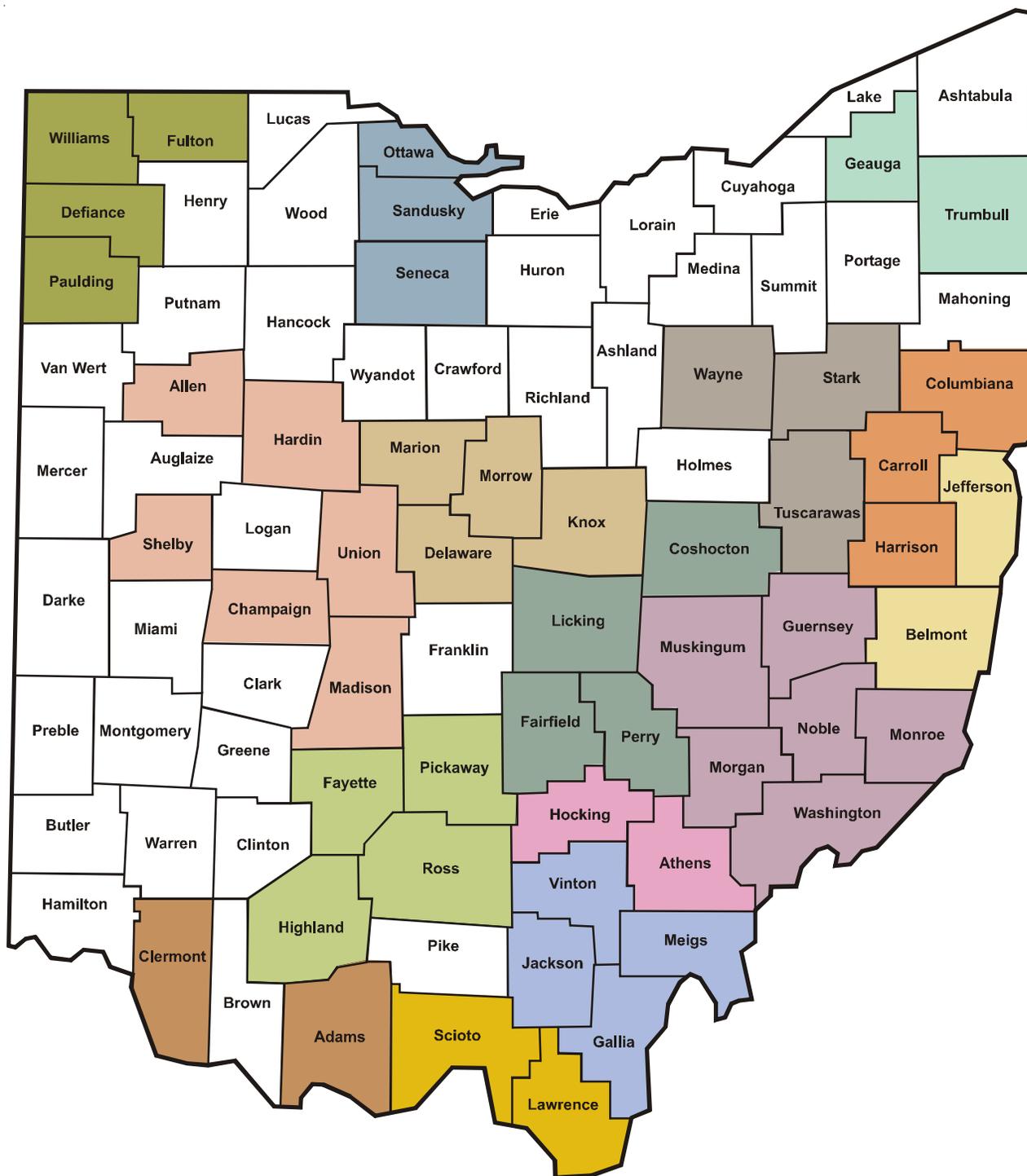


Figure 1-2: Composition of a Policy Committee

The Policy Committee^a

A SWMD's policy committee consists of seven members from each county. These members are as follows:

- President of the board of county commissioners;
- Chief executive officer of the largest municipality;
- Township representative;
- Health commissioner of the health district having the largest jurisdiction;
- Industrial, commercial, or institutional generator of solid waste;
- Citizen representative; and,
- Public representative.

If the SWMD is comprised of an even number of counties, then the policy committee must include an additional public representative. The two largest SWMDs in Ohio each have six member counties. A SWMD consisting of six counties has a policy committee of 43 members – seven members from each county and one additional public representative.

^aThe board of trustees for a solid waste management authority consists of the same members as a policy committee, and the members are selected in the same manner as for a policy committee.

An authority is governed by a board of trustees which consists of the same members as a policy committee. An authority does not have a board of directors. The board of trustees performs the functions of both a board of directors and a policy committee. Thus, it is the board of trustees that prepares and implements the solid waste management plan. The five authorities in Ohio are as follows:

- Belmont-Jefferson;
- Brown;
- Franklin (operating as the Solid Waste Authority of Central Ohio);
- Richland; and,
- Summit-Akron.

Overview of the Local Solid Waste Planning Process

Each SWMD is required to prepare and implement a solid waste management plan. This plan must account for how all of the solid waste that will be generated with the SWMD will be managed over the specified planning period. The SWMD's solid waste management plan must also demonstrate how the SWMD intends to achieve the goals of the state plan. Solid waste management plans are prepared in accordance with a format prescribed by Ohio EPA and the requirements contained in OAC Rule 3745-27-90.

The solid waste management plan must cover a minimum of 10 years but there is no limit on the number of years a plan can cover. A SWMD is required to update its solid waste management plan every three years, if the plan covers a period of less than 15 years, or every five years, if the plan covers a period of 15 or more years. Each time a SWMD updates its solid waste management plan, the SWMD must submit the updated plan to Ohio EPA to be approved.

The bulleted points below list the major steps in the process of preparing a solid waste management plan update:

- The SWMD's policy committee prepares the draft plan update.
- The policy committee submits the draft plan update to Ohio EPA to be reviewed.
- The SWMD's policy committee makes whatever changes it believes to be necessary to address Ohio EPA's comments.
- The policy committee makes the draft plan update available for public comment and holds a public hearing.
- The policy committee undergoes a ratification process during which all political jurisdictions within the SWMD vote to approve or disapprove the draft plan update.
- The policy committee submits the ratified draft plan update to Ohio EPA for review and approval.

The solid waste law establishes deadlines for developing, submitting and receiving approval of a solid waste management plan update. If a SWMD fails to obtain approval for its plan update within the prescribed time frame, then the statute requires Ohio EPA to prepare the plan update for the SWMD. The complete solid waste management plan preparation process is defined in ORC Sections 3734.55 and 3734.56.

What Is Solid Waste?

Ohio and federal solid waste laws differ in terms of what is considered to be solid waste. The federal definition of solid waste encompasses more types of waste than Ohio's definition. At the federal level, solid wastes are regulated, along with other wastes, under Subtitle D of the Resource Conservation and Recovery Act (RCRA). The wastes covered by these federal regulations are often referred to as "Subtitle D wastes". Examples of Subtitle D wastes are identified in Figure 1-3.

The universe of Subtitle D wastes is greater than the universe of what Ohio defines as solid waste. All of Ohio's solid wastes are Subtitle D wastes, but not all Subtitle D wastes are considered solid wastes in Ohio.

Examples of Subtitle D wastes that are not solid waste include construction and demolition wastes, oil and gas wastes, and mining wastes. These wastes are excluded from being solid waste in Ohio's definition of solid waste. Furthermore, municipal sludge is rarely managed as a solid waste in Ohio. Thus, although these other wastes are sometimes disposed of in solid waste landfills, the state and local planning processes in Ohio focus on managing MSW and industrial solid waste (ISW). The differences in what is defined as MSW must be considered when comparing waste statistics from one state to another or from one state to the nation.

Figure 1-3: RCRA Subtitle D Wastes¹

- Municipal Solid Wastes*
 - Residential
 - Commercial
 - Institutional
 - Industrial, non-process waste
- Industrial Nonhazardous Solid Wastes*
- Municipal sludge
- Construction and Demolition Wastes
- Agricultural Wastes
- Oil and Gas Wastes
- Mining Wastes

Waste streams that are the primary focus of Ohio's planning process are denoted with "*"

For Ohio, solid waste is defined in OAC Rule 3745-27-01(S)(24) as follows:

"Solid waste" means such unwanted residual solid or semisolid material, including but not limited to, garbage, scrap tires, combustible and noncombustible material, street dirt and debris, as results from industrial, commercial, agricultural, and community operations, excluding earth or material from construction, mining, or demolition operations, or other waste materials of the type that normally would be included in demolition debris, nontoxic fly ash and bottom ash, including at least ash that results from combustion of coal, biomass fuels, and ash that results from the combustion of coal in combination with scrap tires where scrap tires comprise not more than fifty percent of heat input in any month, spent nontoxic foundry sand, and slag and other substances that are not harmful or inimical to public health, and includes, but is not limited to, garbage, scrap tires, combustible and noncombustible material, street dirt, and debris. Solid waste does not include any material that is an infectious waste or a hazardous waste.

As is illustrated in Figure 1-4, MSW is comprised largely of the products, packaging, food, and yard waste trimmings discarded by residential, commercial, institutional, and industrial generators. ISW is comprised of the non-liquid and nonhazardous wastes generated as the result of an industrial or manufacturing process. Technically, non-process waste generated by industries is MSW, not ISW. Practically, however, non-process and process ISW are often combined by the generator and cannot be discreetly measured.

Generation and Disposal of Solid Waste in Ohio

Ohio EPA annually calculates and publishes the quantities of solid waste that were generated and disposed of statewide. Tracking generation and disposal provides Ohio EPA with the information necessary to monitor the availability of environmentally protective, permitted capacity to manage our waste. The trends discerned from the figures over time are important for effective solid waste management planning.

Ohio EPA tracks solid waste generation according to two categories or sectors of waste generators. Waste from residential and commercial sources comprises one category and waste from industrial sources (ISW) comprises the second category. What Ohio classifies as residential/commercial solid waste is roughly the same as what U.S. EPA and other states refer to as MSW. Statewide generation is calculated by adding together the generation figures for both sectors.

Figure 1-4: Sources and Examples of Municipal Solid Waste²

Sources	Examples
Residential (single-and multi-family homes)	Newspapers, clothing, disposable tableware, food packaging, cans and bottles, food scraps, yard trimmings
Commercial (office buildings, retail and wholesale establishments, restaurants)	Corrugated boxes, food scraps, office papers, disposable tableware, paper napkins, yard trimmings
Institutional (schools, libraries, hospitals, prisons)	Cafeteria and restroom trash can wastes, office papers, classroom wastes, yard trimmings
Industrial (packaging and administrative; not process wastes)	Corrugated boxes, plastic film, wood pallets, lunchroom wastes, office papers.

Ohio EPA calculates solid waste generation by adding together the quantities of solid waste disposed of and recycled for each sector. As is discussed in Chapter 2, Ohioans are recycling and composting increasing amounts of the solid waste that is generated. Even with these efforts, the amount of waste being disposed of in landfills continues to increase.

Solid Waste Generation

As previously mentioned, generation is calculated by adding together waste that was disposed of and waste that was recycled. Recycling data is reported to Ohio EPA by Ohio's 52 SWMDs through the annual district report (ADR). SWMDs obtain the recycling data by surveying communities, businesses, industries, and other entities that recycle.

Disposal data is reported to Ohio EPA by owners and operators of solid waste facilities through the facility annual report. The facility annual report is a report that owners and operators of all solid waste facilities must submit to Ohio EPA. The report provides information about quantities, origins, destinations, and types of waste received at a solid waste facility for the report year. Ohio EPA may adjust the disposal data to account for any mischaracterization of waste that occurred because the waste was routed through a transfer facility before being taken to a landfill. Furthermore, Ohio's

generation figure includes waste that was generated in Ohio but exported to other states for disposal. The generation figure does not include waste that was imported from other states.

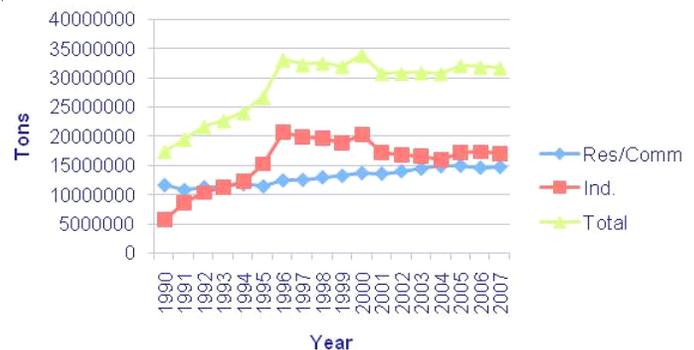
In 2007, Ohioans generated almost 33.7 million tons of solid waste. This translates into a per capita generation rate of a little more than 15 pounds per person per day (ppd). Broken down by sector, Ohioans generated approximately 14.7 million tons of residential/commercial solid waste. This equates to a generation rate of a little more than seven pounds per person per day. Ohio's industrial sector generated solid waste at a rate of approximately 8.1 pounds per person per day for a total of a little more than 16.9 million tons.

Generation Trends

Ohio EPA's data show that Ohioans have generated more and more solid waste each year since 1990. [See Figure 1-5 for a chart that depicts Ohio's solid waste generation over time.] Ohio's records show that residential/commercial waste generation rate rose by approximately three million tons from 1990 to 2007, following the general upward trend for that sector. In 2007, the residential/commercial waste generation rate was 7.05 ppd.

Ohio's residential/commercial solid waste generation rate is higher than the rates for many other states and is significantly higher than the estimated national average MSW generation rate. U.S. EPA estimates that the average national generation rate for MSW was 4.62 pounds per person per day (ppd) in 2007, the most current year that national data is available. Some of the difference between Ohio's generation rate and the nation generation rate is attributable to differences in how the generation rates are calculated.

Figure 1-5: Solid Waste Generated in Ohio Over Time



From 1990 to 2007, Ohio's industrial solid waste generation rate increased by more than 12.7 million tons. It is likely that a substantial portion of that increase is due to better reporting by industrial generators as well as actual increases in waste generation. The substantial increase from 1995 to 1996 (15.2 million tons to 20.6 million tons) is the result of changes to the recyclable materials that are credited to the industrial sector. Prior to 1995, SWMDs were prohibited from crediting materials recycled or reduced by programs that were initiated prior to 1985 in the industrial sector. In 1995, that policy changed resulting in significant amounts of additional material being credited to the industrial sector. Because solid waste generation is calculated by adding together the quantities of waste recycled and disposed of, the addition of these materials also resulted in an increase in the industrial sector solid waste generation rate.

As can be seen in Figure 1-5, the generation rate for the industrial sector has exhibited a much less consistent trend from one year to the next. Overall, however, the industrial sector has experienced a general downward trend in generation since 1996.

In terms of total solid waste, the generation rate has more or less mirrored industrial solid waste generation. Decreases in the amount of industrial waste generated were offset by the increases in residential/commercial sector. Thus, while total solid waste was significantly higher in 2007 than in 1990, the total amount of solid waste generated decreased from 1996 to 2007.

Ohio ranks as the third state in the nation in manufacturing. Furthermore, Ohio's gross domestic product, which includes the service and industrial sectors, is the seventh highest in the nation and grew steadily from 1990 to 2007.³ Ohio's large service sector contributes to the State's residential/commercial solid waste generation. Thus, it is not surprising that Ohio's residential/commercial generation rate would be much higher than the national average. Additionally, the large manufacturing base results in a tremendous amount of industrial waste being generated. Solid waste generated by both sectors resulted in a total solid waste generation rate of 15.2 ppd in 2007.

Solid Waste Disposal

Ohio currently does not have any operating solid waste incinerators that burn mixed MSW. Therefore, Ohio relies almost exclusively on landfill facilities for disposing of solid waste. There are three classifications of solid waste landfills in Ohio – MSW landfills, ISW landfills, and residual solid waste (RSW) landfills.

Types of Solid Waste Landfill Facilities

MSW landfills are used to dispose of the wide variety of wastes generated in a typical community. Thus they are used to dispose of waste from households, commercial businesses, institutions, and industrial plants. In addition, MSW landfills may accept other wastes such as asbestos (if permitted to do so), construction and demolition debris, dewatered sludge, contaminated soil, and incinerator ash. MSW facilities accept the most heterogeneous mix of wastes of all of Ohio's solid waste landfills. In 2007, Ohio had 42 operating MSW landfills in 37 counties.

Although ISW landfills can be publicly available, all of Ohio's operating ISW landfills are private facilities that are owned and operated by a manufacturing company. These facilities are termed "captive" facilities because the landfill is used to dispose of waste generated exclusively by the manufacturing company that owns the landfill. A type of ISW landfill is used to dispose of what is known as residual solid waste (RSW). RSW is a subset of industrial waste and is accounted for as industrial waste. RSW, by definition, is generated by seven specific industries that are named in Ohio's rules. Unlike industrial solid waste landfills which have universal design, construction, and operation requirements, the stringency of the requirements that apply to a RSW landfill facility is determined by the type of RSW being disposed of. The companies that operate Ohio's power utilities own and operate captive RSW landfill facilities. In 2007, Ohio had 13 operating captive industrial and RSW landfill facilities in 13 counties.

Because MSW landfills are used to dispose of a much wider variety of wastes than captive landfills, they are the most stringently regulated type of landfill facility. Conversely, the wastes disposed of at an ISW landfill, particularly a captive facility, are relatively homogenous. Thus, ISW landfills may be constructed and operated according to requirements that are less restrictive than those for MSW landfills. An ISW landfill can accept industrial and residual solid wastes and, if captive, solid waste from only the company that owns the landfill.

When all Ohio-generated solid waste that is accepted at landfills in Ohio is considered, Ohio's publicly-available MSW landfills accept the majority of the waste. Furthermore, Ohio's MSW facilities have historically received more waste from residential and commercial sources than from industrial sources. This continued to be true in 2007. Waste from the residential/commercial sector comprised a little less than 54 percent of all Ohio-generated waste disposed of in Ohio's landfills. Further, the majority of Ohio's solid waste is disposed of in publicly-available facilities. Thus, a little more than 27 percent of the Ohio-generated solid waste disposed of in landfills in Ohio was disposed of in captive facilities.

It is important to remember that large amounts of ISW are disposed of in publicly-available facilities. Consequently, while captive ISW and RSW landfills accept much less waste than public MSW facilities, approximately 46 percent of the solid waste disposed of in 2007 was comprised of waste generated by the industrial sector.

Disposal Trends

Since 1990, Ohioans have disposed of an average of about five ppd of residential/commercial waste, including asbestos. In 2007, Ohio's residential/commercial waste disposal rate for waste generated within Ohio was 5.22 ppd. According to data available from U.S. EPA, Ohio's rate is considerably higher than the national average disposal rate of 2.50 ppd in 2007.⁴ As was mentioned earlier, it is not surprising that Ohio would have a higher disposal rate than the national average given Ohio's industrial and service sectors.

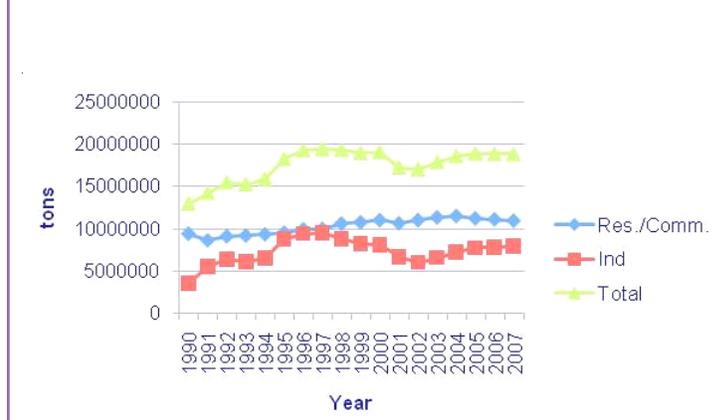
As can be seen from Figure 1-6, with a few minor exceptions, the amount of Ohio-generated residential/commercial waste disposed of in landfills has gradually risen since 1990. The amount of ISW disposed of has fluctuated, with notable declines beginning in 2001 and continuing to 2005.

Impact of Power Generation on Solid Waste Generation and Disposal

Ohio's generation and disposal rates are strongly affected by the presence of three large coal-burning power plants in the state. These plants are:

- The Zimmer Power Station located in Clermont County (part of the Adams-Clermont Solid Waste Management District).
- The Conesville Power Plant located in Coshocton County (part of the Coshocton, Fairfield, Licking, Perry Solid Waste Management District).
- The Gavin Power Plant located in Gallia County (part of the Gallia, Jackson, Meigs, Vinton Solid Waste Management District).

Figure 1-6: Disposal of Ohio-Generated Solid Waste Over Time 1990-2007



As can be seen from Table 1-1, these power plants generate and dispose of significant quantities of waste, primarily flue gas desulfurization (FGD) waste. FGD is a type of pollution control waste and is ISW. FGD has traditionally been difficult to recycle. There are limited markets for FGD (such as raw material for manufacturing gypsum board and a substitute for concrete at agricultural feed lots). However, those markets are mostly saturated, and end users are typically not located close enough to the generating power plants to be viable outlets. As a result, the vast majority of FGD is disposed of in captive, RSW landfill facilities.

By far, the Gavin Power Plant generates and disposes of the greatest quantities of FGD waste of the three power plants. In fact, in 2007, AEP disposed of 3.1 times more FGD waste from the Gavin Plant than was disposed of from the Conesville and Zimmer plants combined.

The fly and bottom ashes generated from coal-burning power generation are not classified as solid waste by virtue of Ohio's legal definition of solid waste (i.e. the wastes are excluded from being solid waste). Thus, fly and bottom ashes are not included in the solid waste generation, disposal, or recycling figures for either SWMDs or the state. FGD is not similarly excluded. FGD is an ISW, specifically a RSW. As an ISW, FGD is included in all ISW and total solid waste statistics.

Table 1-1: Quantities of Waste Disposed^a, Recycled^b, and Generated by Coal Burning Power Plants in 2007

Power Plant	FGD ^c Disposed (tons)	Excluded ^d Disposed (tons)	FGD Recycled (tons)	Total Generated (tons)
Zimmer Power Station	528,489	0	458,337	986,826
Conesville Power Plant	543,272	306,868	320,286	1,170,426
Gavin Power Plant	3,322,304	89,855	0	3,412,159
Total	4,394,065	396,723	778,623	5,569,411

^aAs reported in facility annual reports for 2007 submitted by the owner or operator of the landfill facility to Ohio EPA.

^bAs reported in annual district reports submitted by hosting SWMDs

^cFGD = Flue Gas Desulfurization

^dFly and bottom ashes from coal-burning power plants are excluded wastes.

In 2007, when FGD and excluded wastes generated by electric utilities are considered, that waste comprised a little more than 22 percent of all Ohio-generated waste that was disposed of in solid waste landfills. Combined, these plants alone accounted for 2.3 pounds ppd of the waste that was disposed of in landfills in Ohio. Furthermore, of all the waste disposed of in captive landfill facilities, almost 86 percent of the waste was generated by these three power plants.

In terms of solid waste, Table 1-2 illustrates the effects of FGD on Ohio's total ISW generation and disposal rates.

Table 1-2: Effects of Coal-Fired Electric Utilities on Statewide Generation and Disposal of Industrial Solid Waste - 2007

Including FGD			
Total Generation (tons)	Per Capita Generation (ppd)	Total Disposal (tons)	Per Capita Disposal (ppd)
17,190,872	8.23	8,105,758	3.88
Excluding FGD			
Total Generation (tons)	Per Capita Generation (ppd)	Total Disposal (tons)	Per Capita Disposal (ppd)
12,018,184	5.75	3,711,693	1.78

Although the waste that is generated by the coal-burning electric utilities affects Ohio's generation, disposal and recycling figures, the effects of the power plants are even more pronounced in the SWMDs that host the plants. The effects of the electric utilities on the three SWMDs that host the utilities are presented in Table 1-3.

Table 1-3: Effects of Coal-Fired Electric Utilities on Solid Waste Management District Generation and Disposal of Industrial Solid Waste - 2007

Including FGD				
SWMD	Total Generation (tons)	Per Capita Generation (ppd)	Total Disposal (tons)	Per Capita Disposal (ppd)
AC ^a	1,011,835	24.96	531,874	13.12
CFLP ^b	1,399,369	21.83	712,381	11.11
GJMV ^c	3,398,630	183.53	3,338,632	180.29
Excluding FGD				
SWMD	Total Generation (tons)	Per Capita Generation (ppd)	Total Disposal (tons)	Per Capita Disposal (ppd)
AC ^a	25,009	0.62	3,385	0.08
CFLP ^b	535,811	8.36	169,109	2.64
GJMV ^c	76,326	4.12	16,326	0.88

^a Adams-Clermont Joint Solid Waste Management District

^b Coshocton, Fairfield, Licking Perry Joint Solid Waste Management District

^c Gallia, Jackson, Meigs, Vinton Joint Solid Waste Management District

Solid Waste Disposal Capacity

Ensuring that Ohio would have adequate disposal capacity for its waste is one of the primary purposes of the solid waste planning program. At the time House Bill 592 was adopted, Ohio was facing a potential capacity crisis as landfills were closing at a rapid rate and plans for locating and constructing new disposal capacity were not being developed. Since that time, Ohio's disposal capacity has increased significantly, and disposal capacity has stabilized to acceptable levels.

Since House Bill 592 was adopted, the trend in Ohio has been fewer operating landfills with greater capacity at each facility. Thus, while Ohio has far fewer landfill facilities than prior to House Bill 592, there is significantly more capacity statewide than existed prior to House Bill 592. Even so, available capacity varies from one region of Ohio to another. As an example, by the end of 2006, Ohio as a whole had almost 28 years of available disposal capacity.

In the southwest region of the state, there were six landfill facilities with a total of 15 years of disposal capacity. In contrast, the northeastern region of the state was served by 11 landfill facilities with a total of 34 years of available disposal capacity.

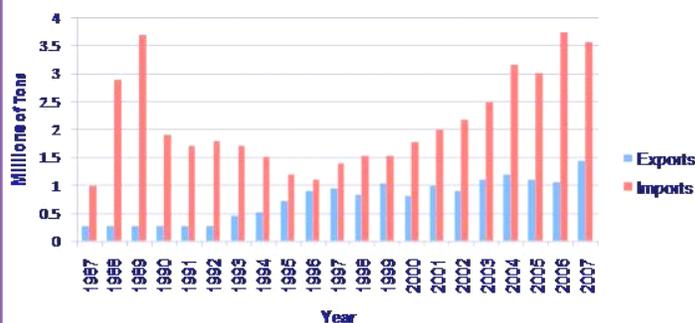
At the end of 2007, Ohio had 42 operating MSW landfill facilities with remaining gross, permitted, available, disposal capacity of 591,652,964 cubic yards. Assuming that the amount of waste disposed of annually equals the total quantity of waste disposed of in Ohio landfills in 2007 and no additional landfill capacity is approved, Ohio had enough disposal capacity at permitted and licensed facilities for almost 31 years. There was one MSW landfill facility that had been permitted but not constructed. That facility, the Harrison County Landfill, could provide another 58 million cubic yards and 3.41 years of disposal capacity if it is operated.

Imports and Exports of Solid Waste

Another issue that led Ohio's General Assembly to revamp Ohio's solid waste program was the large amount of solid waste from other states being imported into Ohio. From 1986 to 1989, out-of-state waste disposed of in Ohio increased from approximately 33,000 tons, representing less than one percent of total disposal, to about 3.7 million tons, representing 20 percent of total disposal. The large quantities of out-of-state waste intensified Ohio's concerns regarding the limited available disposal capacity and provided additional motivation for adopting House Bill 592.

Following the peak in 1989, waste imports decreased significantly to approximately one million tons in 1996, or six percent of total disposal. Since that time, Ohio has experienced a 10-year trend of relatively small but steady increases in waste imports almost every year. This trend is illustrated in Figure 1-7. By 2006, waste imports totaled 3.76 million tons (or 16.6 percent of all waste disposed of in Ohio). This represents the largest amount of imported waste in Ohio's history. However, as a percentage of total waste disposed of, the 2006 quantity falls short of the 1989 quantity. In 2007, Ohio imported almost 3.58 million tons of waste, a small decrease from the 2006 quantity. Regardless, out-of-state waste imports represented more than 16 percent of the waste disposed of in Ohio's landfills in 2007.

Figure 1-7: Imports and Exports of Solid Waste Over Time^{a b}



^a Export figures for 1987 through 1992 are estimates. Imports are based on reported quantities.

^b Chart created using data from facility annual reports and collected from sister agencies in exporting states.

In 2007, as in past years, the largest amounts of imported waste came from New York (1,361,115 tons) and New Jersey (851,579 tons). Together, the waste imported from these two states represents about 62 percent of all waste received from other states. Other states that sent significant quantities of waste to Ohio include Pennsylvania, Connecticut, Massachusetts, and Indiana.

Several factors make Ohio attractive as a destination for out-of-state waste. First, Ohio has ample permitted MSW landfill disposal capacity to receive the waste, with a little more than 30 years of capacity remaining at the end of 2007. More important than capacity are Ohio's relatively low disposal, or tipping, fees. Ohio's tipping fees for MSW are lower than the tipping fees in other states in the northeast part of the country. Ohio's tipping fees can be as low as \$30 per ton, while in some eastern states tipping fees can approach \$100 per ton.

There are factors that help mitigate the effects from importing waste. The waste that is imported into Ohio from other states generates revenue for the state of Ohio, SWMDs, and the communities that host landfill facilities. This revenue comes from solid waste fees that are levied by those entities. Some host communities have negotiated beneficial contracts and agreements with owners and operators of private landfill facilities. In some cases, the owner or operator provides services and/or funding to the host community in exchange for accepting imported waste for disposal. In other situations, owners and operators of landfill facilities have voluntarily agreed to limit the amount of imported waste accepted at their landfill facilities.

Ohio also exports waste to its neighboring states which helps to offset the overall impact of imported waste on the State. Over the last several years, Ohio has exported from 800,000 tons to more than one million tons of waste to neighboring states each year. In 2007, Ohio exported approximately 1.2 million tons of waste to facilities in contiguous states. Generally, waste is exported from Ohio to neighboring states when the closest landfill to a community is located in another state. Overall, however, Ohio is a net importer of solid waste, to the tune of almost 2.4 million tons in 2007. This reality is illustrated in Figure 1-7 on the previous page.

Regardless of mitigating factors, the volume of waste imported into Ohio places an additional burden on Ohio's ability to meet its own disposal needs.

Imports of Waste Via Rail

The amount of waste imported into Ohio has recently been affected by waste that is imported via rail transportation. Transporting solid waste by rail is emerging as a significant factor in the movement of interstate waste into Ohio. Three solid waste landfills, which were among the top five facilities that received the largest quantities of waste imports in 2006 and 2007, are all serviced by rail lines into the facilities. These facilities are the Apex Landfill (Jefferson County), the Ottawa County Landfill and Sunny Farms (Seneca County). None of these facilities received appreciable amounts of out-of-state waste until their rail lines became active.⁵

In 2006, the first full year the Apex facility was operated, the facility received more than 750,000 tons of out-of-state waste. This waste accounted for most of the increase in out-of-state waste received in Ohio from 2005 to 2006. In 2007 the Apex Landfill accepted 1,228,662 tons of waste from outside Ohio. That quantity represented more than a third of waste that was imported into Ohio making the Apex facility the number one destination for out-of-state waste. Furthermore, more than 90 percent of the waste received by Apex Landfill came to Ohio via rail.

Footnotes

¹ U.S. Environmental Protection Agency, Office of Solid Waste, *Municipal Solid Waste in the United States – 2007 Facts and Figures* (Washington, D.C., November 2008), 26.

² *Municipal Solid Waste*, 25.

³ Ohio Department of Development, Policy Research and Strategic Planning Office, *Gross Domestic Product of Ohio* (Columbus, Ohio, 2009), 13.

⁴ *Municipal Solid Waste*, 1

⁵ Ohio Environmental Protection Agency, Division of Solid and Infectious Waste Management, *2006 Out-of-State Waste* (Columbus, Ohio, June 2007), 2.

Chapter 2

Implementing the 2001 State Solid Waste Management Plan

Implementing the state solid waste management plan (state plan) is a collaborative effort among a large number of partners, ranging from agencies at all levels of government to private waste management companies. However, this chapter focuses on efforts Ohio's 52 solid waste management districts (SWMDs) have made to achieve the goals of the *2001 State Solid Waste Management Plan* (2001 State Plan).

As was discussed in Chapter I, the 2001 State Plan established eight goals designed to further waste reduction and recycling in Ohio. These goals were intended to reduce Ohio's reliance upon landfills for the management of solid waste, to increase available recycling opportunities, and to increase recycling participation.

In addition, the 2001 State Plan contained 10 strategies intended to be implemented by state of Ohio agencies. These strategies embodied efforts that those agencies could take to foster recycling efforts and opportunities in Ohio. Ohio's efforts to accomplish these 10 strategies are described at the end of this chapter.

The eight goals, as set forth in the 2001 State Plan, are as follows:

Goal 1

Access to alternative waste management opportunities

The SWMD shall provide access to recycling and waste minimization opportunities for municipal solid waste to its residents and businesses.

Goal 2

Waste reduction and recycling rates

The SWMD shall reduce and/or recycle at least 25 percent of the solid waste generated in the residential/commercial sector and at least 66 percent of the solid waste generated in the industrial sector.

Goal 3

Source reduction

Provide informational and technical assistance on source reduction.

Goal 4

Technical and informational assistance

Provide informational and technical assistance on recycling, reuse, and composting opportunities.

Goal 5

Restricted wastes and household hazardous wastes

Strategies for managing scrap tires, yard waste, lead-acid batteries, and household hazardous waste.

Goal 6

Economic incentive analysis

Evaluate the feasibility of incorporating economic incentives into source reduction and recycling programs.

Goal 7

Market development strategy (optional)

Goal 8

Reporting

Annual reporting of plan implementation.

In their solid waste management plans, all SWMDs are required to demonstrate that they provide or will provide programs to address the goals established in the state plan.

Goals 1 and 2 have always been considered to be the primary goals. Although encouraged to attempt to achieve both goals, SWMDs were required to demonstrate compliance with either Goal 1 or Goal 2, not both. With the exception of Goal 7, which was a voluntary goal, the remaining goals were mandatory. As a result, SWMDs were required to demonstrate compliance with a minimum of six of the eight goals.

Solid Waste Management District Solid Waste Management Plans

Since the 2001 State Plan was adopted, all 52 of Ohio's SWMDs either received approval for a solid waste management plan update or were issued a solid waste management plan update by Ohio EPA. Nine SWMDs received approval for two solid waste management plan updates since November 2001. In all nine cases, however, the first update was prepared prior to adoption of but submitted to Ohio EPA following adoption of the 2001 State Plan. These nine solid waste management plans were approved under the authority of the 1995 State Plan.

Of Ohio's 52 SWMDs, 40 are operating under solid waste management plans with Goal 1 as the designated goal. The remaining 12 SWMDs have plans that demonstrate compliance with Goal 2.

The remainder of this chapter reviews SWMDs' efforts and experiences toward meeting the eight goals of the 2001 State Plan and Ohio's efforts toward implementing the 10 state strategies.

Progress Made Toward Achieving Goal 1

The SWMD shall provide access to recycling and waste minimization opportunities for municipal solid waste to its residents and businesses.

[NOTE: SWMDs are required, via the District Solid Waste Management Plan Format, version 3.0 and OAC Rule 3745-27-90, to complete the demonstration for compliance with Goal 1 for each county in the SWMD's jurisdiction. Thus, a SWMD comprised of four counties must conduct the demonstration for each of the four counties separately. SWMDs representing counties that were providing access to recycling opportunities for less than 90 percent of the counties' populations are then required to implement new recycling opportunities to increase access to at least 90 percent in those counties. Due to the focus of the demonstration on counties as opposed to SWMDs, the discussion that follows is focused primarily on counties rather than SWMDs.]

In its solid waste management plan, a SWMD meets Goal 1 by demonstrating that:

- At least 90 percent of its residents in each county have or will have access to recycling opportunities;
- Commercial and institutional generators have access to recycling opportunities;
- Recycling opportunities will be made available within the first three years of the planning period covered by the solid waste management plan;
- Each recycling opportunity will accept at least five recyclable materials; and
- The SWMD encourages participation in recycling opportunities through outreach and/or financial incentives.

At the time this chapter was prepared, 40 SWMDs were operating under Goal 1 as a result of solid waste management plan updates approved or issued after the 2001 State Plan was adopted. These 40 SWMDs represent 70 of Ohio's 88 counties. To determine the effect that Goal 1 has had on the number and types of recycling opportunities being offered in Ohio, Ohio EPA reviewed the solid waste management plans for all 40 of those SWMDs.

Figure 2-1 illustrates how the 70 counties fared in terms of the residential populations that had access to recycling opportunities. The chart portrays access to recycling opportunities in the reference years of the solid waste management plans that cover the counties.⁶

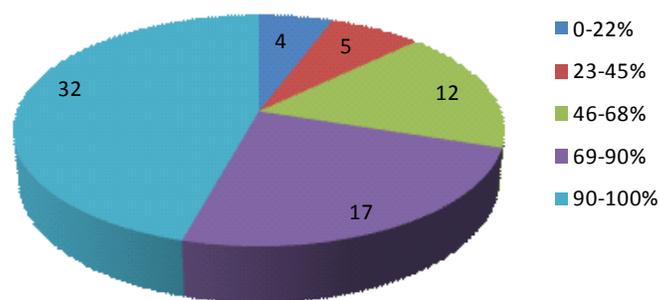
As can be seen in Figure 2-1, 32 counties had adequate recycling opportunities to demonstrate meeting the requirements of Goal 1 in the reference years for those counties. Thus, less than half of the counties met Goal 1 in the reference year. The ranges of populations that had access to recycling opportunities for the remaining 38 counties can be seen in Figure 2-1.

For the counties where additional recycling opportunities were needed, SWMDs representing 33 of those counties committed to providing new or expanded drop-off recycling opportunities. SWMDs representing 15 counties committed to providing new or upgraded curbside recycling programs.

To demonstrate compliance with Goal 1 in their member counties, SWMDs committed to:

- Providing at least 214 new drop-off recycling locations;
- Providing at least 21 new curbside recycling programs; and,
- Upgrading at least 12 subscription curbside recycling services to non-subscription services.

Figure 2-1: Residential Population with Access to Recycling Opportunities in Reference Year



These new and upgraded programs will provide at least 1,110,000 additional residents with access to recycling opportunities. More than likely, many of these residents would not have been provided these recycling opportunities in the absence of Goal 1.

The text box below describes how the Warren County SWMD opted to achieve Goal 1 by ensuring that all residents within the SWMD have access to non-subscription curbside recycling services.

Achieving Goal 1 Through Non-Subscription Curbside Recycling Services

For its most recent solid waste management plan update (approved March 4, 2005), the Warren County Solid Waste Management District (District) opted to demonstrate compliance with Goal 1. In the process of evaluating how to meet the goal, the District determined that 56.38 percent of the residential population had access to recycling opportunities in the reference year (1999). Six communities had non-subscription curbside programs and eight communities had subscription curbside programs. In order to achieve Goal 1, the District evaluated a new system of drop-off locations and determined that the number of locations needed was cost-prohibitive given available funding. In order to provide a comprehensive recycling program without having to obtain additional revenue, the District chose to investigate financially independent recycling options. As an alternative to drop-offs, the District opted to work with the solid waste transporters that operate in Warren County to provide residents in Warren County with non-subscription curbside recycling programs. Thus, the District's plan update established a strategy intended to provide all single family households with non-subscription curbside recycling service.

According to the plan update, the District would enter into solid waste and recycling performance contracts with all waste transporters that collect residential garbage in Warren County. In order to continue to operate in Warren County, a solid waste transporter would have to enter into a contract with the District. To be issued a contract, the waste hauler had to agree to provide non-subscription curbside recycling as part of its basic waste service package. Conditions of the contract would specify the materials to be collected through the service, the frequency of collection, and reporting requirements. Furthermore, waste transporters would be required to supply the collection containers and educate residents about the curbside programs.

The District was willing to franchise solid waste collection for the entire county to one waste hauler. In order to maintain their respective customer accounts, all of the waste haulers that had collection routes in the county voluntarily entered into contracts with the District. The curbside programs for most communities began toward the end of 2005.

One of the consequences of the new performance contracts was an increase in the rates residents had been paying for waste collection service. Initially, the District received criticism from community leaders and residents regarding the increased rates and being "required" to participate in recycling programs. Overall, however, the District has experienced an increase in the quantity of recyclable material collected from the residential/commercial sector. For 2005, 2006, and 2007, the District reported 28,129 tons, 43,771 tons, and 46,183 tons recycled, respectively, from the residential/commercial sector.

Progress Made Toward Achieving Goal 2

The SWMD shall reduce and/or recycle at least 25 percent of the solid waste generated by the residential/commercial sector and at least 66 percent of the solid waste generated by the industrial sector.

Caveats Regarding Data

Quantitative measures, such as Ohio's waste reduction and recycling rates (reduction/recycling rates), are common benchmarks used to assess the effectiveness of recycling programs and for comparing programs. Quantitative measures are also useful for evaluating trends over time. However, there are some limitations inherent in the data used to calculate recycling statistics. These limitations must be taken into account when forming conclusions about recycling trends.

Obtaining Data

One of the most chronic limitations is the challenge of simply obtaining data. As will be discussed in association with Goal 8, each SWMD is required to report to Ohio EPA annually regarding, among other things, the quantities of materials recycled during the previous year within the SWMD. However, the entities that have the data are not required under Ohio's regulations to report to the SWMDs. Unless the SWMD has a means of requiring reporting, such as through a contract, any data the SWMD receives is provided voluntarily by the entities that generate, collect, process, and manage recyclable materials. Consequently, the SWMD has little to no control over the number of entities that respond to a survey or the quality of the data it receives. More often than not, SWMDs achieve relatively low response rates to surveys and must report incomplete data.

The difficulty of obtaining data was a factor that led the Cuyahoga County SWMD to implement a program to improve data collection efforts for the residential/commercial sector. This program is described in the text box on the next page.

Using Competition to Improve Data Availability and Performance of Recycling Programs

The Cuyahoga County Solid Waste Management District (District) developed a creative way of encouraging its communities to both increase their recycling efforts and to report data regarding those efforts to the District. The District accomplished both objectives by creating a document known as the *Residential Recycling Report*. This annual publication showcases the results of community recycling programs in Cuyahoga County and provides readers the ability to compare the relative performance of each community's program.

To prepare the report, the District annually requests that each community submit data, including quantities of recyclable materials collected through the community's residential recycling program and quantities of residential waste disposed. The District uses this data to calculate a recycling rate for each community. The District then prepares the report by listing all 59 of the cities, villages, and townships located within the District along with each community's recycling data (total material recycled and recycling rate).

The District makes the *Residential Recycling Report* available by publishing it within the District's annual report and by distributing press releases and posting the reports on the District's Web site. By making the report available, the District is able to do all of the following:

- Create public awareness and media attention regarding availability and performance of community recycling programs;
- Promote healthy competition among communities and elected officials regarding the performance and success of their recycling programs;
- Encourage communities to expand or improve recycling programs; and
- Improve data collection from communities (as they know the results will be published).

Since initially publishing the *Residential Recycling Report* in 2001, the District has seen its residential recycling rate increase from 18.47 percent to 26.53 percent. In addition, the reporting process has improved record keeping regarding the performance of community recycling programs.

When the District first published the *Residential Recycling Report*, some officials in communities with poorly performing programs were unhappy with the reporting process. In response, the District made some adjustments to the report. Since that initial response, communities have reacted favorably and have used the process as a way to continually improve their recycling programs.

The *Residential Recycling Report* helps the District accurately track the recycling activities of its communities while allowing the District to acknowledge communities' efforts through its annual awards program aptly named the "Trash Oscars".

As described later in this chapter, not receiving surveys from the same entities annually can result in significant variations in the annual reduction/recycling rates. This is particularly true for respondents that report large quantities of material. The effects of including or excluding a major recycler's quantities are sometimes discernable in the statewide rate. Consequently, the effects of a major recycler's quantities on the individual SWMD's reduction/recycling rate are even more pronounced.

The difficulty of obtaining data was one of the factors that led Ohio EPA and SWAC to develop a goal focused on providing recycling opportunities and give SWMDs the option of selecting which goal to strive for. This flexibility introduced another limitation that affects calculated reduction/recycling rates. Some SWMDs that opt to pursue Goal 1 may dedicate limited resources to gathering data. This is an anticipated result of having a goal that is focused on providing services rather than on gathering and reporting data.

Limitations on the accuracy of available data also include:

- the level of experience of the person completing a survey;
- using actual versus estimated weights;
- "double counting" materials;
- inconsistent evaluation methodologies;
- converting volume to weight;
- reporting "non-creditable" materials;
- accounting for waste eliminated through source reduction;
- annual versus periodic surveys (some SWMDs survey less than annually and report the same data for multiple years); and,
- combining data from previous years with current data (a SWMD may use data from a previous response for an entity that did not respond to the most recent survey in combination with data from respondents to the most recent survey).

Changes in Waste Management Practices

In addition to the inaccuracies inherent in the data, changes in waste management practices in Ohio affect the reduction/recycling rate. As an example, by the mid-1990s, all of Ohio's major solid waste incinerators ceased operating. Ohio's methodology

for calculating waste reduction allows SWMDs to credit volume reductions due to incinerating solid waste toward the reduction/recycling rate. SWMDs did report volume reductions due to incineration in the early to mid 1990s.

In 1994, the waste to energy incinerator in Columbus, Ohio ceased accepting waste. From 1994 to 1995, the residential/commercial sector waste reduction and recycling rate fell from 20.8 percent to 17.0 percent. The elimination of the volume reduction was likely a factor in that decrease. Montgomery County closed its first solid waste incinerator in December 1996 and its second incinerator in 1997. Ohio's residential/commercial recycling rate fell again, from 20.6 percent in 1997 to 18.5 percent in 1998.

Other Factors

Other unexpected and uncontrollable factors affect the reduction/recycling rate from one year to the next. Some of these factors are:

- Storms, natural disasters, and weather conditions (see the discussion associated with the statewide residential/commercial rate below for more information about the resulting effects on the reduction/recycling rate);
- Economic conditions;
- Opening and closing of major waste generators;
- Markets for recyclable materials; and,
- Receiving/not receiving data from major waste generators and recyclers.

All of the factors listed above affect the overall reliability of a point-in-time calculation such as an annual reduction/recycling rate. Consequently, Ohio EPA generally focuses on trends over several years when evaluating changes in recycling activity rather than changes, particularly insignificant changes, in recycling statistics from one year to the next.

Statewide Waste Reduction and Recycling Rates

Table 2-1 presents data regarding waste reduction and recycling in Ohio for the years that the 2001 State Plan was in effect (except for 2008). Although Ohio does not have statewide goals for the residential/commercial and industrial sectors, Ohio EPA does track statewide data for both sectors. That data is then used to calculate Ohio's total reduction/recycling rate.

Table 2-1: Statewide Reduction/Recycling for Ohio-Generated Solid Waste - Calendar Years 2001 Through 2007⁷

Tons Reduced/Recycled			
Year	Residential/ Commercial	Industrial	Total
2001	2,979,310	10,564,515	13,543,825
2002	3,015,265	10,775,708	13,790,973
2003	3,124,507	9,917,779	13,042,286
2004	3,386,355	8,775,726	12,162,081
2005	3,745,758	9,474,260	13,220,018
2006	3,518,289	9,501,987	13,020,276
2007	3,817,366	9,085,475	12,902,840

Reduction/Recycling as a Percentage of Generation			
Year	Residential/ Commercial	Industrial	Total
2001	21.9	61.7	44.1
2002	21.6	63.7	44.6
2003	21.7	50.9	42.2
2004	22.8	55.2	39.6
2005	25.1	57.1	41.9
2006	24.1	57.0	41.7
2007	25.9	53.6	40.7

Total Solid Waste

Table 2-1 shows that Ohio's total reduction/recycling rate decreased from 44.1 percent in 2001 to 40.7 percent in 2007. Ohio's total reduction/recycling rate peaked in 2002 at 44.6 percent before undergoing a general trend toward lower rates. As is explained later in this section, the overall decrease is attributable to less material being reported as recycled from the industrial sector.

As was mentioned in Chapter 1, the flue gas desulfurization (FGD) waste that is generated by three coal-burning power plants has a noticeable effect on Ohio's ability to meet the statewide reduction/recycling rate of 50 percent. Table 2-2 presents the statewide reduction/recycling rates for all solid waste that was reported as recycled in 2007 with and without FGD waste.

Table 2-2: Effects of Coal-Burning Power Plants on Statewide Solid Waste Reduction and Recycling Rates

Waste Type	2007 Recycling Rate (with FDG)	2007 Recycling Rate (without FDG)
Total Solid Waste	39.26%	43.78%
Industrial Solid Waste	52.85%	69.12%

As is illustrated in Table 2-2, removing the FDG from the waste reduction and recycling calculations does bring Ohio's overall recycling and waste reduction rate closer to the 50 percent goal.

Residential/Commercial Solid Waste

Although the residential/commercial goal of reducing/recycling 25 percent of the waste generated applies to individual SWMDs, not Ohio as a whole, Ohio EPA measures the statewide reduction/recycling rate for that sector. As illustrated in Table 2-1, Ohio's overall residential/commercial sector reduction/recycling rate increased fairly significantly from 21.9 percent in 2001 to 25.9 percent in 2007.

The compositions of the materials that were reported as recycled for the residential/commercial sector in 2001 and 2007 are presented in Table 2-3.

The overall residential/commercial sector rate calculated using reported data actually rose above 25 percent for the first time in 2005. However, as is explained below, questionable data contributed to this rate. When that questionable data is eliminated from the equation, the calculated rate is lower. The rate calculated for 2007 represents the highest residential/commercial sector reduction/recycling rate achieved in Ohio to date.

The substantial increase in the amount of material that was reported from 2004 to 2005 was a function of three main factors:

- an increase (16.5 percent) in the amount of yard waste composted;
- an increase (186 percent) in the quantity of commingled recyclable materials reported; and
- a decrease (-2.3 percent) in the amount of residential/commercial waste disposed of in landfills in 2005.

Yard Waste: The increase in the yard waste figure was largely the result of a major ice storm that impacted northwest and central Ohio in December 2004. It is common for the quantities of yard waste reported as composted to correspond with weather patterns and disaster events. In the past, Ohio EPA has observed

Table 2-3: Comparison of Reported Quantities of Waste Recycled in 2001 and 2007

Material	2001 (tons)	2007 (tons)	2001 (Percent of Total)	2007 (Percent of Total)	2001 Rank	2007 Rank
Yard Waste	1,010,072	1,238,011	34.44	32.43	1	1
Cardboard	348,534	697,878	11.88	18.28	4	2
Metals	528,355	599,872	18.02	15.71	2	3
Other Paper	363,159	523,592	12.38	13.72	3	4
Wood	135,340	213,394	4.61	5.59	6	5
Commingled	152,324	207,442	5.19	5.43	5	6
Tires	68,584	121,833	2.34	3.19	8	7
Plastic	28,952	45,242	0.99	1.19	12	8
Glass	93,465	42,463	3.19	1.11	7	9
White Goods	65,370	39,300	2.23	1.03	9	10
Other	41,062	36,623	1.40	0.96	11	11
Lead-Acid Batteries	20,291	12,683	0.69	0.33	13	12/13
Food	41,885	12,473	1.43	0.33	10	12/13
Used Oil	16,716	7,913	0.57	0.21	14	14
Textiles	13,630	7,726	0.46	0.20	15	15
Electronics	1,704	5,654	0.06	0.15	17	16
HHW	3,171	4,946	0.11	0.13	16	17
Household Batteries	65	322	>0.00	0.01	18	18
Total	2,932,679	3,817,367				

lower quantities of yard waste reported in years with lower than average rainfall and vice versa. As is shown in Table 2-4, following the ice storm in 2004, the amount of yard waste composted as reported by SWMDs increased by 197,232 tons. It is likely that the majority of this increase is attributable to vegetative debris from the ice storm as most of that debris was collected during 2005.

Table 2-4: Quantities of Yard Waste Reported by SWMDs: 2004-2007

	2004	2005	2006	2007
Total Tons	1,196,149	1,393,381	1,255,561	1,238,011
Change (tons)		197,232	(137,820)	(17,550)
Change (percent)		16.5%	(9.9%)	(1.4%)

Ohio EPA recalculated the residential/commercial reduction/recycling rate for 2005 by replacing the yard waste figure for 2005 with the figure for 2004 (which did not include storm debris). The resulting rate is 24.1 percent, a full percentage point lower than the rate using the 2005 yard waste figure.

The degree to which the storm affected Ohio's reduction/recycling rate is further reflected by the decrease in the quantity of yard waste reported for 2006 of 137,820 tons.

Commingled Recyclables: Almost all of the increase in commingled recyclables reported for 2005 was attributed to one SWMD. The SWMD used a new data collection tool to gather recycling data for 2005. This SWMD then combined the data collected for 2005 with legacy data. The legacy data was material specific whereas the new data combined all materials into one figure for commingled material. In this manner, the SWMD likely counted material quantities twice – once as material-specific legacy data and again as the new commingled figure. Thus, at least a portion of the increase in the reduction/recycling rate is likely a function of a reporting error as opposed to an increase in the amount of material recycled.

The SWMD continued to report both large commingled and material-specific legacy data in both 2006 and 2007. So, it is likely that the residential/commercial reduction/recycling rates for those years are overstated as well. Due to the manner in which SWMDs report data to Ohio EPA, it is not possible for the Agency to adjust the data. Therefore, Ohio EPA calculated the residential/commercial reduction/recycling rates for 2005 through 2007 without the commingled material reported by the SWMD. The results are presented in Table 2-5.

Table 2-5: Statewide Residential/Commercial Sector Waste Reduction and Recycling Rates With and Without Commingled Recyclables

Year	With Commingled Recyclables		Without Commingled Recyclables	
	Total Recyclables (tons)	Reduction/Recycling Rate	Total Recyclables (tons)	Reduction/Recycling Rate
2005	3,745,758	25.1%	3,592,713	24.3%
2006	3,518,289	24.1%	3,410,383	23.6%
2007	3,817,365	25.9%	3,709,459	25.4%

As can be seen in Table 2-5, while the commingled material does affect the overall residential/commercial reduction/rate. Even without the suspect material, Ohio's statewide residential/commercial sector reduction/recycling rate for 2007 is still above 25 percent.

Because any correction Ohio EPA would make to the reported data would be arbitrary, Ohio EPA included the commingled material in the statistics published by the Agency.

The increase in the total quantity of recyclables achieved from 2006 to 2007 is largely due to an increase of 116,904 tons in the amount of cardboard reported, an increase of 79,661 tons in the amount of paper reported, and an increase of 58,492 tons in the amount of ferrous metals reported as recycled.

Industrial Solid Waste

As with the residential/commercial sector, the industrial goal of reducing/recycling 66 percent of the waste generated applies to individual SWMDs, not Ohio as a whole. Regardless, as is illustrated in Table 2-1, Ohio's statewide industrial reduction/recycling rate peaked in 2002 at 63.7 percent. The quantity of industrial waste reported as recycled for 2003 decreased by 857,000 tons which caused the industrial reduction/recycling rate to fall to 50.9 percent.

A large portion of that decrease (517,164 tons) was caused when a large metals manufacturer in southwestern Ohio ceased operating. This result illustrates the effect that an entity that recycles significant quantities of material can have on reduction/recycling rates. While this effect can be seen at the state level, it is even more pronounced at the SWMD level. The host SWMD's industrial reduction/recycling rate fell from 86.22 percent in 2002 to 58.64 percent in 2003 as the result of the manufacturer's closing.

Although the statewide industrial reduction/recycling rate increased to 55.2 percent in 2004 and continued to increase until it reached 57.3 percent in 2006, the rate decreased again from 2006 to 2007.

Attributing causes to the trends in industrial reduction/recycling rates is difficult due to natural fluctuations in industrial activity and the limitations inherent in industrial data. In general, Ohio EPA would expect industrial recycling to correspond to manufacturing activity. Thus, all else being equal, the greater manufacturing output, the more recycling and vice versa.

According to data made available by the Ohio Department of Development (ODOD), Ohio's gross domestic product increased steadily from 2001 to 2006. Over that same period, economic output for the manufacturing sector increased incrementally in every year except for 2003. Figure 2-2 compares graphs of economic output and industrial reduction/recycling rates for 2001 through 2006.

As can be seen, Ohio's industrial reduction/recycling rates tend to rise and fall in direct correlation with Ohio's economic output. As a result, although the magnitude of the change from one year to the next differs between the two statistics, the overall trends are similar.

Solid Waste Management District Waste Reduction and Recycling Rates

[NOTE: Unlike for Goal 1, the demonstration of compliance with Goal 2 and the reduction/recycling rates that are calculated by Ohio EPA apply to the entire SWMD rather than on a county-by-county basis. Thus, a SWMD consisting of four counties has one reduction/recycling rate for the collective residential/commercial sector. For an explanation of the caveats that accompany the collection, reporting, and evaluation of recycling data please see the discussion under the heading for Goal 2 earlier in this chapter.]

The reduction/recycling rates for all 52 SWMDs for 2001 and 2007 are presented in Appendix B.

Residential/Commercial Sector

Ohio's 52 SWMDs reported that a total of 3,817,366 tons of residential/commercial waste were recycled in 2007. While Ohio's overall reduction/recycling rate for the residential/commercial sector was 25.9 percent in 2007, the rates achieved by the 52 SWMDs were quite varied both above and below the statewide rate. In 2007, reduction/recycling rates achieved by the SMWDs for the residential/commercial sector ranged from a low of 3.28 percent to a high of 40.45 percent. Figure 2-3 illustrates how the 52 SWMDs fared in terms of achieving Goal 2 for the residential/commercial sector in 2007.

Figure 2-2: Comparison of Ohio's Gross Domestic Product and Statewide Industrial Recycling

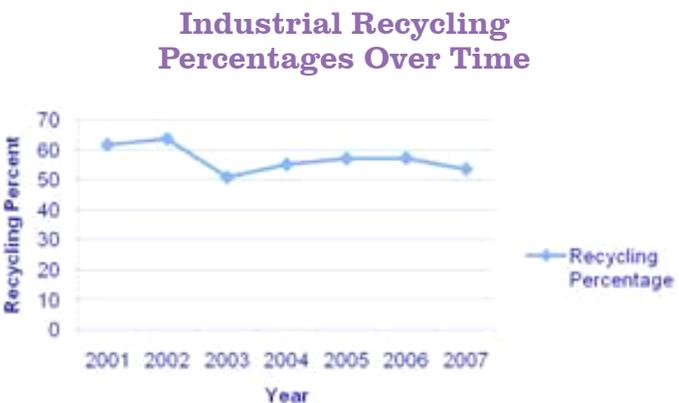
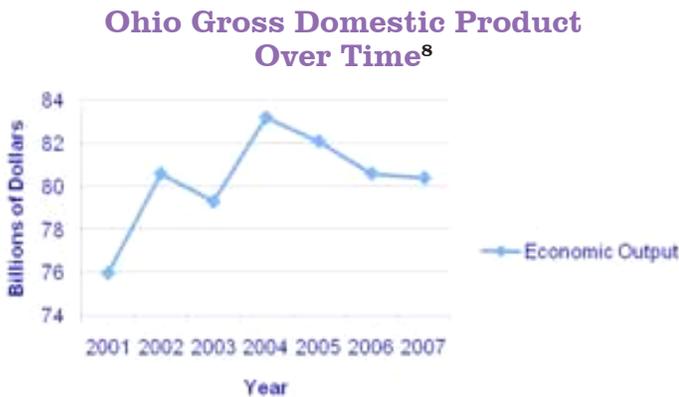
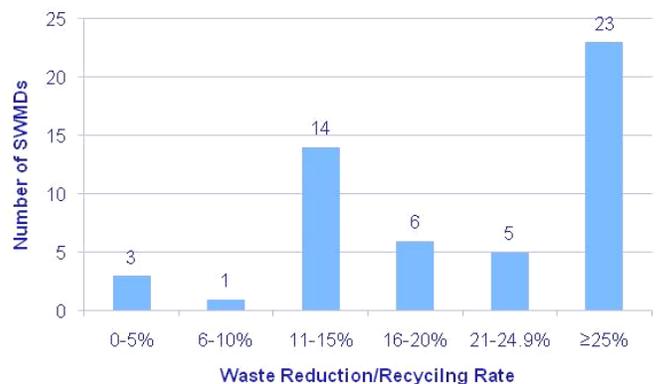


Figure 2-3: Residential/Commercial Sector Waste Reduction and Recycling Rates in 2007 by Range



The 2007 residential/commercial reduction/recycling rates for the 52 SWMDs are illustrated in the chart in Figure 2-4.

Figure 2-4: SWMD Residential/Commercial Sector Waste Reduction and Recycling Rates in 2007

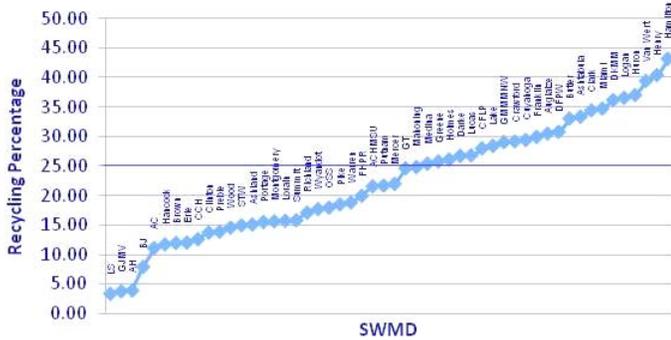
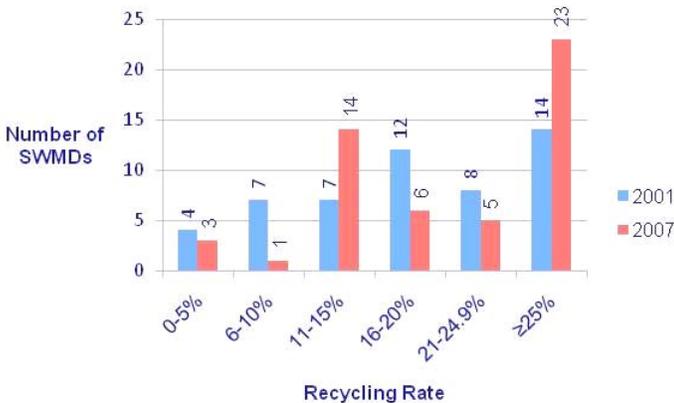


Figure 2-5 below illustrates changes in how SWMDs fared in terms of achieving Goal 2 for the residential/commercial sector between 2001 and 2007

Figure 2-5: Comparison of SWMD Waste Reduction and Recycling Rates for the Residential/ Commercial Sector 2001 & 2007



From 2001 to 2007:

- 13 SWMDs that had not met the 25 percent waste reduction and recycling goal in 2001 reported having recycled enough material to surpass the goal in 2007.
- Four SWMDs that met the 25 percent goal in 2001 reported less material in 2007 and fell below the goal.
- 11 SWMDs that met the 25 percent goal in 2001 also met the goal in 2007.
- Six of the 12 SWMDs that were operating under Goal 2 met the 25 percent goal in 2001 and in 2007.
- 33 SWMDs reported increases in their residential/commercial reduction/recycling rates.
- 19 SWMDs reported decreases in their rates.
- The average reduction/recycling rate among the SWMDs increased from 19.18 percent to 21.56 percent.

The majority of the 23 SWMDs that achieved reduction/recycling rates above 25 percent reported high quantities of yard waste, metals, cardboard, paper, and wood.

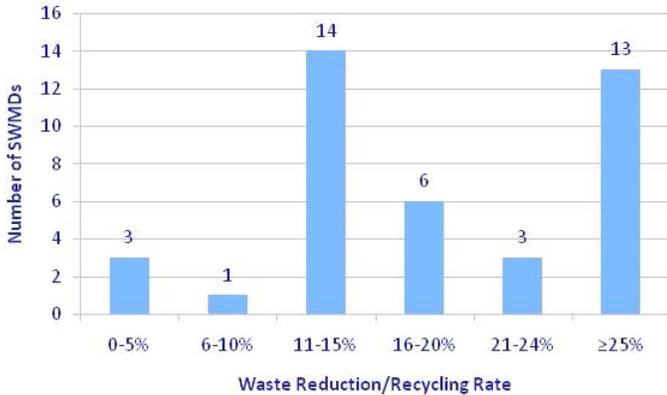
Residential/Commercial Sector Waste Reduction and Recycling Rates for SWMDs Operating Under Goal 1

All of the SWMDs that reported reduction/recycling rates below 25 percent are operating under solid waste management plans with Goal 1 as the designated goal. As was mentioned previously, one of the purposes behind providing Goal 1 was to reduce the burden of collecting data for the SWMDs and allow them to focus more time and resources on providing recycling programs. For the majority of the SWMDs with the lowest reduction/recycling rates, the low quantity of material reported probably is a function of the SWMDs’ survey efforts. Therefore, it is likely that recycling activity in those SWMDs is not reflected in their reduction/recycling rates.

Reporting low reduction/recycling rates and providing access to recycling opportunities do not always go hand-in-hand. There are a number of SWMDs that are operating under Goal 1 that also report higher than average reduction/recycling rates. In 2007, 15 SWMDs that opted to meet Goal 1 reported reduction/recycling rates above the average rate of 21.56 percent.

The chart in Figure 2-6 below illustrates how the 40 SWMDs that are operating under Goal 1 fared in terms of the amount of residential/commercial waste recycled in 2007.

Figure 2-6: Residential/Commercial Sector Waste Reduction and Recycling Rates for Goal 1 SWMDs by Range



As can be seen from the chart in Figure 2-6, 13 SWMDs (representing 22 counties) were able to demonstrate having recycled at least 25 percent of the residential/commercial waste generated in 2007. These SWMDs represent almost a third of all SWMDs operating under Goal 1.

Industrial Sector

SWMDs in Ohio reported that a total of 9,085,475 tons of industrial waste were reduced and recycled in 2007. In 2007, the SWMDs achieved industrial reduction/recycling rates that ranged from a low of 0.00 percent to a high of 97.97 percent.⁹ Figure 2-7 illustrates how the 52 SWMDs fared in terms of achieving Goal 2 for the industrial sector in 2007.

The 2007 industrial sector reduction/recycling rates for the 52 SWMDs are illustrated in the chart in Figure 2-8.

Figure 2-8: SWMD Industrial Sector Waste Reduction and Recycling Rates in 2007

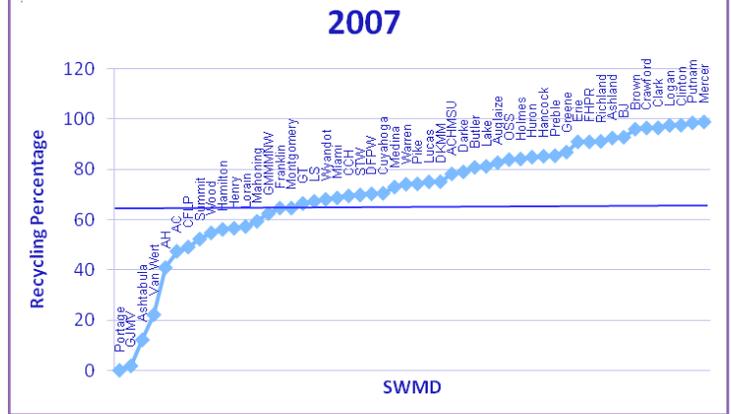
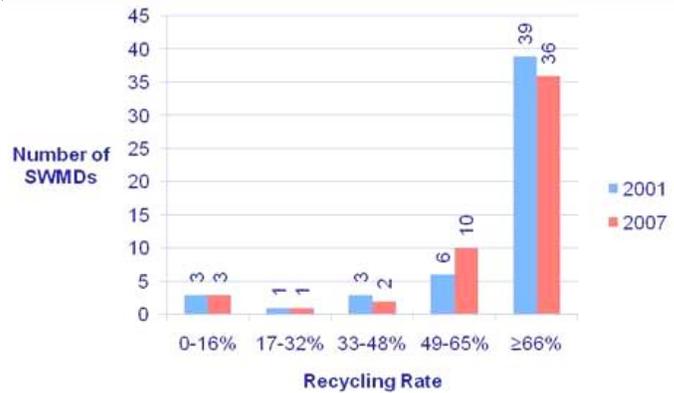


Figure 2-9 below illustrates changes in how SWMDs fared in terms of achieving Goal 2 for the industrial sector between 2001 and 2007.

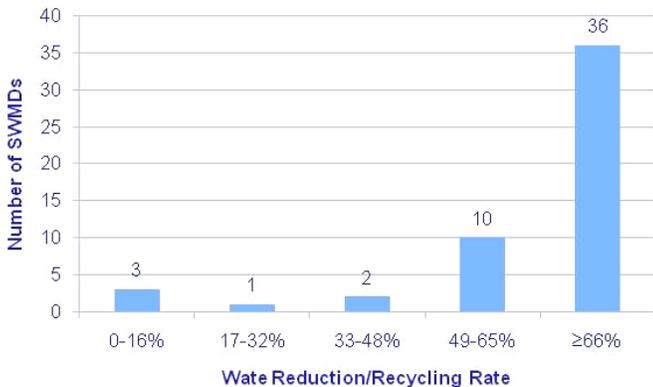
Figure 2-9: Comparison of SWMD Waste Reduction and Recycling Rates for the Industrial Sector: 2001-2007



From 2001 to 2007:

- Four SWMDs that had not met the 66 percent waste reduction and recycling goal in 2001 reported having recycled enough material to surpass the goal in 2007.
- Seven SWMDs that met the 66 percent goal in 2001 reported less material in 2007 and fell below the goal.

Figure 2-7: SWMD Industrial Sector Waste Reduction and Recycling Rates in 2007 by Range



- 32 SWMDs that met the 66 percent goal in 2001 also met the goal in 2007.
- All 12 of the SWMDs that demonstrated compliance with Goal 2 in their approved solid waste management plans met the 66 percent goal in both 2001 and 2007.
- 21 SWMDs reported increases in their industrial reduction/recycling rates.
- 31 SWMDs reported decreases in their industrial reduction/recycling rates.
- The average reduction/recycling rate among the SWMDs decreased from 73.40 percent to 70.74 percent.

As was explained earlier in this chapter, obtaining data through surveys is a difficult undertaking for a SWMD. While obtaining all data requires effort, obtaining that data from industrial sector entities is probably the most difficult task for SWMDs. For its most recent solid waste management plan update, the Lake County Solid Waste Management District (Lake SWMD) worked with a solid waste consultant to obtain what the Lake SWMD considers to be quality industrial data. The methodology the Lake SWMD followed is described in the text box.

Impacts of Coal-Fired Power Plants on Recycling Rates

As was mentioned earlier, specific circumstances within an individual SWMD can strongly impact the reduction/recycling rate for that SWMD. An example is the presence of a coal-burning power plant within the SWMD. As was explained in Chapter 1, power plants generate and dispose of large quantities of flue gas desulphurization waste (FGD). Because this waste is industrial waste, it affects all calculated reduction/recycling rates that include the FGD waste.

There are three SWMDs that host large coal-burning electric utilities. These SWMDs and the electric utilities they host are as follows:

- The Adams-Clermont Joint Solid Waste Management District, host of the Zimmer Power Station;
- The Coshocton, Fairfield, Licking, Perry Joint Solid Waste Management District, host of the Conesville Power Plant;
- The Gallia, Jackson, Meigs, Vinton Joint Solid Waste Management District, host of the Gavin Power Plant.

Obtaining Industrial Survey Data

During the process of preparing its most recent solid waste management plan update (approved on March 8, 2006), the Lake County Solid Waste Management District (Lake SWMD) worked with CT Consultants, Inc. to develop and follow a detailed survey methodology. Using this survey methodology, the Lake SWMD collected what it feels is comprehensive and representative industrial generation, disposal, and recycling data for the industrial sector in Lake County.

As part of its survey methodology, the Lake SWMD attempted to obtain usable surveys from as many industries within all appropriate SIC categories as possible. The Lake SWMD first obtained a list of industries from the Harris Directory. The Lake SWMD next contacted each company to determine the person responsible for solid waste management. The Lake SWMD then sent a survey package to all industrial entities with more than 20 employees. This package included an introduction letter, instructions, and the survey form.

The Lake SWMD made follow-up phone calls to all non-respondents. The Lake SWMD also made phone calls to respondents that provided incomplete or questionable data. To confirm the accuracy of collected data, the Lake SWMD conducted site visits to observe waste and recycling activities. The Lake SWMD then contacted industrial entities where reported data was not consistent with what was observed. The Lake SWMD also compared current data from a respondent to data that respondent reported in previous survey rounds and investigated questionable figures.

Ultimately, the Lake SWMD chose to survey additional industrial entities. As a second round, the Lake SWMD sent surveys to industrial entities with between 10 and 19 employees. A third round of surveys was sent to entities with one to nine employees. The same methodology as described above was used for both rounds.

In total, the Lake SWMD received surveys from 44.06% of industrial entities surveyed. Respondents represented 73.28% of industrial employment. Using collected data, the Lake SWMD calculated two generation rates for each SIC – one using data from fully completed surveys and a second using data from incomplete surveys (i.e. containing data for either disposal or recycling but not both). These rates were then applied to non-responding entities.

In order to eliminate counting an entity's data twice, the Lake SWMD screened companies by address and against listings in the Harris Directory. The Lake SWMD then eliminated multiple listings. The Lake SWMD also eliminated data from buyback centers.

The Lake SWMD feels that its thorough and conservative approach to collecting industrial data resulted in quality data that accurately portrays waste generation and management in Lake County's industrial sector.

In order to illustrate the effects of the coal-burning power plants on the host SWMDs, Ohio EPA calculated industrial sector reduction/recycling rates for the three host SWMDs with and without the FGD waste included. Table 2-6 presents these rates.

Table 2-6: Effects of Coal-Burning Power Plants on Industrial Sector Solid Waste Reduction and Recycling Rates of Host SWMDs

SWMD	2007 Recycling Rate (w/ FGD Waste)	2007 Recycling Rate (w/o FGD waste)
Adams-Clermont	47.43%	86.46%
Coshocton, Fairfield, Licking, Perry	49.09%	68.44%
Gallia, Jackson, Meigs, Vinton	1.77%	78.61%

As can be seen from Table II-6, with FGD included, none of the host SWMDs achieved the industrial sector objective of reducing/recycling 66 percent of the industrial waste generated. Excluding the FGD waste allows all three SWMDs to achieve the industrial sector objective. While the waste reduction and recycling rates for all three host SWMDs are significantly affected, the SWMD exhibiting the most profound effect is the Gallia, Jackson, Meigs, Vinton Joint SWMD.

Progress Made Toward Achieving Goals 3 and 4

Provide informational and technical assistance on source reduction

Provide informational and technical assistance on recycling, reuse and composting opportunities

Effects of House Bill 66 on Education and Outreach

Before analyzing the progress that SWMDs have made toward achieving Goals 3 and 4, it is necessary to discuss a change to ODNR's source of funding in 2005 that effectively reduced available funding for education. This change significantly affected how SWMDs fulfill their education and outreach obligations.

Prior to 2005, the Ohio Department of Natural Resources, Division of Recycling and Litter Prevention (ODNR, DRLP) administered the *Recycle, Ohio!* Program. Through this program, ODNR

distributed significant funding to support recycling and waste reduction in Ohio. Through the *Recycle, Ohio!* program, ODNR provided funding to SWMDs, cities, and local recycling and litter prevention offices to support, among other programs, recycling and litter prevention education. The financing for ODNR's grant programs came from Ohio's corporate franchise tax structure which provided ODNR, DRLP with funding for the Agency's administrative expenses and for distributing grants. Under the *Recycle, Ohio!* grant program, most applicants were assured of receiving funding, and many applicants were awarded grants annually. Thus, for many years, educators were able to rely on annual financing from ODNR, DRLP to supplement their budgets and continue their programs.

In 2005, Governor Taft signed House Bill 66 into law. House Bill 66 contained Ohio's budget for State Fiscal Year 2006. The bill eliminated the corporate franchise tax that was used to fund recycling and litter prevention programs. The bill replaced that funding source with a fee-based funding system by creating a new disposal fee for construction and demolition debris (C&DD). House Bill 66 established the new fee at \$0.75 per ton of C&DD disposed of and specified that the income is to be used for funding recycling and litter prevention programs. As with the state and SWMD disposal fees, the C&DD disposal fee is collected by owners and operators of disposal facilities acting as trustees for ODNR. The facility owners and operators forward the fee income to approved health departments which then send the income to ODNR, DRLP.

With the new fee, ODNR receives significantly less money than it formerly received from the corporate franchise tax. As a result, ODNR was forced to restructure not just its grant programs but its entire office.

House Bill 66 established a ceiling on how much fee income ODNR, DRLP can use for administrative expenses. The balance of the fee income must be distributed through grants. DRLP reduced its staff to a fraction of its previous personnel in order to operate under this ceiling. Even so, the reduced income also affects how much ODNR DRLP has available for grant programs. Thus, ODNR, DRLP revamped its grant programs. In doing so, the Division replaced the *Recycle, Ohio!* grant program which was strongly focused on awareness education with a Community Development Grant program which emphasizes the recycling collection and processing infrastructure. Given the reduced funding, ODNR, DRLP now awards far fewer applicants with Community Development Grants. The grant program is now much more competitive than the former *Recycle, Ohio!* program. A comparison of grant awards between 2001 and 2007 illustrates the magnitude of change to ODNR, DRLP's grants.

- In 2001, ODNR, DRLP awarded a total of almost \$6.8 million to 99 recipients through *Recycle, Ohio!*

- In 2006, ODNR, DRLP awarded a little less than \$900,000 in Community Development Grants to 34 recipients. This represents a reduction of almost 87 percent.
- During the 2007 grant round, ODNR, DRLP awarded \$1,095,245 to 31 recipients. Individual grant amounts ranged from \$5,956 to \$100,000. The complete lists of grant awards for the 2006 and 2007 grant rounds are provided in Appendix C.

Many of the education and outreach professionals who provided programs for SWMDs were funded, at least partially, through *Recycle, Ohio!* Thus, the reduction in available grant funding affected the recycling and waste reduction education community. How the 52 SWMDs adjusted varies. In some cases, SWMDs took over funding the former recycling and litter prevention offices leaving the offices more in less intact. In other cases, SWMDs absorbed the former recycling and litter prevention offices and staff to create one unified office. A number of SWMDs assumed the duties of former recycling and litter prevention offices rather than fund the programs or take on the staff. The net result was the elimination of many recycling and litter prevention offices and a reduction in education staff. See the text box on the next page for how North Central Ohio Solid Waste Management District addressed the loss of funding.

Progress Made Toward Achieving Goals 3 and 4

To meet Goal 3, SWMDs are required to incorporate strategies into their solid waste management plans to address providing information and technical assistance regarding information and technical assistance regarding source reduction. For Goal 4, SWMDs are required to provide information and technical assistance on recycling, reuse, and composting opportunities. Although these requirements are addressed in two separate goals, many SWMDs implement programs that deal with both goals simultaneously. Therefore, implementation of these goals is discussed together.

Goals 3 & 4 do not have numeric standards associated with them nor do they establish minimum standards as benchmarks for achieving the goals. This allows SWMDs maximum flexibility for determining how best to provide outreach to their constituents. However, the lack of standards makes evaluating Ohio's level of success in achieving Goals 3 and 4 difficult. Complicating the evaluation is the wide variety of entities that provide education services, including SWMDs, county recycling and litter prevention offices, county extension offices, soil and water conservation districts, health departments, etc. For these reasons, it is difficult to quantify recycling and reduction education programs and

Adjusting to Reduced Funding for Education and Outreach

Prior to passage of House Bill 66, each of the six counties in the North Central Ohio Joint SWMD (District) (consisting of Allen, Champaign, Hardin, Madison, Shelby, and Union Counties) had active recycling and litter prevention offices. Most of the funding for each of the six offices came from the *Recycle, Ohio!* grant program administered by ODNR, DRLP. The District provided matching funds and some additional financial support. Each of the counties provided office space and administrative support for its recycling and litter prevention office.

The six recycling and litter preventions offices were managed by their respective counties, and the content of their education programs was determined to a large part by the content standards associated with the *Recycle, Ohio!* grants. However, the offices all provided publicity and support for programs provided by the District. While all six offices had commonalities in the programs offered, the offices differed in terms of the scope of their programming. Some offices focused on providing education and awareness, primarily to school age children. Other offices were directly involved in providing recycling opportunities.

Following the passage of House Bill 66 and the loss of grant revenue, the District determined that it would not be able to maintain recycling and litter prevention offices for all six counties. The District reduced the number of offices to three, retained three of the existing education program coordinators, and assigned each coordinator to two counties. Although the coordinators are technically employees of the counties in which their offices are located, funding for and oversight of the coordinators are provided by the District. The counties' obligations are limited to providing physical office space. The relationship between the District and the education program coordinators defines the duties of the coordinators as well as their program priorities.

Under the streamlined education structure, planning and implementation of the educational program is a cooperative effort among the three education offices, the District's Executive Director, and staff at the District's office. Although the funding and staff time required to implement programs may vary from county to county, the actual program requirements apply to all six counties equally. Furthermore, the focus of the education program has changed from the past focus on awareness education to promoting participation in available recycling opportunities and increasing the quantities of material recycled. In this respect, the education coordinators are instrumental in assisting with implementation of the District's solid waste management plan

present a truly comprehensive portrayal of the programs being implemented.

All 52 SWMDs either fund or directly provide education, information, and technical assistance to their residents and businesses in one way or another. From that perspective, Ohio's SWMDs have been successful in meeting Goals 3 and 4. However, the types of programs and activities offered by the 52

Maximizing Outreach Efforts Through Targeted Campaigns

During the process of updating its solid waste management plan, the Hamilton County Solid Waste Management District (Hamilton SWMD) became interested in developing a new residential outreach campaign. This campaign would represent the Hamilton SWMD's first new recycling outreach campaign in eight years. However, before devoting resources to a new campaign, the Hamilton SWMD wanted to ensure that it would send the correct message. Thus, the Hamilton SWMD conducted a study of residents' recycling practices.

The Hamilton SWMD contracted with the University of Cincinnati's Research Policy Institute to conduct phone surveys of Hamilton County residents. Using the resulting market research, the Hamilton SWMD discovered that one of the top reasons residents did not recycle was that they simply did not know how to get a recycling bin.

Using what it learned from the survey, in 2005 the Hamilton SWMD launched a new outreach program called the "Get a Bin!" campaign. During the first year of the campaign, the Hamilton SWMD focused on providing general outreach to Hamilton County residents using billboards, radio spots, and newspaper advertisements. Results of the campaign included:

- 56 percent increase in the number of phone calls to the Hamilton SWMD's Recycling Hotline;
- 141 percent increase in hits to the Hamilton SWMD's Web site;
- 3.2 percent increase in curbside recycling tonnages.

Given the success of the "Get a Bin!" campaign, the Hamilton SWMD worked with Rumpke Recycling and the city of Cincinnati to make the campaign an on-going program. Cincinnati adopted the slogan for its recycling promotions. This provides a consistent recycling message throughout the city.

Each year, the Hamilton SWMD works closely with two to three communities to increase residential recycling in those communities through targeted outreach. Targeted communities typically have recycling rates of 10 percent or less. Since initiating the targeted outreach program, the Hamilton SWMD has worked with at least eight communities. In 2007, the Hamilton SWMD worked with the cities of Harrison and Reading. As a result of these efforts, the Cities experienced increases in the tonnages of recyclables collected of 34 percent and 10 percent, respectively.

Prior to launching a campaign, the Hamilton SWMD meets with community representatives to obtain support for the campaign and receive feedback on the best methods of reaching residents. Methods typically include direct mail (focusing on how to recycle and what can be recycled), school education programs, civic presentations, editorials in local newspapers, booths at community festivals, and tours of material recovery facilities for elected officials. In addition, the Hamilton SWMD provides recycling containers for community festivals.

SWMDs are quite varied. Furthermore, the resources a SWMD devotes to education activities, the methods it uses to deliver the educational message, and the complexity of the overall education program vary considerably from one SWMD to another.

Some SWMDs emphasize educating school-age children about reducing the amount of waste disposed of in landfill facilities. To that end, many SWMDs make an education specialist available to provide in-school presentations as well as materials for teachers to use in the classroom. Other SWMDs focus on affecting behavior to increase quantities of recyclables collected. These SWMDs provide information to homeowners and others to encourage them to use available recycling opportunities and to change purchasing behaviors.

Some SWMDs provide information through simple brochures and pamphlets whereas others take a much more active role in providing outreach. One example is the Hamilton County SWMD's targeted community program which is described in the text box below. Still other SWMDs, due to the base of commercial and industrial establishments within their jurisdictions have very strong programs geared towards those sectors.

One trend in providing outreach since the 2001 State Plan was adopted is the use of the Web to provide information. At the time this document was being prepared, 43 of the 52 SWMDs had active Web sites.

Some SWMDs have comprehensive promotional campaigns that use all types of media to reach targeted audiences. Other SWMDs rely strictly on printed media for their awareness campaigns. Still other SWMDs participate in local events, such as fairs, parades, and other venues to promote their services and to distribute information.

Progress Made Toward Achieving Goal 5

Strategies for managing scrap tires, yard waste, lead acid batteries, and household hazardous waste.

All SWMDs are required to provide programs to address the following five restricted and difficult-to-manage waste streams:

- Household Hazardous Waste (HHW);
- Electronics
- Scrap Tires;
- Lead-Acid Batteries; and
- Yard Waste.

As with Goals 3 and 4, SWMDs have maximum flexibility to determine how best to satisfy Goal 5. Thus, as would be expected, the SWMDs differ significantly regarding their approaches to addressing Goal 5. At one extreme are the SWMDs that provide basic information, usually in printed brochures, pamphlets, or flyers, about how to manage the restricted wastes. At the other extreme are the SWMDs that own and operate collection facilities where residents can deliver restricted wastes. Some of these SWMDs accept the materials without an associated fee and some charge a user fee.

SWMDs are not required to provide residents with alternatives to disposal for managing restricted wastes. Thus, SWMDs are not required to provide collection events for the wastes. As is explained in the following paragraphs, many SWMDs do provide the collection events as services to their residents. These collection events typically are very popular with residents. In the case of HHW, the events typically are expensive and are a major undertaking. In order to be responsive to the needs of their residents while being financially conscious, many SWMDs offer annual collection programs on a temporary basis.

Household Hazardous Waste

Although HHW is not restricted from being disposed of in landfill facilities, the characteristics of HHW make it a difficult to manage waste stream. Disposing of HHW is the least preferred management method. Thus, SWMDs are required to provide a program to address how to properly manage HHW. The programs that SWMDs offer for HHW include the following: education, awareness, outreach, and technical assistance regarding alternatives to hazardous products, how to manage HHW, the dangers associated with using hazardous products, and dangers associated with hazardous wastes, etc.; dedicated hotlines for answering residents' questions; and collection programs.

As is explained in more detail in Chapter VIII, 32 SWMDs representing 58 counties provided collection programs for general HHW to their residents in 2008. Of those SWMDs, 23, representing 47 counties, offered temporary collection events. These events typically occurred over a weekend once or twice during the year, and multi-county SWMDs typically offered an event in each county. One SWMD provided its residents with a permanent collection program at the county-owned solid waste landfill. Seven SWMDs provided their residents with semi-permanent collection programs which were available on a regular schedule, such as weekly, monthly, or seasonally. Two SWMDs provided both temporary and semi-permanent collection options.

Another four SWMDs provided collection programs for a limited number of hard-to-manage or restricted wastes, and a number of SWMDs provided drop-off services for specific wastes.

In 2007, SWMDs reported having collected a total of 6,464 tons of HHW from all collection programs. Of the HHW collected, 90 percent was recycled or incinerated. To collect, recycle, and dispose of the 6,464 tons of HHW collected, SWMDs reported spending a total of \$6,300,739.

Since 2001, the number of SWMDs operating facilities where HHW is collected has steadily increased. Many SWMDs choose the facility option in order to make managing HHW in an environmentally-conscious manner more convenient for their residents. In addition, several of the SWMDs that operate their own facilities have seen a reduction in the cost of operating the collection program as a result of switching from temporary collection events to a facility-based program.

Chapter 8 provides more detailed information regarding HHW management in Ohio. This information includes descriptions of the programs that SWMDs typically provide for educating residents regarding HHW as well as the collection programs offered by SWMDs.

Electronics

The requirement to provide a program addressing the management of end-of-life and obsolete electronic waste (e-waste) was introduced with the 2001 State Plan. As with HHW, e-waste is not restricted from being disposed of in landfill facilities. However, the presence of hazardous constituents in e-waste, the volume of e-waste entering the waste stream, and the bulky nature of many electronic devices make e-waste a difficult to manage waste stream.

Since 2001, the number of SWMDs that provide collection programs for e-waste has increased significantly. In 2001, three SWMDs provided collection programs for e-waste. By 2008, 39 SWMDs offered collection programs.

Please see Chapter 8 for more information regarding e-waste and the programs that SWMDs offer to address managing e-waste.

Scrap Tires

SWMDs provide the following programs for scrap tires: education regarding the proper management of scrap tires and Ohio's scrap tire regulations; collection opportunities for scrap tires; funding for remediating of illegal scrap tire accumulations; and funding for scrap tire enforcement personnel. For 2007, the 52 SWMDs reported that a total of 110,495 tons of scrap tires were recycled in 2007. This is up from the reported 67,623.48 tons that were reported by SWMDs for 2001.

Please see Chapter 7 for a more in-depth discussion of both Ohio's scrap tire program and programs offered by the SWMDs.

Lead-Acid Batteries

Goal 5 of the 2001 State Plan requires SWMDs to provide a program to address managing lead-acid batteries. However, the majority of lead-acid batteries are recycled through non-SWMD-sponsored programs. In fact, U.S. EPA estimates that nearly 90 percent of all lead-acid batteries are recycled. Additionally, as is discussed in Chapter 4, a new Ohio law that addresses lead-acid batteries became effective on April 25, 2008. That law prohibits anyone from disposing of a lead-acid battery in a landfill facility. The law is intended to ensure that all spent lead-acid batteries in Ohio are recycled. The law further requires retailers and wholesalers that sell lead-acid batteries to accept spent batteries from customers who purchase new batteries.

Due to the strength of the existing network for recycling lead-acid batteries, many SWMDs focus their efforts on educating residents where to take lead-acid batteries rather than on programs geared towards collecting the batteries. Even so, many of the SWMDs that provide HHW collection programs accept lead-acid batteries at those events. Furthermore, some of the SWMDs that operate recycling centers accept lead-acid batteries on an on-going basis. In total, the 52 SWMDs reported that 12,675.59 tons of lead-acid batteries were recycled in 2007 from the residential/commercial sector compared to 20,879.66 tons in 2001.

Yard Waste

As with the other restricted wastes, SWMDs are required to provide a program to address the proper management of yard waste. SWMDs are not required to provide facilities for managing yard waste. Even so, many of Ohio's composting facilities are publicly owned and operated, some by SWMDs and others by various political jurisdictions.

As of August 2008, Ohio had 405 registered Class III and IV composting facilities. Although all classes of composting facilities can accept yard waste, Class IV facilities are limited to composting yard waste, and Class III facilities are limited to composting yard waste, animal wastes, and specified agricultural wastes. [Note: Approved bulking agents and additives can be used at both Class III and Class IV facilities]. Table 2-7 presents the types of materials that each of the four classes of composting facilities is authorized to accept.

Therefore, the majority of yard waste is composted at registered Class III and IV composting facilities. In 2007, owners and operators of Class III and Class IV facilities reported having accepted a combined total of 2,181,626 cubic yards (727,209 tons) of yard waste. By comparison, owners and operators of Ohio's 22 Class I and II facilities reported having accepted 102,740 tons of yard waste in 2007.

In addition to the available composting facilities, many SWMDs rely on providing residents with

education about managing yard waste. Often this education focuses on informing residents how to avoid generating yard waste and how to responsibly manage yard waste on their properties.

Nearly all of Ohio's SWMDs have initiated educational campaigns to teach residents to leave grass clippings on their lawns when they mow and to use mulching lawnmowers. Many of these campaigns use the slogan "Don't Bag It". In conjunction with the "Don't Bag It" campaign, many SWMDs promote backyard composting as a management technique. Some SWMDs sell back-yard composting containers to their residents at cost.

Table 2-7: Approved Feedstocks for Composting Facilities

Feedstock Type	Class I	Class II	Class III	Class IV
Yard Waste	X	X	X	X
Agricultural Plant Materials	X	X	X	
Animal Waste	X	X	X	
Vegetables, Fruits, & Grains	X	X		
Processed Vegetables, Fruits, & Grains	X	X		
Rendering Waste	w/Approval	w/Approval		
Domestic Animal Carcasses	w/Approval	w/Approval		
Wild Animal Carcasses	w/Approval	w/Approval		
Other Source Separated Organics	X	w/Approval		
Mixed Municipal Solid Waste	X			

A number of communities throughout Ohio provide residents with curbside collection programs for yard waste. Some of these programs are provided year-round whereas others are seasonal. In some communities, the yard waste that is collected is sent to registered composting facilities. In other communities, the yard waste is directly applied to agricultural fields. Generally, curbside services are more common in cities and villages whereas land applying yard waste is more common in rural areas within close proximity to agricultural operations.

Chapter 4 provides more information about how yard waste is regulated in Ohio.

Progress Made Toward Achieving Goal 6

Evaluate the feasibility of incorporating economic incentives into source reduction and recycling programs.

The requirement to perform an economic incentive analysis was introduced to SWMDs with the 1995 State Plan. As part of their demonstration of compliance with Goal 1 in their solid waste management plans, SWMDs were required to evaluate the feasibility of implementing financial incentives to encourage increased participation in recycling programs. SWMDs that demonstrated compliance with Goal 2 were not required to perform the analysis. By upgrading the requirement to a goal in the 2001 State Plan instead of leaving it as a component of the demonstration for Goal 1, Ohio EPA and SWAC extended the obligation to perform the analysis to all SWMDs.

Incentive-based programs that either tie the amount recycled to some sort of financial compensation or reduce the cost of recycling have the potential to significantly increase participation in an available recycling program. Incentives can also increase the volume of recyclables collected. Combining a curbside recycling service with a volume-based trash collection/pay-as-you-throw (PAYT) system has been proven to be one of the most powerful tools for increasing the effectiveness of the recycling program.

Ohio EPA and SWAC believe that requiring all SWMDs to perform the analysis is beneficial because it exposes the SWMD to potential programming that the SWMD might not otherwise consider. The analysis can be a tool for making strategic decisions and can provide information that can be used by the policy committee during the process of updating the SWMD's solid waste management plan.

It is difficult to evaluate the effect of this goal on the number of incentive-based programs that SWMDs have implemented as a result of the requirement. Since adoption of the 2001 State Plan, a number of

Encouraging Communities to Implement PAYT Programs

The Lorain County SWMD (Lorain SWMD) administers a Community Grant Program through which the SWMD supplements recycling programs implemented by political subdivisions. All communities within the Lorain SWMD are invited to participate. In the past, the amount a community received through the grant program depended upon a number of factors, including: the convenience of the program; the amount of material recycled in the previous year; the number of households served; and the population of the community. Communities that received grant awards were required to provide matching funds.

In 2004, The Lorain SWMD awarded 31 communities a total of \$1.5 million. Residents in 23 of those communities were served by bag-based curbside recycling services.

In 2005, during the process of updating its solid waste management plan, the Lorain SWMD's policy committee evaluated the Community Grant Program to determine the effectiveness of the program in light of current recycling activity in the Lorain SWMD's communities. During this evaluation, the policy committee found low participation rates in most of the curbside programs, lower than expected quantities of material being collected, and a limited range of recyclable materials being collected.

As a result of its findings, the policy committee opted to make strategic changes to the SWMD's Community Grant Program to improve the quality of community recycling programs as well as participation in those programs. To do so, the policy committee revised the grant guidelines to encourage political subdivisions to switch to PAYT programs. In exchange for implementing a PAYT program, a community will receive:

- An increase in grant funding;
- Continued grant funding under future solid waste management plan updates;
- A waiver from match requirements; and,
- A one-time funding incentive based on population.

A political subdivision that elects not to switch to PAYT will receive a fixed amount of money through the grant program from 2006 to 2009. If, by 2010, a community has not implemented a PAYT program, then the community will receive \$10,000 for a drop-off recycling program and \$5,000 for a curbside program. Communities that implement PAYT will be eligible for payments of from \$10,000 to \$150,000. The amount of the payment will depend upon the population of the community.

To complement the new grant program, the policy committee also developed an education component for the SWMD. Thus, the Lorain SWMD will develop and distribute materials to educate public officials about PAYT systems, will hold one-on-one meetings with public officials and community seminars, and will develop and distribute brochures to residents about potential changes to their trash collection and recycling programs.

The policy committee and the Lorain SWMD did receive negative publicity and criticism for the proposed new guidelines. However, the policy committee and the Lorain SWMD believe in the new program enough to implement it despite the opposition. The Lorain SWMD is confident that the new guidelines ultimately will increase the effectiveness of the community recycling programs in Lorain County and result in a better investment of Lorain SWMD's resources.

communities have implemented combined PAYT trash collection and curbside recycling services. In most cases, however, it isn't clear if the decision to implement the service was made in response to Goal 6 or some other stimulus. In addition, at least one SWMD revamped a community grant program to encourage communities to implement PAYT programs. This revamped program was developed by the Lorain County SWMD and is described in the text box on page 28.

Another incentive program that is receiving attention is the *RecycleBank* program. The *RecycleBank* program is a nationwide program that is easily adaptable to local needs and has been proven to be effective in increasing both participation in recycling programs as well as quantities of materials recovered. The *RecycleBank* program is described in the text box below.

RecycleBank

RecycleBank is a company that was founded in 2004 to create incentives for households to participate in local curbside recycling programs. *RecycleBank* accomplishes this goal by partnering with local communities and recycling service providers to reward homeowners for the recyclable materials they separate from their trash. This is done by providing homeowners with “*RecycleBank* Reward Points” which can be redeemed at a variety of retailers and restaurants. In this way, *RecycleBank* returns a portion of the value of recycled materials directly to the homeowners who generate the recyclables.

RecycleBank uses a single-stream recycling system to make recycling understandable and easy. Homeowners receive a recycling cart that is equipped with a radio frequency identification device (RDIF). Each homeowner's RDIF is assigned an account identification code that is unique to that homeowner and is used to collect data on the weight of recyclables the homeowner places at the curb. The recycling trucks are equipped with scales and computers to weight the recyclables, scan the RFID, and record the weight for the home.

For each pound of recyclable material collected, the homeowner receives 2.5 *RecycleBank* Reward Points. The more a homeowner recycles, the more reward points they earn. These points are then redeemed at participating businesses, including local and national retailers and restaurants. Participating homeowners can track their reward points and order rewards on-line. In addition, homeowners can quantify how their recycling efforts conserve natural resources, such as trees and oil.

In Ohio, the Hamilton County Solid Waste Management District (Hamilton SWMD), working with ODNR, DRLP and Rumpke Recycling, integrated the *RecycleBank* program into the curbside recycling service offered in the city of Montgomery. The program began on October 27, 2008, and as of March 31, 2009, the City's diversion rate increased from 19 percent to 29 percent. In addition, residential participation increased by 37 percent.

Progress Made Toward Achieving Goal 7

Market development strategy (optional)

Goal 7 of the 2001 State Plan is intended to help develop markets for recyclable materials. Unlike the other goals, however, Goal 7 is optional. Thus, a SWMD could choose to provide market development programs but is not required to do so. For 2007, 28 SWMDs reported that they provided market development programs.

In general, SWMDs compile and make available lists of vendors that offer products made with recycled materials. In addition, many SWMDs include the “Buy Recycled” message in their education and outreach efforts. Many SWMDs also purchase products containing recycled materials and encourage and assist other government offices to do the same. A number of SWMDs award grants to local entities to purchase products made with recycled materials. [See Chapter 9 for more details regarding the programs that SWMDs have implemented for Goal 7]

Progress Made Toward Achieving Goal 8

Annual reporting of plan implementation

In accordance with OAC Rule 3745-27-90, Ohio EPA annually distributes to all SWMDs a form called the Annual District Report (ADR) form. SWMDs are required to use this form to report their activities related to implementing their approved solid waste management plans during the previous year. The primary purpose of the ADR is for Ohio EPA to monitor each SWMD's compliance with its approved solid waste management plan. However, the information submitted via the ADR form is also used to measure each SWMD's progress toward meeting the goals established in the state solid waste management plan. The ADR also helps Ohio EPA track Ohio's overall progress toward achieving those goals.

The objectives of the ADR include:

- To provide the amount of solid waste reduced and recycled in the reporting SWMD for the report year.
- To provide an update on the SWMD's efforts to implement its approved solid waste management plan in the report year. To do this, the SWMD provides information on the status of programs that the SWMD committed to providing in its approved plan and what activities toward implementing each program the SWMD performed during the report year.
- To report on HHW collection programs provided during the report year.
- To estimate the amount of solid waste disposed of in facilities located outside of Ohio.
- To report on miscellaneous items such as changes to fee schedules, PAYT programs, conditions that affected the quantities of materials recycled in the report year, and new or changed rules.

SWMDs are required to complete the ADR form and submit the completed form to Ohio EPA by June 1 of each year. The report provides information for the previous year. Thus, in 2008, SWMDs provided information for calendar year 2007.

Using the information reported in both the facility annual reports and the ADRs, Ohio EPA annually prepares and distributes to each SWMD an annual district report review form specific to that SWMD. This form is a summary report that provides the reported information as well as calculations performed by Ohio EPA, such as generation, disposal, and reduction/recycling rates.

Progress Made Toward Achieving State Strategies

Strategy 1: Continue to provide grants to local communities to help pay the start-up costs for recycling programs.

As was explained in association with Goals 3 and 4 earlier in this chapter, ODNR, DRLP administers a number of grant programs. Prior to 2005, one of these programs was known as *Recycle, Ohio!* grant. Through the *Recycle, Ohio!* grant program, ODNR funneled money to local communities to support, among other priorities, providing recycling programs

and education. Prior to 2005, all of ODNR, DRLP's grant programs as well as the Division's administrative expenses were funded by Ohio's corporate franchise tax.

Until 2005, ODNR received a considerable amount of money annually from the corporate franchise tax. In 2005, Ohio's General Assembly restructured the corporate franchise tax and in the process, replaced ODNR, DRLP's previous funding with a fee on the disposal of construction and demolition debris. The revenues ODNR, DRLP receives from this fee are significantly less than the Division formerly received from the franchise tax. Additionally, Ohio's General Assembly placed a ceiling on the amount of revenue that could be used to pay for administrative expenses. Consequently, in addition to eliminating many staff positions, ODNR, DRLP restructured its grant programs. As part of this restructuring process, the Division eliminated the *Recycle, Ohio!* program and replaced it with the Community Development Grant.

Whereas the *Recycle, Ohio!* grant was essentially an entitlement grant and was heavily focused on awareness education, the Community Development Grant program is a highly competitive grant which emphasizes establishing recycling collection and processing infrastructure. Applicants can also receive grants to fund litter collection activities on publicly-owned properties.

Entities that are eligible to apply for Community Development Grants are the same as under the former *Recycle, Ohio!* grant. Thus, counties, SWMDs, and cities with populations greater than 50,000, can apply for Community Development Grants. There are match requirements under the program. The amount of the required match is project-specific and is based on standards established in the grant guidelines.

In 2001, ODNR, DRLP awarded a total of almost \$6.8 million to 99 recipients through the *Recycle, Ohio!* program. In 2006, ODNR, DRLP awarded a little less than \$900,000 in Community Development grants to 34 recipients. In 2007, ODNR, DRLP awarded a combined total of \$1,095,245 to 31 applicants. Applicants and projects awarded grants in 2006 and 2007 are summarized in Appendix C:

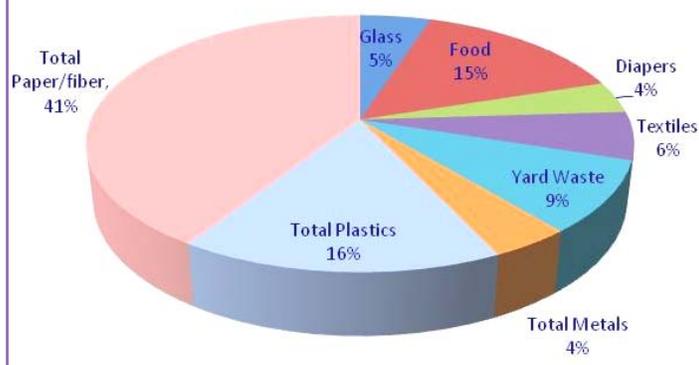
Strategy 2: Explore an Ohio-specific waste characterization and generation study

In early 2003, ODNR retained Engineering Solutions & Design, Inc. (ES&D) to perform a study of the waste that Ohioans throw away. The focus of the sort was on Ohio-generated MSW. To accomplish the study, ES&D conducted waste picks or waste sorts at landfill and transfer facilities located within 11 SWMDs throughout Ohio. Waste was sorted into predefined categories and measured according to volume and weight. In all, waste sorts were conducted at nine landfill facilities and five transfer facilities in the 11 SWMDs. A solid waste facility was selected

based on its location and size as well as the willingness of the owner or operator to allow access to facility.

Two waste sorts were conducted at each of the selected facilities. One field sort event was undertaken in May or June 2003 (Spring Sort) and the other sort was undertaken in September or October 2003 (Fall Sort). Waste was separated into the following categories: paper/fiber, plastics, glass, metals, yard waste, food waste, diapers, textiles, empty aerosol cans, medical waste, and fines/superfines. Figure 2-10 illustrates the composition of the waste stream based on the results of the field sorts. [NOTE: When combined, empty aerosol cans, medical waste, and fines/superfines comprised less than one percent of the total material sorted. Thus, those materials are not represented in Figure 2-10.]

Figure 2-10: Statewide Distribution of Major Waste Stream Components and Categories by Weight



Summary of Results

According to the results of Ohio's waste characterization study, paper/fiber, plastics, and food waste comprised the largest percentages, by weight, of the waste being disposed of in landfill facilities – 41 percent, 16 percent and 15 percent, respectively. In addition, ODNR found that four materials commonly collected through community recycling programs made up 66 percent of the waste sorted. These materials were paper/fiber, plastics, glass, and metals.

ES&D also made visual inspections of all 460 loads that were sampled to identify large items such as wood, carpet, computers, and appliances. Based on those inspections, ES&D recorded that of the 460 loads sorted:

- More than 75 percent contained loose wood.
- 62 percent contained carpet.
- 52 percent contained construction and demolition debris.
- 42 percent contained small appliances.
- 30 percent included wood furniture.
- More than 17 percent contained computers.

Of the 460 loads sampled, 58 loads consisted entirely of commercial waste. As such, these loads contained waste generated by only retail businesses, offices, schools, nursing homes, and/or medical centers. For the 58 loads of purely commercial waste:

- Paper fibers accounted for nearly 50 percent of the weight.
- The average percentage of total paper fiber was 7.54 percent higher than the average percentage of paper in all 460 loads sampled (49.18 percent compared to 41.64 percent in all loads).
- The average percentage of plastics was 1.85 percent higher than the average percentage in all 460 loads sampled (17.49 percent vs. 15.64 percent in all loads).
- Yard waste, textiles and food waste were less prevalent than in loads of general municipal solid waste.

Sampling from the 58 commercial loads, combined with results from mixed commercial/residential loads and interviews with drivers and facility staff, indicate a need to focus commercial waste reduction efforts on corrugated paper, office paper, mixed paper and plastics.¹⁰

[Note: All of the information for the explanation for how Strategy 2 was fulfilled came from the report published by ODNR, DRLP. The full report can be obtained from ODNR, DRLP.]

Strategy 3: Explore means of obtaining improved reporting on the part of processors, haulers, and industrial generators

As was mentioned in conjunction with the discussion of Goal 2, SWMDs rely on others to supply the data that is needed to calculate the waste reduction and recycling rates. Ohio EPA collects data regarding solid waste managed at regulated solid waste facilities through the mandatory facility annual report. However, the entities that have reduction and recycling data are not legally required to report that data. Many SWMDs have developed cooperative relationships with the entities that have the data and are able to obtain satisfactory data. Even so, it has been very difficult for SWMDs to obtain comprehensive data. As a result, there has been a

long-standing gap between reported recycling data and overall recycling effort.

Beginning in 2004, Ohio EPA began working with the owners and operators of Ohio's largest material recovery facilities (MRFs) to create a voluntary, cooperative reporting system for recycling data. Through this system, Ohio EPA will annually collect data from the owners and operators of the MRFs and distribute the data to all appropriate SWMDs. In this manner, Ohio EPA will reduce the data collection burden on SWMDs. Because the individual SWMDs will no longer need to send their own surveys, the system would reduce the number of surveys each MRF owner or operator has to complete.

Ohio EPA and the owners and operators of the major MRFs developed the form that Ohio EPA will use to collect the data. A copy of this form is contained in Appendix D. Following completion of the form, Ohio EPA compiled a database of as many MRFs, processors, and recycling centers as the Agency could identify. This database included both publicly and privately owned and operated facilities as well as facilities that serve one SWMD or county and those that serve multiple SWMDs or counties.

A pilot of the survey was performed mid-2007 to collect data for 2006. For the pilot, Ohio EPA sent surveys to the owners/operators of 46 facilities, including Republic, Waste Management, Rumpke, and BFI-Allied. Based on the results of the pilot project, Ohio EPA limited the universe of processors to be surveyed by removing facilities based on the following criteria:

- The facility serviced only one county or one SWMD;
- The facility was a salvage yard;
- The owner/operator was unable to report the county of origin for recycled materials;
- A SWMD operated the facility and already distributed information to all SWMDs served;
- The owner/operator preferred to maintain a direct reporting relationship with the SWMDs the facility services; and
- The facility served as a temporary consolidation center or a transfer station and sent recyclable materials to a MRF or other recycling center.

In January 2009, Ohio EPA distributed the MRF survey to collect 2008 recycling data. The survey was sent to owners and operators of 11 independent facilities and Republic, Waste Management, Rumpke, and BFI-Allied.

Strategy 4: Study existing recycling and disposal programs and the associated costs

As is explained under the heading for Strategy 5, Ohio EPA conducted a study of drop-off recycling programs in 2004. In 2008, Ohio EPA began evaluating the effectiveness of curbside recycling

programs in Ohio. This study is intended to be a companion to the drop-off study. Where the drop-off study was focused heavily on obtaining primary data, the curbside study will use mostly secondary data available from providers of curbside recycling services and the political jurisdictions where those services are provided.

Ohio EPA was in the preliminary stages of the curbside study at the time this update was being prepared. Therefore, this discussion is focused on the Agency's strategy for conducting the study as opposed to findings from the study. Ohio EPA will make those findings available when the study has been completed.

Initially, Ohio EPA has limited its study to non-subscription curbside recycling programs. Eventually, the Agency may expand its focus to encompass subscription programs.

As a first step, Ohio EPA identified the universe of non-subscription curbside programs that would be included in the study. This was accomplished by identifying a list of SWMDs that had non-subscription curbside recycling programs in operation within their member counties. Preference was given to those SWMDs that had multiple curbside programs in operation. From that list, Ohio EPA selected SWMDs from all regions of Ohio to provide as representative sample as possible. Ultimately, Ohio EPA identified the following 14 SWMDs for the study:

- Auglaize County SWMD;
- Ashland County SWMD;
- Brown County Solid Waste Authority;
- Cuyahoga County SWMD;
- Delaware, Knox, Marion, Morrow Joint SWMD;
- Gallia, Jackson, Meigs, Vinton Joint SWMD;
- Hamilton County SWMD;
- Lorain County SWMD;
- Montgomery County SWMD;
- North Central Ohio SWMD (Allen, Champaign, Hardin, Madison, Shelby, and Union Counties);
- Logan County SWMD;
- Portage County SWMD;
- Solid Waste Authority of Central Ohio (Franklin County); and
- Van Wert County SWMD.

All of the non-subscription curbside recycling programs within each identified SWMD are included in the study. The SWMDs provided Ohio EPA with contact information for each political jurisdiction where a curbside program is available. Ohio EPA sent each political jurisdiction a survey that requested information regarding:

- the service provider;
- materials collected;
- type of container used;
- frequency of collection;
- availability of PAYT collection service;

- number of households served;
- participation;
- costs;
- how billing is accomplished;
- quantities of waste disposed of and recycled; and
- quantities of yard waste managed separately from garbage.

Once Ohio EPA has obtained responses from as many political jurisdictions as possible, staff will enter the information into a database to be analyzed for a number of factors, including trends, average costs, relationship between cost and amount of material collected, and participation rates. Ohio EPA is hoping to be able to use the conclusions drawn from the study to provide a profile of a typical recycling program as well as determine the factors that make a curbside recycling program successful. Ultimately, the conclusions drawn from the curbside study are intended to be used as a tool to encourage additional political jurisdictions to implement curbside recycling programs or to improve existing curbside programs.

Strategy 5: Study alternative access credits for recycling opportunities and expected participation rates

In 2004, Ohio EPA conducted a study to evaluate the effectiveness of drop-off recycling programs. Through this study, Ohio EPA assessed diversion amounts, participation rates, usage patterns, etc. at drop-off recycling sites throughout Ohio.

The study was funded by a solid waste management assistance grant from the United States Environmental Protection Agency, Region V (U.S. EPA, Region V) with a significant financial contribution from ODNR. Ohio EPA was the lead agency in developing and conducting the study. Input and assistance from Ohio's SWMDs was received throughout the study. Ohio EPA also employed a local contractor to perform much of the survey work and data analysis as well as all of the GIS mapping.

The study involved three major components:

- Analysis of quantities of material collected at more than 250 drop-off sites throughout the state;
- Face-to-face surveys of users at 17 drop-off sites; and
- Telephone survey of 600 people living in Summit County.

Ohio EPA submitted a final report to U.S. EPA, Region V in November 2004. A copy of this report is contained in Appendix E. The report summarizes the project methodology as well as the results.

The report provides recommendations for methods of assigning population credits to drop-off

recycling opportunities. In general, the report does not recommend major changes to the existing default standards associated with demonstrating compliance with Goal 1.

Ohio EPA generally believes that the current structure of Goal 1 is appropriate and that the goal is resulting in SWMDs establishing recycling opportunities as was originally intended. However, Ohio EPA has observed situations in which the standards have not worked as well as they should. As a result, this state plan update contains additional options for assigning population credits to recycling opportunities. Please see Chapter 3 for more detail regarding these options.

Strategy 6: Publish the *Facility Data Report and Solid Waste Management in Ohio - Recycling, Reduction, Waste Generation & Disposal* every other year and make data available annually

Facility Data Report – This document provides data regarding the management of solid waste in Ohio's solid waste facilities. In years when the Facility Data Report is published, the document contains data in figures and tables along with text analyzing and explaining the data. In years when the tables and figures are published, only data is made available. This document was published according to the following schedule:

- December 2003 – Published a full report for 2001 data.
- February 2004 – Published tables and figures for 2002 data.
- December 2004 – Published full report for 2003 data.
- December 2005 – Published tables and figures for 2004 data.
- April 2007 - Published full report for 2005 data

At the time this document was prepared, Ohio EPA was in the process of finalizing the tables and data for 2006 data.

Summary of Solid Waste Management In Ohio - Reduction, Recycling, Waste Generation, and Disposal – In years when the report is published, it provides an overview of solid waste management in Ohio as well as an account of trends in solid waste management. The report provides data on the generation of solid waste by Ohio's residents and businesses as well as the methods used to manage that solid waste. The report also summarizes the reduction and recycling programs Ohio's SWMDs have implemented to achieve the goals established in the state solid waste management plan. In years when the tables and figures are published, only data is made available. This report was published according to the following schedule:

- December 2003 – Published a full report for data from 1990 through 2000.
- June 2004 – Published tables and figures for data from 2002 (some tables and figures provide data for 2000 through 2002).
- May 2007 – Published tables and figures for data from 2005 (some tables and figures provide data for 2000 through 2005).

Ohio EPA has also begun making data available through the following reports:

- ***Solid Waste Imports and Exports*** – This summary was published annually from 1997 to 2006.
- ***Annual District Report Review Forms*** – Ohio EPA prepares a version of this form annually for each SWMD. These forms summarize waste management data for the year and provide:
 - a listing of all the solid waste facilities which accepted waste from the SWMD along with the quantities and types of wastes accepted by each facility;
 - adjusted landfill disposal totals for the SWMD based upon a comparison of transfer facility reports, landfill reports, and, if applicable, waste that was disposed of in an out-of-state landfill facility;
 - a table that presents the SWMDs total amount of waste reduction and recycling, based on data reported by the SWMD in the ADR; and,
 - the SWMD's calculated waste reduction/recycling percentages.
- ***Ohio's Approved and Proposed Landfill Capacity*** – Ohio EPA published this report in 2005 and 2007.

Although the data are not published in a formal report, Ohio EPA also collects data from:

- owners and operators of registered Class IV and Class III composting facilities through an annual operational report;
- owners and operators of scrap tire facilities through an annual operational report; and,
- MRF operators (as was discussed in association with State Strategy 3) through a voluntary survey effort.

Once Ohio EPA has compiled and analyzed the data listed in the bullet points above, the Agency attempts to make that data available to SWMDs.

Strategy 7: Establish a waste reduction and recycling goal for state agencies

ODNR has approached the governor's office on several occasions to encourage the governor to sign an executive order that would require all state agencies to implement recycling programs and purchase recycled-content products. To date, the governor has not signed such an order.

At the time this document was prepared, the Ohio Department of Administrative Services (ODAS) was working with the Ohio Department of Transportation (ODOT) on developing a recycling service contract. This contract would cover recycling services for all ODOT offices and facilities. Although ODAS would prefer for the contract to cover all Ohio agencies and facilities, participation in the service contract will initially be limited to ODOT.

ODAS and ODOT initially developed a contract to provide for collecting a comprehensive list of materials, including hazardous waste. The Agencies opened a request for bids from interested service providers but did not receive any acceptable proposals. Based on that experience, ODOT and ODAS are simplifying the scope of the contract to provide for the collection of a limited number of recyclable commodities.

Eventually, once the contract has been refined and the services provided have been determined to be satisfactory, ODAS intends to increase the number of commodities covered by the contract as well as extend participation in the contract to all state of Ohio agencies.

Strategy 8: Develop and implement a plan to increase state agency procurement of recycled-content products

In May 1993, Ohio's General Assembly passed Substitute House Bill 25, legislation that enhanced the state of Ohio's ability to purchase products containing recycled materials. The bill, and subsequent law, ORC Section 125.082, required the director of ODAS to adopt guidelines for purchasing equipment, materials, and supplies containing recycled materials. The bill and law also require ODNR to prepare an annual report on the value and types of recycled-content products purchased by government entities.

ODAS's definitions, guidelines for purchasing, and performance standards for recycled-content products are contained in OAC Sections 123:5-1-01 (definitions) and 123:5-1-09 (Purchase of recycled products). State of Ohio agencies that want to purchase recycled-content products must follow these guidelines. State of Ohio agencies are permitted to purchase recycled-content products when those products are no more than five percent more expensive than a comparable non-recycled content product.

State agencies report purchases of recycled-content products through the State's accounting system using designated reporting codes. At the end of each fiscal year, the Office of Budget and Management (OBM) summarizes the dollar value and types of recycled-content items purchased. Not all recycled-content purchases are captured through Ohio's reporting process. Examples are mixed-content products, such as vehicles. In addition, the reporting system relies on state purchasing agents and fiscal officers to properly account for purchases in the State's accounting system.

ODNR compiles and makes available the "*State Agency Recycled-Content Procurement Programs Report*". This report documents the efforts of state government to purchase recycled-content products. The report is prepared using information from the State's accounting system. The report shows, by agency, the dollar value of products purchased during the report year. During State Fiscal Year 2006 (July 1, 2005 to June 30, 2006), Ohio's state governmental agencies purchased recycled-content products totaling \$1,116,530. In fiscal years 2000 through 2006, state agencies purchased a combined total of more than \$11 million worth of recycled-content products.

ODNR has not published a more recent version of the *State Agency Recycled-Content Procurement Programs Report* due to complications associated with the *Ohio Administrative Knowledge System* (OAKS). OAKS has made it difficult to obtain the data regarding purchases of recycled-content products. Furthermore, Ohio's procurement policies complicate purchasing recycled-content products. Not all preferred and contracted vendors offer recycled-content products.

Strategy 9: Establish a procedure whereby Ohio EPA will notify ODNR when a SWMD is not in compliance with its solid waste management plan

Although Ohio EPA and ODNR did not develop a formal procedure for accomplishing Strategy 9, both agencies have worked closely on coordinating their programs. Thus, Ohio EPA has been making ODNR aware of compliance issues. In addition, Ohio EPA has been notifying ODNR of SWMDs that are experiencing financial struggles as well as projects that may be candidates for funding under ODNR, DRLP's grant programs. ODNR has been keeping Ohio EPA informed of changes to its grant programs as well as grants that have been awarded during annual grant cycles.

The effort to develop a closer working relationship between Ohio EPA and ODNR was renewed in 2008 through meetings and discussions about strategic goals. Both agencies expect to continue these efforts.

Strategy 10: Study the potential impact of increased energy costs on waste, recycling, and reduction and evaluate new or emerging technologies for waste reduction and recycling with a focus on those that provide energy recovery

As is discussed in Chapter 10, environmental issues such as global warming, alternative sources of energy, and sustainable development have led to increased interest in waste to energy technologies. In response to this interest, ODNR, working with a number of partners and sponsors, offered the *First Annual Partnerships in Emerging Technology Conference* in October 2008. This conference provided attendees with an overview of various emerging technologies. The conference was designed to showcase the state-of-the-art waste reduction and recycling technologies and systems being developed. Ultimately, the conference was intended to bring together businesses, venture capitalists, government officials, and academia to help further the development of these technologies, improve Ohio's environment, and attract new businesses and jobs to Ohio.

Some of the technologies that were discussed included:

- Converting waste into biofuels such as biodiesel and ethanol;
- Converting waste into synthetic next generation transportation fuels;
- Recycling industrial waters through small scale systems; and,
- Converting biomass, C&DD, and organic waste into energy.

Chapter 10 provides more information regarding the waste-to-energy technologies being discussed by solid waste professionals.

Footnotes

⁶ In its solid waste management plan, a SWMD establishes a reference year and provides baseline generation, disposal, and reduction data for that calendar year. The SWMD uses the data for subsequent projections in the solid waste management plan. The reference year typically is the year prior to the year in which the SWMD begins preparing its amended solid waste management plan.

⁷ Ohio EPA, DSIWM, "Table 2: "Statewide Reduction/Recycling for Ohio-Generated Waste," *Solid Waste Management in Ohio - Recycling, Reduction, Waste Generation & Disposal: Draft 2007 Tables and Figures* (Columbus, Ohio, November 2008).

⁸ *Gross Domestic Product*, 22.

⁹ One SWMD did not report any material having been recycled from the industrial sector in 2007.

¹⁰ Ohio Department of Natural Resources, Division of Recycling and Litter Prevention, *Waste Characterization Study* (Engineering Solutions & Design, Inc., Overland Park, Kansas, April 2002), 18-19.

Chapter 3

Goals for Solid Waste Reduction, Recycling, Reuse, and Minimization

Ohio Revised Code (ORC) Section 3734.50(A) requires the state solid waste management plan to “Reduce reliance on the use of landfills for management of solid wastes.”

ORC Section 3734.50(B) requires the state solid waste management plan to “Establish objectives for solid waste reduction, recycling, reuse, and minimization and a schedule for implementing those objectives.”

To fulfill the directives quoted in the text box above, this chapter establishes nine solid waste management district (SWMD) goals that are designed to further waste reduction and recycling in Ohio. In their solid waste management plans, SWMDs must demonstrate having strategies and programs to address all of the required goals.

This chapter also outlines a statewide solid waste reduction and recycling goal as well as 11 strategies to be implemented by state of Ohio agencies. These strategies are focused on ways that Ohio’s various agencies can promote recycling and waste minimization as well as ways those agencies can assist Ohio’s SWMDs in their efforts at the local level.

Solid Waste Management District Goals

Introduction to Goals 1 and 2

All nine SWMD goals in this state plan are crucial to furthering solid waste reduction and recycling in Ohio. However, by virtue of the challenges posed by Goals 1 and 2, SWMDs typically have to devote more resources to achieving those goals than to the remaining goals. Thus, Goals 1 and 2 are considered to be the primary goals of the state plan and SWMDs are encouraged to devote resources to achieving both goals. However, the 52 SWMDs in Ohio vary significantly in their abilities to achieve both goals. Thus, SWMDs are not required to demonstrate that they will achieve both goals. Instead, SWMDs have the option of choosing either Goal 1 or Goal 2 for their solid waste management plans. This affords SWMDs with two methods of demonstrating compliance with the State’s solid waste reduction and recycling goals.

In order to obtain approval from Ohio EPA for its solid waste management plan, a SWMD must demonstrate being able to achieve either Goal 1 or Goal 2 in its solid waste management plan. The criteria for the demonstration, the information that is needed for the demonstration, and how that information must be presented will be prescribed in the *District Solid Waste Management Plan Format* (Format) prepared by Ohio EPA as well as in Ohio Administrative Code (OAC) Rule 3745-27-90.

Goal 1: Infrastructure

The SWMD shall ensure that there is adequate infrastructure to give residents and commercial businesses opportunities to recycle solid waste.

Developing an adequate “infrastructure” is a necessary first step in achieving diversion of waste into recycling, composting, and other alternate waste management approaches. Infrastructure, in the context of this goal, refers to physical facilities, such as drop-off recycling locations and mixed solid waste materials recovery facilities, and collection systems, such as curbside recycling programs.

The purpose of establishing the infrastructure goal (previously referred to as the “Access” goal) was to allow SWMDs to devote their resources towards establishing the basic recycling infrastructure needed to achieve diversion, as opposed to the sometimes difficult and expensive process of measuring diversion (due to the difficulties in gathering accurate recycling information). This goal was originally established in 1995 and has evolved since that time.

At its simplest level, the goal requires SWMDs to demonstrate that adequate infrastructure to provide at least 90 percent of the population convenient opportunities to recycle exists or will exist. This version of the state plan provides SWMDs with the option of demonstrating a slightly lower percentage under some circumstances. The details of how to demonstrate this goal follow.

Demonstrating Achievement of Goal 1

A SWMD that opts to demonstrate compliance with Goal 1 in its solid waste management plan must do the following:

Standard Demonstration

1. Analyze the percentage of the residential population in each county of the SWMD that had the opportunity to recycle using the infrastructure that existed in the reference year.

2. Based on the results of the analysis, the SWMD must demonstrate one of the following (unless the SWMD can demonstrate qualifying for an alternative option below):

a. Demonstrate that there was adequate infrastructure in the reference year to provide at least 90 percent of the residential population within each county of the SWMD the opportunity to recycle.

If the SWMD determines that specific components of the infrastructure are underutilized, then the SWMD shall develop strategies to increase participation in those components.

b. Demonstrate that the SWMD will implement new and/or upgraded recycling infrastructure sufficient to provide at least 90 percent of the residential population within each county of the SWMD the opportunity to recycle.

The SWMD must implement identified recycling opportunities according to an aggressive schedule that is established in the solid waste management plan. If identified recycling opportunities cannot be implemented within the first year of the planning period, then the SWMD must provide compelling justification in its solid waste management plan for a longer implementation schedule.

3. The SWMD must ensure that there will be adequate infrastructure throughout the entire planning period covered by the solid waste management plan to give at least 90 percent of the residential population in each county of the SWMD the opportunity to recycle (unless the SWMD has demonstrated compliance with one or more of the alternative options identified in this section).

Alternative Demonstrations

The SWMD may obtain approval of a solid waste management plan that demonstrates that less than 90 percent of the population in each county of the SWMD will have the opportunity to recycle if the SWMD can demonstrate meeting one of the following three options:

Volume-based Disposal Option

A SWMD can demonstrate that:

- The largest community in a county is or will be served by a combined non-subscription curbside recycling program and volume-based trash collection program, and
- At least 80 percent of the total residential population in the county will have access to recycling infrastructure.

Volume-based (or unit-based) trash collection programs have proven to be one of the single most effective residential diversion program options available. They consistently divert significantly more material than traditional curbside programs and greatly outperform traditional drop-off programs. This option recognizes the diversion achieved by these types of programs is disproportional when compared to other types of residential programs, and therefore even if the percentage of people served is lower than the 90 percent standard, the actual diversion achieved will be greater.

Curbside Start-up Option

A SWMD can demonstrate that:

- The largest community (and, in limited situations, another large community in a county was not served by a non-subscription curbside recycling program in the reference year, but such a service will be implemented in that community;

[Note: If the largest community was served by a non-subscription curbside recycling program in the reference year, then this option shall also be available by establishing a non-subscription curbside recycling program in a community whose population comprises at least 15 percent of the county's total population.]

- For the first three years of the planning period, the SWMD can demonstrate that infrastructure will exist to provide the opportunity to recycle to a minimum of 80 percent of the total residential population in the county and;

- By the beginning of the fourth year of the planning period, the SWMD will provide opportunities to recycle to 90 percent of the population in that county.

This option allows a SWMD to devote the financial resources that would otherwise have been used to achieve the 90 percent standard to facilitate implementing the non-subscription curbside recycling program (such as purchasing collection containers, etc.).

Multi-County Option

A multi-county SWMD can demonstrate all of the following:

- The SWMD will provide recycling opportunities to no less than 90 percent of the total residential population of the entire SWMD.
- The SWMD will provide recycling opportunities to no less than 85 percent of the residential population (or the equivalent of one less drop-off than would be necessary to achieve 90 percent, whichever is greater) in each individual county.

For the purpose of achieving a more cost-effective collection system, this option gives multi-county SWMDs the ability to focus on increasing diversion in one county by eliminating some low-performing or high-cost portions of the infrastructure in other counties. The SWMD is expected to spend the money that would have been used to provide the low-performing/high-cost portions of the infrastructure on improving the existing infrastructure in other areas to achieve increased diversion.

Additional Components of the Demonstration

In addition to the previously outlined items, the SWMD must do the following in either the standard or an alternative demonstration:

1. Demonstrate that the SWMD will meet the applicable standards that are established in the Format for the remainder of the planning period.
2. Calculate the solid waste reduction and recycling rate for the residential/commercial sector. If a SWMD is achieving less than a 25 percent reduction and recycling rate, the SWMD must demonstrate that it will continue to make progress toward achieving Goal 2 by demonstrating annual increases in the reduction and recycling rate for the residential/commercial sector.

3. Demonstrate that commercial and institutional generators of solid waste have adequate opportunities to recycle solid waste.

4. Calculate the solid waste reduction and recycling rate for the industrial sector. A SWMD that has an industrial solid waste reduction and recycling rate of less than 66 percent must demonstrate that it will continue to make progress toward achieving Goal 2 by demonstrating annual increases in the reduction and recycling rate for the industrial sector.

5. Demonstrate that the SWMD will encourage participation in available recycling infrastructure. This can be accomplished through outreach and education programs and through incentive programs.

6. Demonstrate that the SWMD will maintain the required infrastructure throughout the entire planning period.

Technical Elements of the Demonstration

The following items are various technical elements required in the demonstration of meeting Goal 1. Additional information and details on these and other technical elements, as well as the demonstration as a whole, will be provided in the revised format that will be issued by Ohio EPA.

1. Components of the residential infrastructure (i.e. curbside programs and drop-off locations) must collect at least five materials from a list specified in the format.
2. The SWMD must demonstrate that the commercial sector has adequate opportunities to collect at least five materials from a list specified in the format.
3. “Credit” for various types of infrastructure will be specified in the format. Default values for curbside and drop-off programs will be provided. In addition, alternate methodologies of establishing participation in drop-off recycling opportunities will be provided, including a “tonnage model” and a survey methodology.
4. Minimum standards for drop-off locations used demonstrate meeting Goal 1 are as follows:
 - a. Residents can easily find and access the site.
 - b. Drop-off capacity meets the following minimum capacity standards (unless the SWMD can demonstrate that smaller capacity is adequate):
 - Rural drop-offs must provide a minimum of six cubic yards of capacity, and
 - Urban drop-offs must provide a minimum of 10 cubic yards of capacity.

- c. Signs are provided and are adequate to, at a minimum:
- Direct the public to the site or indicates the location of the site,
 - List the materials that are accepted, and
 - Provide days and hours of operation (particularly important if the site is not a full-time site that is available 24 hours per day, seven days per week).
- d. The SWMD has made a reasonable attempt to meet the demand of the population for use of the drop-off site (e.g., provides collection containers with adequate capacity to handle the use of the site, services the site frequently enough given the use of the site, etc.).

5. “Credit” for infrastructure in a community is limited to the population of an entire community, up to and including the entire credit for a drop-off that would be needed to achieve providing 100 percent of the residential population with access to recycling infrastructure.

Goal 2: Waste Reduction and Recycling Rates

The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/commercial sector and at least 66 percent of the solid waste generated by the industrial sector

Residential/Commercial Sector Component

A SWMD must demonstrate that it will reduce and recycle at least 25 percent of the solid waste generated by the SWMD’s residential/commercial sector by the third anniversary of the date the solid waste management plan was approved by Ohio EPA. The demonstration in the SWMD’s solid waste management plan must detail all existing and new programs that will allow the SWMD to achieve the 25 percent reduction and recycling rate.

A SWMD must also demonstrate that it will maintain a solid waste reduction and recycling rate of at least 25 percent for the remainder of the planning period covered by the approved solid waste management plan.

Industrial Sector Component

A SWMD must demonstrate that it will reduce and recycle at least 66 percent of the solid waste generated by the SWMD’s industrial sector by the

third anniversary of the date the solid waste management plan was approved by Ohio EPA. The demonstration in the SWMD’s solid waste management plan must detail all existing and new programs that will allow the SWMD to achieve the 66 percent reduction and recycling rate.

A SWMD must also demonstrate that it will maintain a solid waste reduction and recycling rate of at least 66 percent for the remainder of the planning period covered by the approved solid waste management plan.

A SWMD will have the ability to demonstrate that specific industrial solid wastes cannot be recycled thereby preventing the SWMD from being able to achieve the 66 percent reduction and recycling rate. Such a demonstration must prove that a particular solid waste is inherently “non-recyclable”. A successful demonstration must identify the non-recyclable solid waste(s) and explain why the solid waste is not or cannot be recycled. The SWMD must then demonstrate that at least 66 percent of the remaining industrial solid waste is or will be recycled by the third anniversary of the date the solid waste management plan was approved by Ohio EPA.

Relationship between Goals 1 and 2

Although SWMDs have the option of working toward an infrastructure-oriented goal by providing opportunities to recycle and encouraging participation in available infrastructure, doing so is intended to increase the amount of material being recycled. Thus, even if a SWMD designates Goal 1 in its solid waste management plan, the SWMD is still expected to make progress towards achieving Goal 2. Therefore, in its solid waste management plan, a SWMD that opts to demonstrate compliance with Goal 1 must also demonstrate that it will achieve increases in its residential/commercial sector reduction and recycling rate over the planning period.

At some time in the future, all SWMDs will be expected to demonstrate meeting a diversion goal. Providing infrastructure to meet Goal 1 is intended to achieve greater diversion. Under a future update of the state plan, Ohio EPA and SWAC will phase out Goal 1. Once that happens, a SWMD that establishes the infrastructure necessary to provide 90 percent of the residential population with the opportunity to recycle will be required to demonstrate compliance with a diversion goal in future solid waste management plan updates.

Additionally, while preparing the next update of the state plan, Ohio EPA and SWAC will evaluate whether to increase Ohio’s target residential/commercial recycling and reduction rate from 25 percent to 35 percent to match the United States Environmental Protection Agency’s (U.S. EPA) national target recycling rate.

Introduction to Goals 3 and 4

This update of the state plan restructures the education and awareness goals (Goals 3 and 4 from the 1995 and 2001 updates). This is the first update of the state plan since the 1995 update to include significant changes to Ohio's education and awareness goals.

Ohio's education and awareness goals have remained unchanged since they were originally established in the 1995 State Plan. The existing goals gave SWMDs maximum flexibility for determining what programs and strategies to provide in order to meet the goals. As a result, there is significant variability in SWMDs' approaches to providing education. The flexibility is beneficial because it gives SWMDs the ability to tailor their education strategies to the needs of their audiences. However, some of the tools that are necessary for effective outreach are not being provided statewide. The changes to the existing education and awareness goals are intended to create a minimum standard for outreach programming statewide (see Goal 3) while continuing to provide SWMDs with the flexibility for localized outreach and education (see Goal 4).

In the past, Ohio's educational efforts have focused on creating general "awareness" of recycling. This state plan refocuses the State's efforts on changing behavior through outreach. The overall purpose of Ohio's reduction and recycling requirements is to divert as much solid waste as possible to safe and appropriate alternative management options. Therefore, education and outreach efforts should be oriented toward achieving that purpose. The ultimate goal is to provide outreach that motivates people to recycle.

Another purpose behind the new outreach and education goal is to make the solid waste management plan development process more meaningful and useful. SWMDs will use a strategic planning process to develop their outreach and education programs. The aim is to increase the efficiency of the development process and the effectiveness of the resulting programming.

Goal 3: Outreach and Education- Minimum Required Programs

***The SWMD shall provide the following required programs:
a Web site;***

***a comprehensive resource guide;
an inventory of available infrastructure; and
a speaker or presenter.***

Most SWMDs provide a wide variety of outreach and education resources and activities. In order to ensure that essential, basic outreach programs are provided consistently statewide, this update of the state plan requires all SWMDs to provide at a minimum the following four programs:

Web Site – The SWMD shall create and maintain a Web site to provide, at a minimum, basic information about the recycling infrastructure in the SWMD.

Comprehensive Resource Guide – The SWMD shall prepare, regularly update, and make available a compilation of reduction and recycling outlets for specific materials. This guide is intended to be used to provide referrals to interested parties that are looking for alternative management options for specific wastes. For example, the resource guide shall identify where residents and businesses can recycle unwanted items such as clothing, used oil, compact fluorescent bulbs, home renovation items, household hazardous waste, electronic waste, etc.

Infrastructure Inventory – The SWMD shall maintain and make available up-to-date information about the basic solid waste recycling and management infrastructure in the counties that comprise the SWMD. This information shall include but is not limited to curbside recycling programs, drop-off recycling locations, composting facilities, yard waste collection programs, hauler-provided recycling programs, material recovery facilities, and recycling centers.

Speaker/Presenter – The SWMD shall either employ or have readily available someone who can function as a speaker or presenter when needed.

Goal 4: Outreach and Education- Outreach Plan and General Requirements

The SWMD shall provide education, outreach, marketing and technical assistance regarding reduction, recycling, composting, reuse and other alternative waste management methods to identified target audiences using best practices.

Outreach and Marketing Plan

Each SWMD will develop an outreach and marketing plan. This outreach and marketing plan will be the SWMD's strategic plan for providing outreach and education.

There are three components that all SWMDs shall incorporate into their outreach and marketing plans. These components are:

1. Each SWMD will address specified target audiences;
2. Each SWMD will follow basic best practices when developing outreach programs; and,
3. Each SWMD will select an outreach priority and provide programs to all appropriate audiences in the context of the priority.

Each of these components is explained below under a heading corresponding to the component. Following these explanations is a discussion regarding the development and selection of programs.

Target Audiences

Each SWMD's outreach and marketing plan will address five target audiences, as follows:

1. Residents;
2. Schools;
3. Industries;
4. Institutions and Commercial Businesses; and
5. Communities and Elected Officials.

The composition of each target audience will be defined in the Format.

A SWMD will have the ability to demonstrate that outreach to a particular target audience is not needed if that audience does not constitute a significant presence in the SWMD. For example, a SWMD without a large industrial sector may not need to include outreach programs for industrial generators in its outreach and marketing plan. A SWMD with multiple counties may have different target audiences in each county depending upon the presence or absence of the audiences in each county.

Best Practices

When selecting programs and strategies to address each audience, the SWMD will adhere to the following best practices:

1. Be familiar with the solid waste management infrastructure.

Understanding the solid waste management infrastructure, particularly the reduction and recycling infrastructure, is crucial to understanding how outreach can be the most effective.

2. Provide outreach within the context of the infrastructure.

The central message of the outreach and marketing plan will depend upon the existing infrastructure. The ultimate goal of the outreach and marketing plan is to increase the amount of material diverted from disposal within the SWMD by changing behavior. However, it is not possible for people to divert material if the necessary infrastructure is not available. Thus, if a SWMD lacks infrastructure, then the outreach and education programs should be focused on getting that infrastructure established. If the SWMD has adequate infrastructure, then the programs should be focused on getting residents, businesses, and institutions to use the infrastructure.

3. Develop and implement outreach effectively by:

- Having measurable outcomes to achieve;
- Understanding the different needs of different audiences;
- Using a consistently and frequently repeated message;
- Focusing on changing behavior not just creating awareness; and
- Evaluating the results to determine if the program is achieving the desired outcome.

Outreach Priority

In addition to specifying the programs to be provided for each target audience, SWMDs will select an outreach priority and will provide programs to all appropriate target audiences in the context of the chosen priority.

In the process of developing its solid waste management plan, a SWMD will perform a needs assessment. This needs assessment will lead SWMDs through the process of analyzing the existing solid waste management infrastructure and identifying underserved audiences and/or program weaknesses. Ohio EPA will provide the process for the needs assessment in the Format.

The results of the needs assessment can help the SWMD identify the outreach priority for the outreach and marketing plan. The outreach priority can be one of the improvements that the SWMD determines it needs to make, a goal that the SWMD wants to achieve, or another priority that the SWMD identifies. The SWMD's outreach and marketing plan will specify the affected audiences and the strategies the SWMD will use to address the priority. The outreach programs will be designed to change the behaviors of the target audiences to accomplish the desired result. The SWMD's outreach priority may change over the planning period of its solid waste management plan.

Developing and Selecting Programs

A SWMD will have the option of developing its own outreach programs and/or selecting programs from a compilation of programs that will be developed by Ohio EPA. This compilation will consist of outreach and education programs that have successfully resulted in changing reduction and recycling behavior. These “model” programs will be programs that have been implemented by other SWMDs in Ohio, and the implementing SWMD has information documenting the success of the program. By providing these programs as models, Ohio EPA has determined that these programs meet the requirements of Goal 4 provided the programs are implemented effectively. Although these programs can meet the requirements of Goal 4, ensuring success will mean that the SWMD will need to adapt the program to that SWMD’s specific local circumstances.

The purpose of the compilation of model programs is to simplify the solid waste management plan preparation process by giving SWMDs the ability to select proven programs rather than research and develop new programs.

All SWMDs will retain the ability to develop their own outreach programs, and no SWMDs will be required to implement any model programs. Regardless of whether a SWMD develops its own programs or selects programs from the compilation of model programs, development and selection of programs will occur within the context of the best practices.

Goal 5: Restricted Solid Wastes, Household Hazardous Waste (HHW) and Electronics

The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, household hazardous waste and obsolete/end-of-life electronic devices.

SWMDs are required to provide strategies regarding the management of solid wastes that are restricted from disposal in solid waste facilities. There are three materials currently restricted from disposal in solid waste landfills facilities. These materials are scrap tires, yard waste, and lead-acid batteries. In addition, SWMDs are required to provide residents with strategies that address HHW and end-of-life/obsolete electronic devices. For more information regarding Ohio’s material restrictions, see Chapter 4.

The specific programs and strategies that a SWMD chooses to implement are at the discretion of the SWMD. However, each SWMD must, in its solid waste management plan, demonstrate that it does or will provide programs to address all five wastes listed in this goal. More details regarding the types of programs provided by SWMDs are provided in Chapters 2, 4, 7, and 8.

Goal 6: Economic Incentives

The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

Despite the availability of opportunities to participate in recycling and reduction programs and outreach regarding those opportunities, recycling behavior is heavily influenced by economic incentives and disincentives. For this reason, it is important that SWMDs continue to explore methods of increasing participation through economic incentives or the removal of economic disincentives.

Therefore, SWMDs are required to evaluate how economic incentives could be incorporated into their programs and activities. While this evaluation will not obligate a SWMD to implement an incentive-based program, it is expected that the information obtained through the evaluation will be considered by the SWMD as it develops future programs.

Potential financial incentives include volume-based collection rates (i.e. Pay-As-You-Throw (PAYT) programs), incentive-based grant programs, rewards for recycling (such as RecycleBank), and reducing the costs for residents to recycle.

Goal 7: Measure Greenhouse Gas Reduction

The SWMD will use U.S. EPA’s Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Greenhouse gases are gases that trap heat in the atmosphere. Some greenhouse gases, such as carbon dioxide, occur naturally and are emitted to the atmosphere through both natural processes and human activities. Other greenhouse gases, such as fluorinated gases, are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are:

- Carbon Dioxide (CO₂):
- Methane (CH₄):
- Nitrous Oxide (N₂O):
- Fluorinated Gases.¹¹

Greenhouse gases are generated as a result of activities that support our quality of life, like using energy, growing food, raising livestock, and managing waste. It is believed that most of the global warming in recent decades is the result of greenhouse gases created by human activities. Greenhouse gas emissions can be minimized through simple measures, including using energy saving technologies such as compact fluorescent light bulbs and energy-efficient appliances, proper automobile maintenance, and reducing and recycling waste.

Unfortunately, generating waste which must be managed is one of the consequences of our lifestyle, and a large portion of that waste is disposed of in landfill facilities. According to U.S. EPA, landfills are the largest human-related source of methane in the U.S., accounting for 34 percent of all methane emissions.¹² Even though methane accounts for less than 10 percent of all greenhouse gas emissions¹³, it is at least 20 times more effective than carbon dioxide at trapping heat in the atmosphere.¹⁴ The potency of methane as a greenhouse gas makes reducing and recycling waste even more paramount.

U.S. EPA's WARM is designed to help solid waste management professionals track and voluntarily report reductions in greenhouse gas emissions based on the management practices that are used to manage waste (i.e. source reduction, recycling, combustion, composting, and landfilling). WARM calculates and totals greenhouse gas emissions based on existing waste management practices (i.e. "business as usual" scenario) and implementing alternative waste management practices. Thus, WARM is used to measure the effects on greenhouse emissions after implementing alternative waste management practices.

WARM calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent (MTCO₂E), and energy units (million BTU) across a wide range of material types commonly found in municipal solid waste (MSW).¹⁵

SWMDs can use the results of WARM as a tool to promote the benefits of recycling programs as well as to advertise the success of recycling programs.

Goal 8 (optional): Market Development

The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Having adequate demand and strong markets for recyclable materials are widely acknowledged as critical components for the success of recycling programs. "Closing the loop" by purchasing products that are made from recovered materials creates the strong markets that make providing recycling programs possible.

Many markets for recovered materials are global in nature. However, waste management professionals widely recognize that localized efforts to stimulate markets for recovered materials can positively affect those markets at both the local and regional levels as well. For this reason, SWMDs are encouraged to conduct market development activities to promote the use of recycled products and to develop local markets for recovered materials. However, providing a market development strategy is not a mandatory element of a SWMD's solid waste management plan.

Examples of strategies geared towards this goal include: compilation and distribution of lists of vendors that sell products made from recycled materials; development of policies that favor recycled-content products for government purchasing programs; grant programs for the purchase of recycled-content items; grants and loans to businesses that use recovered materials in their processes or products, and funding research and development projects. For more discussion concerning potential market development activities, please see Chapter 9.

Goal 9: Reporting

The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

SWMDs shall annually submit an annual district report (ADR) to Ohio EPA on a form that is prescribed by Ohio EPA. Through the ADR, each SWMD shall describe the status of the programs and activities listed in the implementation schedule of the plan and

the progress made toward the reduction objectives. Completing the ADR will require the SWMD to provide:

- (a) a detailed report on the status of the ongoing, new and proposed facilities, programs, and activities listed in the implementation schedule of the approved solid waste management plan;
- (b) an inventory of the alternative management methods available in the district and the types and quantities of municipal solid waste, yard waste, and industrial solid waste managed through alternate methods such as recycling, reuse, or minimization for the year;
- (c) an identification of source reduction activities that occurred during the year;
- (d) an identification of quantities of waste generated in the district that were disposed of at out-of-state landfills;
- (e) including copies of revisions or additions to rules adopted under ORC 343.02;
- (f) an inventory of municipalities and townships that levy a host community fee under ORC 343.01 (G); and
- (g) an evaluation of the effectiveness of special collection events (such as for HHW, appliances, and scrap tires) and a report on the results of a SWMD's special collection events, including the types and quantities of wastes collected, recycled, or disposed of.

The key components necessary to achieve this goal are the programs that SWMDs implement in order to meet Goal 1 and Goal 2. The state of Ohio's government agencies will contribute to achieving a 50 percent WRRR by implementing the strategies described in the next section.

State Recycling and Reduction Goal

Reduce and/or recycle at least 50 percent of the solid waste generated in Ohio.

State Strategies

The following 11 strategies will be implemented by Ohio's state agencies during implementation of this state plan.

Strategy 1: Continue to provide financial assistance through the Ohio Department of Natural Resources (ODNR) to:

- Ohio's local governments that propose to design and establish projects involved in the collection and processing of recyclable materials;
- Ohio's businesses that propose to create the infrastructure necessary for successful markets of recyclable materials and related products; and,
- Ohio's local governments, businesses, schools, colleges, and non-profit organizations for projects that utilize scrap tires.

Strategy 2: Explore means of obtaining improved reporting on the part of industrial generators.

As part of their annual reporting requirements, SWMDs must report the quantities of materials that were recovered during the previous year. This requires that SWMDs survey the entities that generate, collect, process, and use recyclable materials. Those entities are not legally obligated to provide information to the SWMDs. Thus, any information those entities provide is given on a purely voluntarily basis. Consequently, it is often difficult for SWMDs to obtain the necessary data. This is particularly true for industrial waste generators.

Ohio EPA will explore ways that the Agency can facilitate collecting data from industrial generators to improve not only the quality of data that is received but also the ease of obtaining the data.

Strategy 3: Study existing curbside recycling programs to determine factors that make curbside programs successful as well as define typical costs and expected participation rates.

As a companion to the drop-off study that Ohio EPA completed in 2004, Ohio EPA will continue to evaluate the effectiveness of curbside recycling programs in Ohio. Ohio EPA began this study in 2008 but was in the initial stages at the time this revision of the state plan was adopted. Ohio EPA will make the

findings of its evaluation available at the conclusion of the study.

Strategy 4: Publish the *Facility Data Report* every other year and *Solid Waste Management in Ohio - Recycling, Reduction, Waste Generation & Disposal* every three years. In years when full reports are not published, Ohio EPA will make the data used for both reports available.

Ohio EPA recognizes that the data and information provided in these reports is helpful to SWMDs. Thus, Ohio EPA believes that it is necessary to continue to make these reports available to the extent possible. However, preparation the full reports is extremely time consuming. Therefore, Ohio EPA will publish both reports periodically but will make the data available annually via the Agency's Web site.

Strategy 5: Ohio EPA and ODNR will work with the Ohio Department of Administrative Services to incorporate recycling services into the service contracts for Ohio's state government agency office buildings.

Strategy 6: Ohio EPA and ODNR will coordinate solid waste planning between both agencies.

Ohio EPA and ODNR will continue to explore ways that the two agencies can better communicate and work together to achieve Ohio's recycling goals. This may involve regular meetings between both agencies. It may also involve developing closer links between ODNR's grant programs and the SWMD planning process.

Strategy 7: Ohio EPA will conduct an annual survey of material recovery facilities (MRFs) and distribute the results of the survey to appropriate SWMDs.

In an effort to relieve some of the SWMD's burden of surveying, Ohio EPA will continue to request information from at least those MRFs that accept recyclable materials from multiple SWMDs or counties. Ohio EPA will make this data available to the appropriate SWMDs in a timely manner.

Strategy 8: Continue to investigate and support programs to divert organic materials from disposal in landfill facilities, including the following:

- Anaerobic digesters;
- Food waste composting; and,
- Yard waste composting.

Strategy 9: To the extent possible, Ohio EPA will facilitate implementing technologies that use waste to produce energy.

To fulfill this strategy, Ohio EPA will investigate ways to streamline permitting and regulatory oversight of waste-to-energy facilities. Ohio EPA will further investigate ways of overcoming the environmental regulatory barriers that are discussed in Chapter X. ODNR will evaluate funding waste-to-energy projects through the Market Development Grant program.

Strategy 10: Ohio EPA will monitor and evaluate the impacts of landfills in Ohio on greenhouse gas emissions.

Strategy 11: Ohio EPA will continue to explore ways to reduce fugitive landfill gas emissions and increase Ohio's utilization of landfill gas for energy recovery

Footnotes

¹¹ U. S. EPA, "Greenhouse Gas Overview," *Greenhouse Gas Emissions*, <http://epa.gov/climatechange/emissions/index.html> (August 28, 2009).

¹² U. S. EPA, "Sources and Emissions," *Methane*, <http://www.epa.gov/methane/sources.html> (August. 28, 2009).

¹³ Energy Information Administration, "Figure 1: U.S. Greenhouse Gas Emissions by Gas, 2007," *Emissions of Greenhouse Gases Report*, <http://www.eia.doe.gov/oiaf/1605/ggrrpt/index.html> (December 3, 2008).

¹⁴ US Climate Change Science Program, "CCSP Research Highlight 1," *Methane as a Greenhouse Gas*, <http://www.climatechange.gov/infosheets/highlight1/default.html> (January 2006).

¹⁵ U.S. EPA, *Waste Reduction Model (WARM)*, http://epa.gov/climatechange/wycd/waste/calculators/Warm_home.html (August, 2008).

Chapter 4

Restrictions on the Types of Solid Waste Disposed in Landfills and Burned in Incinerators

Ohio Revised Code (ORC) Section 3734.50(C) requires the state solid waste management plan to “Establish restrictions on the types of solid wastes disposed by landfilling for which alternative management methods are available, such as yard wastes, and a schedule for implementing those restrictions...restrictions under this division need not be of uniform application throughout the state or as to categories of solid waste generators. Rather, in establishing those objectives and restrictions, the director shall take into consideration the feasibility of waste reduction, recycling, reuse, and minimization measures and landfilling restrictions in urban, suburban, and rural areas and also shall take into consideration the extent to which those measures have been implemented by specific categories of solid waste generators and political subdivisions prior to June 24, 1988.”

Introduction

In the late 1980s, Ohio’s General Assembly recognized that regulatory-based measures needed to be available to help direct wastes away from disposal in landfills. As a result, the General Assembly incorporated the provision cited above into House Bill 592. By doing so, the General Assembly gave the Ohio Environmental Protection Agency (Ohio EPA), working with the Solid Waste Management Advisory Council (SWAC), the authority to determine if specific solid wastes should be restricted from disposal because more appropriate, alternative management methods exist. By establishing disposal restrictions on these wastes, Ohio EPA and SWAC, through the state solid waste management plan (state plan), can facilitate the flow of restricted wastes to the alternative management options.

In the spirit of House Bill 592, Ohio EPA and SWAC recommended comprehensive disposal restrictions for four wastes in the first state plan, the *1989 State Solid Waste Management Plan* (1989 State Plan). These wastes were yard waste, scrap tires, lead-acid batteries, and used oil. Looking forward to 2008, Ohio currently has restrictions on disposing of three out of the four materials: scrap tires, source-separated yard waste, and lead-acid batteries.

While all of Ohio’s current solid waste disposal restrictions were recommended in the 1989 State Plan, implementation of those restrictions did not occur as originally envisioned. The restriction for

used oil was never implemented. [See the explanation associated with each material for more details regarding implementation of the restriction.]

As a result of Ohio’s experiences with developing the yard waste ban (see text box on page 4), Ohio EPA changed its philosophy regarding disposal restrictions. This changed philosophy was incorporated into the *1995 State Solid Waste Management Plan* (1995 State Plan). Thus, rather than focus on strict prohibitions, the 1995 State Plan emphasized creating non-regulatory strategies to divert materials from disposal. The only exception involved scrap tires. Ohio EPA and SWAC continued to support a full-scale ban on the disposal of scrap tires.

The 1995 State Plan fostered the creation of detection programs at solid waste management facilities for yard waste and, to some extent, for lead-acid batteries. The 1995 State Plan also required solid waste management districts (SWMDs) to provide, at a minimum, education and outreach programs to inform residents of available alternative management options for lead-acid batteries, yard waste, and scrap tires. The 2001 revision of the state plan (2001 State Plan) continued this focus on education and outreach as does this revision.

Nature of Disposal Restrictions

In addition to the restrictions recommended in the state plan, the solid waste rules prohibit disposing of a number of other wastes in solid waste facilities (e.g., hazardous waste, polychlorinated biphenyls (PCBs), infectious waste, radioactive waste, and friable asbestos). These prohibitions are based upon the increased threat to public health and safety or to the environment posed by the materials when disposed of in facilities. The disposal restrictions envisioned by House Bill 592 represent a departure from traditional prohibitions under Ohio’s solid waste program. The restrictions established in the state plan are, for the most part, intended to save landfill space and direct reusable and recyclable resources to more productive outlets. For example, there is little to no increased threat created by disposing of yard waste in engineered landfill facilities. However, when composted, yard waste becomes a reusable material rather than a wasted resource when disposed of in landfill facilities. Consequently, the primary purpose of the material restrictions is to force the management of restricted materials through alternative means.

The lead-acid battery and scrap tire restrictions are a combination of both restriction types. Lead-acid batteries do contain hazardous constituents that are better managed outside of a landfill. Lead-acid batteries are also highly recyclable, and numerous outlets for recycling lead-acid batteries existed at the time the restriction was implemented. Scrap tires are difficult to manage in a landfill and represent a source of reusable rubber and steel. Therefore, even though an extensive system for recycling scrap tires did not exist at the time the restriction was established, such a system has developed.

Because material restrictions envisioned for the state plan are not necessarily based upon threats to humans and the environment, evaluation of potential restrictions requires a specific approach that considers the potential ramifications of the restrictions. The potential to harm humans and the environment are factors that Ohio EPA considers when evaluating a material for a disposal restriction. However, for purposes of the state plan, the approach for evaluating disposal restrictions typically takes the following factors into consideration:

- The volume of the specific waste versus the total volume of waste disposed of at landfills;
- The toxicity of the waste and the threat it poses to human health and the environment;
- Costs and benefits of alternative management options;
- Effect upon recycling activities, generators, and management costs; and,
- Availability of and potential for alternative management options.

Ohio's Disposal Restrictions

Each of Ohio's current material restrictions are discussed below under headings corresponding to each material – yard waste, lead-acid batteries, and scrap tires. The used oil restriction, although never implemented, is also discussed.

Yard Waste

The 1989 State Plan was prepared with a recommendation that, by December 1, 1993, yard waste be banned from being disposed of in municipal solid waste (MSW) landfills and burned in solid waste incinerators.

Toxicity and contamination are generally not considered to be issues with disposing of yard waste in landfills. Once placed in a landfill, yard waste can contribute to the production of methane gas and leachate. However, the main reason for the yard waste restriction was to preserve landfill capacity.

Yard waste can comprise as much as 20 percent of MSW generated. Furthermore, yard waste is easily managed through composting facilities, both on residential properties and at centralized facilities. The resulting compost is a valuable product. Restricting yard waste from the solid waste stream also can have positive effects for incineration. The moisture content of solid waste tends to be lower after removing yard waste. The result is greater combustion efficiency and control over combustion temperatures. Consequently, SWAC and Ohio EPA supported a full-scale ban on the disposal and incineration of yard waste in Ohio.

While the ban on incinerating yard waste at solid waste incinerators took effect in 1991, a comprehensive ban on disposal of yard waste at solid waste landfill facilities was not implemented. Regulations implementing a modified yard waste restriction were adopted on September 13, 1994 and became effective February 1, 1995.

The yard waste restriction that was implemented in 1995, and that Ohio currently operates under, bans source-separated yard waste from being disposed of in solid waste landfill facilities. The specifics of the yard waste restriction are presented in Appendix F. Yard waste mixed with other waste by the generator of the yard waste is not banned from disposal in solid waste landfill facilities. In order to encourage the separation of yard waste from solid waste, disposal facility operators are required to take actions to limit the amount of yard waste accepted for disposal. To do this, owners and operators of disposal facilities are required to implement procedures to identify and refuse loads of source-separated yard waste and to promote alternative management of yard waste by distributing educational materials.

As was explained in the text box on page 4, the chief obstacle to implementing a full-scale disposal restriction on yard waste is the focus of Ohio's solid waste regulations on solid waste disposal facilities. As a result, for most types of solid waste, Ohio EPA has the authority to regulate only disposal facilities. Ohio EPA's authority does not extend to generators and transporters of solid waste. The only exception is in the scrap tire regulatory program where Ohio EPA does regulate generators and transporters of scrap tires as well as owners and operators of management facilities. Owners and operators of landfill facilities have no control over whether a home owner disposes of yard waste in a trash can with other waste. Thus, it is not as effective to prohibit the disposal of restricted materials when it is an unregulated entity that controls whether the restricted material is source separated or mixed with other waste.

Ohio's Experiences with Implementing Material Restrictions

Implementation Issues

The 1989 State Plan envisioned that Ohio's material restrictions would be comprehensive and would prevent all restricted materials from being disposed and incinerated. However, this expectation was impossible to fulfill as implementation of the restrictions proceeded, particularly for yard waste. The chief obstacle to full-scale material restrictions is the focus of Ohio's solid waste regulatory program on facilities at the exclusion of generators and transporters. [The scrap tire program is an exception because Ohio's General Assembly gave Ohio EPA the authority to regulate generators, transporters, and facility owners and operators.] Without the ability to prevent generators from putting restricted wastes in their trash, a disposal restriction cannot keep all yard waste out of trash. Facility owners and operators have little to no control over what materials end up in the loads that are delivered for disposal. Once restricted materials are placed in mixed solid waste, it is not possible to prevent those materials from being disposed in landfill facilities.

The current material restrictions are contained in rules governing operational criteria for each type of licensed solid waste facility (landfill, transfer facility, incinerator, and composting facility). This gives Ohio EPA and local health departments the ability to enforce the facility owner's or operator's obligations to implement the restrictions. When the regulations prohibit the receipt of a specific waste (e.g., whole or shredded tires, source separated yard waste, lead-acid batteries), Ohio EPA or the local health department may cite the owner or operator of the facility for a violation of the applicable rule for accepting the prohibited waste. Additionally, Ohio EPA may take the appropriate enforcement action against the owner or operator of the facility in accordance with ORC Chapter 3734 and Ohio Administrative Code (OAC) Chapter 3745-27.

As Ohio EPA developed rule language for implementing the restrictions, especially for yard waste, Ohio's regulatory control of each component of waste management became an important issue. Ohio EPA has no authority under Ohio law to regulate either the generators or transporters of solid waste, including yard waste. In determining the appropriate regulatory structure for the restrictions specified in the 1989 State Plan, Ohio EPA also evaluated the potential environmental risk associated with disposing of each material in landfills and/or incinerators. Both of these issues were primary considerations in developing the yard waste restrictions and were also considered when restrictions were established for scrap tires and lead-acid batteries. For these reasons, a number of delays were experienced in implementing the disposal restrictions according to the timelines prescribed by the 1989 State Plan.

No Regulatory Authority over Generators or Transporters of Solid Waste

Ohio EPA's statutory authority extends to regulating solid waste facilities (landfill, transfer, incinerator, and composting) and enforcement against open dumping and open burning of solid waste. This authority does not extend to transporters or generators of solid waste. Because Ohio EPA cannot cite a violation or take enforcement against a generator for placing yard waste in with solid waste or against the transporter for taking yard waste to a solid waste facility, it is not possible to develop a compliance program for a comprehensive yard waste restriction. In fact, Ohio's solid waste law inherently places an obligation on generators and transporters of solid waste to dispose of all solid waste in permitted and licensed solid waste facilities if the solid waste is not recycled or otherwise managed through alternative means.

Given the limitations in Ohio's solid waste law, Ohio EPA cannot require generators to separate specific waste materials, including yard waste, from their general solid waste or require transporters to take specific materials to particular types of facilities, such as composting facilities. In fact, there is no law in Ohio that mandates generators to source separate any wastes, including yard waste. Once the generator places yard waste in with his/her general trash, the restriction cannot be effective.

Ohio EPA regulates the last step in the waste management process – the management facilities. Strictly prohibiting a landfill owner or operator from accepting yard waste that generators can legally mix with garbage and that transporters can take to a solid waste facility is difficult because the owner or operator of the landfill may not have effective management control over the transporter or the transporter's customers. The best action owners and operators of solid waste facilities can take is to provide outreach to transporters about keeping yard waste separate from trash during collection. Transporters can provide education to their residential customers about keeping yard waste separate from trash. Solid waste containing yard waste that is imported from other states without yard waste restrictions further compounds the landfill owner's or operator's ability to limit acceptance and disposal of yard waste.

The result of Ohio EPA's authority is that the Agency cannot ensure that generators and transporters will keep yard waste from becoming mixed with general trash before being delivered to the appropriate solid waste facility. This is a critical issue because owners and operators of yard waste composting facilities (i.e., Class IV composting facilities) can legally accept only source-separated yard waste.

Ohio EPA's rules regarding the yard waste restriction are intended to ensure that the owner or operator of a solid waste landfill, transfer, or incinerator facility identifies the transporter of source-separated yard waste and provides the transporter with information regarding the locations of nearby yard waste composting facilities. The rules further make it illegal for the owner or operator of a landfill, transfer, or incinerator to accept source-separated yard waste (except under very specific circumstances).

It is critical that Ohio EPA coordinate implementation of disposal restrictions with local authorities and ensure that adequate alternative management capacity exists statewide to recycle or otherwise manage the restricted materials.

Lead-Acid Batteries

As is illustrated in the text box to the right, discarded lead-acid batteries continue to be a source of valuable recyclable materials. In 1989, at the time the material restriction was proposed, a strong recycling infrastructure for lead-acid batteries already existed, and the percentage of discarded lead-acid batteries being recycled was already significant. Also, lead-acid batteries pose environmental threats when disposed of in MSW landfill facilities due to the potential for lead to leach into ground and surface waters. Lead-acid batteries also increase the lead content of ash generated by municipal incinerator and waste-to-energy facilities. For all of these reasons, it made sense for Ohio to adopt a lead-acid battery disposal restriction.

In the 1989 State Plan, Ohio EPA and SWAC envisioned that the restriction on disposing of lead-acid batteries in landfills and incinerators would be in place by January 1, 1993. Rules banning lead-acid batteries from solid waste incinerators actually became effective on May 31, 1991. Although not recommended by the 1989 State Plan, a ban on accepting lead-acid batteries at solid waste transfer facilities became effective on October 31, 1993. As is explained in the following paragraphs, the ban on disposing of lead-acid batteries in MSW landfills was not implemented until April 25, 2008.

The 1995 State Plan directed Ohio EPA to promulgate regulations requiring landfill owners and operators to implement lead-acid battery detection and education. When Ohio EPA began addressing this obligation, it became clear that those regulations were not necessary as the majority of lead-acid batteries were already being recycled. Thus, SWAC advised Ohio EPA to monitor the lead-acid battery industry. If a shift from recycling to disposal was observed, then regulations might be warranted.

In 2007, at the behest of Battery Council International, House Bill 169 was introduced into Ohio's General Assembly with the intent of establishing a true lead-acid battery disposal restriction. House Bill 169 was drafted using model battery recycling legislation that had been developed by Battery Council International, the trade organization for the lead-acid battery industry. For that reason, House Bill 169 was supported by the lead-acid battery industry.

The model legislation was developed for two reasons. The first and primary reason was to promote consistency of disposal restrictions throughout the United States. The second intention was to redirect the small percentage of batteries currently being disposed of to recycling.

Due to the number of states adopting disposal bans on lead-acid batteries, the lead-acid battery industry was concerned about having to comply with different requirements from one state to another. The model legislation is an attempt to overcome those

concerns. To accomplish its goal of nationwide consistency, Battery Council International is encouraging all states to adopt the model legislation. Prior to Ohio's ban, 43 states had instituted lead-acid battery disposal bans. Of those, 38 had adopted bans based on the model legislation thereby creating a consistent lead-acid battery disposal ban in all of those states.¹⁶ Ohio adopted its legislation in January 2008, and the disposal ban became effective on April 25, 2008.

Generation and Recycling of Lead-Acid Batteries

Lead-acid batteries represent the largest single largest source of lead among all products manufactured in the United States. In fact, the Battery Council International reports that more than 80 percent of the lead produced in the United States is used in lead-acid batteries.^a Given the environmental and health concerns with lead, it is not surprising that lead-acid batteries are targeted by recycling programs and are the subject of many disposal restrictions nationwide.

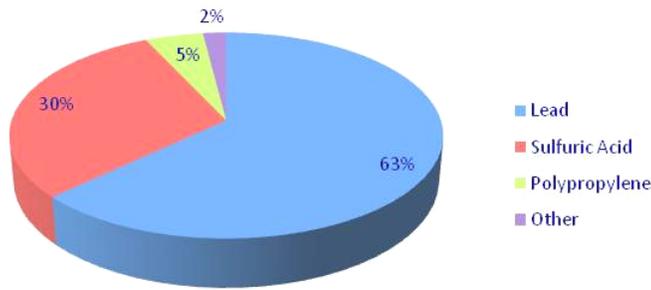
According to the United States Environmental Protection Agency (U.S. EPA), lead-acid batteries comprise approximately one percent of total MSW generated. This amounted to 2.54 million tons of lead-acid batteries entering the MSW stream in 2007. Of those batteries, U.S. EPA estimates that a little more than 99 percent were recovered resulting in a little more than 1.2 million tons of lead being recovered. Furthermore, U.S. EPA reports that of all metal products recovered from MSW, lead from lead acid batteries comprised almost 17 percent in 2007.^b

The high recovery rate for lead-acid batteries is largely the result of a successful partnership among the lead-acid battery industry and retail establishments to provide the necessary infrastructure. Almost every retailer that sells new lead-acid batteries accepts old batteries and channels those batteries to reclaimers/recyclers who in turn supply manufacturers of lead-acid batteries.

As is illustrated in the chart on the next page, a lead-acid battery consists primarily of lead metal and metal oxide (63 percent), dilute sulfuric acid (30 percent), and polypropylene (5 percent). Of the lead in a lead-acid battery, 40 percent is in metal form and 60 percent is in oxide form. The polypropylene is found in the casing and, in some batteries, in cell separators.^c All three of those components are recycled from end-of-life batteries. In fact, newly manufactured lead-acid batteries contain anywhere from 60 to 80 percent recycled lead and plastic. Furthermore, the lead can be recycled indefinitely, and the plastic can be used many times to manufacture new battery casings or other plastic products. The sulfuric acid is either neutralized and discharged to a sewer system or converted to sodium sulfate and used in laundry detergent and in glass and textile manufacturing.^d

The system for recycling lead-acid batteries may serve as a model for recycling programs for other hard-to-manage materials. Furthermore, the high recycling rate for lead-acid batteries demonstrates that when manufacturers of a product take a stewardship role in helping to manage end-of-life products, a successful program can result without placing the burden for the program on local governments or consumers.

Figure 4-1: Composition of a Lead-acid Battery^e



Sources:

^a Battery Council International, *Lead Acid Batteries and the Environment*, <http://www.leadacidbatteryinfo.org/environment.htm> (July 30, 2008).

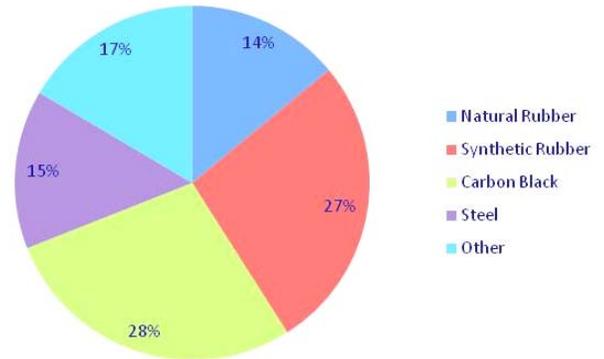
^b *Municipal Solid Waste*, 6.

^c Ulrich Hoffman. *Requirements for Environmentally Sound and Economically Viable Management of Lead as Important Natural Resource and Hazardous Waste in the Wake of Trade Restrictions on Secondary Lead by Decision III/1 of the Basel Convention: The Case of Used Lead-acid Batteries in the Philippines*, (UNCTAD Draft Study), July 1999), 4.

^d <http://www.leadacidbatteryinfo.org/environment.htm>

^e Hoffman, 4.

Figure 4-2: Composition of a Scrap Tire¹⁷



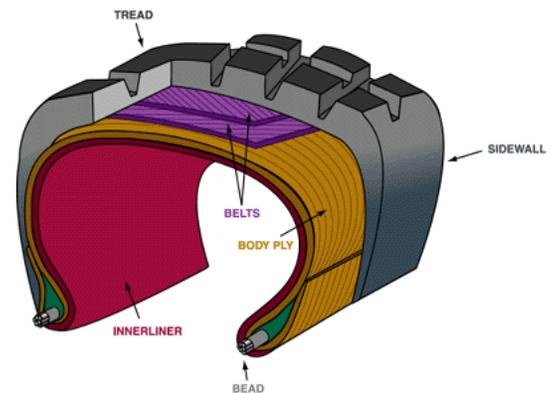
In 1993, Ohio's General Assembly adopted Senate Bill 165 which became effective on October 29, 1993. This law gave Ohio EPA the authority to implement the disposal ban on scrap tires. Unlike Ohio's yard waste restriction program, the scrap tire law afforded Ohio EPA the authority to regulate all entities involved in the scrap tire waste stream, including transporters and, to some extent, generators. Consequently, Ohio EPA had the authority to develop a comprehensive disposal ban as envisioned in the 1989 State Plan. The scrap tire regulations went into effect on March 1, 1996, along with the ban on the disposal of whole scrap tires at solid waste landfill facilities and incinerators. The ban on shredded scrap tires at solid waste landfills and incinerators went into effect on March 1, 1997. For more information regarding Ohio's scrap tire management program and regulations, see Chapter 7.

Scrap Tires

In the 1989 State Plan, the recommendation for restricting scrap tires from disposal was primarily meant to eliminate problems involved with disposing of scrap tires in solid waste landfills. There was a limited infrastructure available for managing scrap tires outside of MSW landfills at the time that SWAC and Ohio EPA recommended the disposal restriction. However, whole scrap tires are difficult to manage in landfills because they do not compact, they trap gas, and they migrate to the surface where they disturb the cap system thereby allowing water to enter the landfill and produce leachate. In addition to these environmental concerns, Ohio EPA and SWAC recognized the potential that scrap tires represent as a commodity. The composition of a scrap tire is presented in Figure 4-2, and the structure of a scrap tire is illustrated in Figure 4-3.

In the 1989 State Plan, Ohio EPA and SWAC envisioned that whole scrap tires would be banned from solid waste landfills by January 1, 1993 and that shredded scrap tires would be banned by January 1, 1995.

Figure 4-3: Structure of a Scrap Tire¹⁸
What's Inside A Tire?



TREAD: Provides traction and cornering grip

BELTS: Stabilize and strengthen the tread

SIDEWALL: Protects the side of the tire from road and curb damage

BODY PLY: Gives the tire strength and flexibility

BEAD: Assures an air-tight fit with the wheel

INNERLINER: Keeps air inside the tire

The restriction on disposing of scrap tires in solid waste landfill facilities has helped Ohio achieve one of the most successful tire management programs in the United States and achieve a high recycling rate for scrap tires.

Rubber recovered from scrap tires is used in a variety of applications, including the following:

- Civil engineering applications, such as subgrade fills and embankments, backfill for bridge and wall abutments, and subgrade for roads;
- Use as a substitute for traditional aggregate
- Tire derived fuel;
- Mulch;
- Manufactured rubber products;
- Pavement additive/rubberized asphalt; and
- Manufacturing new tires.

Used Oil

The 1989 State Plan recommended establishing a restriction on disposing and incinerating used oil. At the time the 1989 State Plan was being prepared, Ohio EPA and SWAC recommended that Ohio's General Assembly adopt legislation requiring all retail establishments selling motor oil to accept used motor oil from the public. Ohio EPA and SWAC were concerned that restricting used oil from landfills and incinerators without creating a collection infrastructure would cause increased dumping of used oil into sewers and onto the ground. Ohio EPA and SWAC further recommended that the restriction on disposing of used oil at landfills and incinerators take effect within six months of legislation being adopted.

The recommended legislation was never adopted, and the disposal restriction for used oil was never implemented. Even so, a number of automotive service centers and retail establishments voluntarily accept used oil from residents as a public service. In addition, SWMDs that hold collection events for household hazardous waste usually accept used motor oil from their residents. For more information regarding household hazardous waste collection programs, see Chapter 8 of this document.

Other Material Restrictions

Material Restrictions in Other States

Ohio EPA continually monitors the disposal restrictions proposed and implemented in other states. Although Ohio EPA pays attention to restrictions in all states, the Agency pays particular attention to restrictions in the other five states in U.S. EPA's Region V.

A number of states around the United States have imposed restrictions on the types of materials that can be disposed of in solid waste landfills and

incinerators. The restrictions on materials that can be disposed of vary from state to state. The most frequently restricted materials are scrap tires, lead-acid batteries, and yard waste. Other typical, although less common, disposal restrictions include those on major appliances/white goods, used motor oil, electronics, and source-separated recyclables.

As is the case nationwide, the states in U.S. EPA's Region V vary in terms of the types and complexity of their disposal restrictions. Table 4-1 presents the most common material restrictions and indicates which states in U.S. EPA Region V have implemented those restrictions. Footnotes to the table provide information about other, less common disposal restrictions that are in place in Region V states.

Electronics

As is discussed in more detail in Chapter 8, end-of-life consumer electronics represent a rapidly increasing percentage of total MSW. In addition, the variety of electronic devices reaching the end of their useful lives is expanding. As a result, how to best manage unwanted and obsolete electronics is receiving a great amount of attention from waste management professionals. The sheer volume of end-of-life electronics being generated and, even more concerning, projected to be generated in the near future will consume a great deal of landfill space if adequate alternative management options are not available. Furthermore, many electronic products contain heavy metals, including lead, that pose threats to human health and the environment if managed inappropriately.

The vast majority of electronic devices contain highly recoverable and valuable metals and other materials. An exception is televisions. However, the available infrastructure to contend with the large number of devices is not adequately accessible to all generators. Furthermore, governments, which usually bear the burden of providing alternative management options for wastes, do not have the financial resources necessary to create the extensive infrastructure needed to deal with the quantities of electronics being generated. Therefore, governments at all levels are taking actions to develop the necessary infrastructure and to identify financing tools. Many governments, particularly state governments, are evaluating disposal restrictions combined with other legislatively based mandates as solutions.

To date, the legislative authorities for 13 states and New York City have passed disposal restrictions for a variety of electronics. A number of states have adopted legislation that combines product stewardship programs with disposal restrictions. These states and New York City are listed in Table 4-2 along with pertinent information regarding each jurisdiction's restriction.

Table 4-1: Waste Disposal Restrictions in U.S. EPA's Region V

State	Yard Waste/ Vegetative Matter	Whole Scrap Tires	Scrap Tire Shreds	Lead-Acid Batteries	Major Appliances/ White Goods	Used Oil	Electronics	Other
Illinois	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Indiana	Yes	Yes	Not Specified	Yes	No	No	No	No
Michigan	Source- separated only	No	No	Yes	No	No	No ^a	Beverage bottles covered by Michigan Beverage Container Act
Minnesota	Yes	Yes	Yes	Yes	Yes	Yes	Cathode Ray Tubes	Various materials ^b
Ohio	Source- separated only	Yes	Yes	Yes	No	No	No	No
Wisconsin	Yes	Yes	Not specified	Yes	Yes	Yes	No	Recyclable wastes ^c

^a At the time this update of the state solid waste management plan was prepared, there was some legislative activity in Michigan to create disposal restrictions for mercury-containing products and electronics, but no legislation had been adopted.

^b Minnesota also has disposal restrictions on the following wastes: source-separated recyclables; household hazardous waste; dry-cell batteries; rechargeable batteries; mercury-containing wastes; fluorescent and high-intensity discharge lamps; lead paint; automotive fluids and filters; and telephone directories.

^c Wisconsin's disposal restrictions on "recyclable materials" (including waste tires) do not apply to solid waste generated in a region that has an approved effective recycling program. The ban does apply to materials that have already been separated for recycling.

The product stewardship programs, also known as manufacturer or producer responsibility programs, require manufacturers of electronic devices to take responsibility for providing recovery programs for at least their end-of-life products. These programs typically require manufacturers to either fund the recovery programs or directly provide recovery programs for their products. Often a disposal restriction is instituted along with the producer responsibility program, although the restriction typically takes effect a few years after the producer responsibility program takes effect.

As can be seen from Table 4-2, the most commonly restricted materials are computer monitors (specifically those containing cathode ray tubes) and other video display devices. A number of other states have banned all computer equipment and, in some cases, all electronics from disposal in landfills. Of the 13 governmental jurisdictions implementing disposal restrictions, eight also adopted legislation mandating producer responsibility programs (California implemented a consumer fee law). An additional six states adopted producer responsibility laws without an accompanying disposal restriction.

Table 4-2: States (and City) with Electronics Bans¹⁹

State/City	Law Passed	Effective Date	Banned Materials	Landfill Ban	Incinerator Ban	Producer Responsibility Law
Arkansas	March 2005	January 2008	Computer and Electronic Equipment	Yes	No	No
California	August 2001	2002 2006	CRTs Electronic Devices	Yes	No	No, (but has a consumer fee law)
Connecticut	July 2007	January 2011	TVs, monitors, personal computers, laptops	Yes	Yes	Yes
Illinois	Sept. 17, 2008	2012	Electronics	Yes	No	Yes
Maine	2004	July 2006	CRTs	Yes	No	Yes
Massachusetts	2000	April 2000	CRTs	Yes	Yes	No
Minnesota	May 8, 2007	July 2006	Video Display Devices	Yes	No	Yes
New Hampshire	May 2006	July 2007	Video Display Devices	Yes	Yes	No
New Jersey	January 2008 Amended Jan. 12, 2009 (for TVs.)	January 2010	TVs, monitors, computers, and laptops	Yes	Yes	Yes
New York City	April 2008	July 2009 for manufacturers July 2010 for everyone else	Computers, laptops, monitors, TVs, printers, keyboards, mice	Yes	Yes	Yes
North Carolina	August 2007 August 2008	January 2012	Computer equipment TVs	Yes	Yes	Yes
Oregon	June 2007	January 2010	Desktop computers, laptops, TVs and monitors > 4 inches	Yes	No	Yes
Rhode Island	July 2006	July 2008	Desktop and laptop computers, computer monitors, CPUs with monitors, TVs, video display devices > 4"	Yes	No	No

The Future of Material Restrictions in Ohio

Ohio EPA will continue to monitor other states' regulations and policies as well as Ohio's recycling infrastructure for indications that additional disposal restrictions should be considered for Ohio. Given the focus of the current solid waste regulations on solid waste facilities rather than generators and transporters, Ohio EPA does not foresee implementing any new disposal restrictions. In the future, if Ohio EPA's regulatory authority is expanded to encompass at least transporters, then new disposal restrictions could be pursued. Any new restrictions would be evaluated in terms of the criteria described at the beginning of this chapter: volume and hazards associated with the material, the costs and benefits of options, the effect of a disposal restriction on waste management, and availability of an alternative management infrastructure.

Due to implementation issues associated with disposal restrictions in Ohio, this revision of the state plan (and in all likelihood future revisions) focuses on encouraging participation in alternative management strategies for waste streams that can be managed more properly by some method other than disposal. While this approach does not create a regulatory prohibition on the disposal of specific wastes, it is more workable in the short term. Such an approach requires a strong emphasis on providing outreach and education to residents about making long term changes to how waste is managed. Such education and outreach programs must also educate residents and community leaders about the need for new recycling infrastructure for specific materials. As the demand for and interest in participating in alternative management programs increases, those programs typically become more prevalent.

Footnotes

¹⁶ Battery Council International, *Summary of U.S. State Lead-Acid Battery Laws*, <http://www.batterycouncil.org/LeadAcidBatteries/BatteryRecycling/StateRecyclingLaws/tabid/120/Default.aspx> (Aug. 28, 2009).

¹⁷Rubber Manufacturer's Association, *Facts and Figures – Scrap Tire Characteristics*, http://www.rma.org/scrap_tires/scrap_tire_markets/scrap_tire_characteristics (Aug. 28, 2009).

¹⁸ Rubber Manufacturer's Association, *Tire Safety – What's Inside a Tire*, http://www.rma.org/tire_safety/tire_basics/what_is_inside_a_tire (Aug. 28, 2009).

¹⁹ Electronics TakeBack Coalition, *States Where You Can't Throw E-Waste into the Trash*, http://www.computertakeback.com/legislation/States_with_Disposal_Ban_laws.pdf (Aug. 31, 2009).

Chapter 5

Revised General Criteria for the Location of Solid Waste Facilities

ORC Section 3734.50(D) requires the State Plan to “establish revised general criteria for the location of solid waste facilities...”

Introduction

Prior to 1990, there were few formally established requirements governing the appropriateness of a particular location for locating and operating a solid waste facility. Consequently, many disposal facilities were operated in improper locations and threatened human health and the environment. The threats posed by poorly-sited disposal facilities were compounded by a lack of engineered controls being incorporated into facility design and construction and by poor operating practices.

Improperly sited, constructed, and operated disposal facilities were directly responsible for degrading surface water, ground water, and drinking water supplies. In addition, improperly sited facilities resulted in the lateral migration of explosive gases through underground paths to nearby structures. Improperly sited facilities represented hazards to aircraft, impacted nearby properties, were damaged by subsidence of underlying geography, affected and were affected by nearby utility and transportation corridors, and caused general nuisance conditions. In many instances, expensive, time consuming cleanups were performed to correct the impacts caused by poorly-located disposal facilities.

As a result of all of these factors, Ohio’s legislature, through House Bill 592, required the Ohio Environmental Protection Agency (Ohio EPA) and the Solid Waste Management Advisory Council (SWAC) to recommend, in the state solid waste management plan (state plan), a set of criteria for the proper placement of solid waste facilities. House Bill 592 also required Ohio EPA to adopt comprehensive rules governing solid waste disposal facilities. These rules were to include the recommended location criteria from the state plan. Although the criteria were to address all types of solid waste facilities (landfill, transfer, compost, and incinerator), the main focus was on municipal solid waste (MSW) landfill facilities.

History of Siting Criteria and the State Solid Waste Management Plan

Siting and the “1989 State Solid Waste Management Plan”

An initial set of recommended siting criteria were contained in the *1989 State Solid Waste Management Plan* (1989 State Plan). On March 1, 1990, Ohio EPA’s revised regulations for solid waste landfills became effective. These regulations incorporated not only the recommended siting criteria from the 1989 State Plan but also provisions from proposed federal regulations for MSW landfills that were, at the time, in draft form.

In addition to adopting siting criteria for landfill facilities, Ohio promulgated siting criteria for transfer stations, incinerators, and composting facilities. The siting criteria for transfer stations and incinerators went into effect with the adoption of regulations on May 31, 1991. Siting criteria for composting facilities became effective on June 1, 1992.

The United States Environmental Protection Agency (U.S. EPA) adopted regulations for sanitary landfills on October 9, 1991. These regulations were promulgated in accordance with Subtitle D of the Resource Conservation and Recovery Act (RCRA) and established, among other requirements, minimum siting and operational standards for all landfills receiving MSW. The federal regulations, in turn, required states to develop and implement programs for permitting MSW landfills to ensure that those landfills comply with the new federal requirements. Once a state’s program was approved by U.S. EPA, then the state received primacy for the MSW landfill program.

Ohio’s solid waste regulations already addressed most of the siting requirements from the federal regulations. However, Ohio EPA was required to make some changes to its siting criteria. On June 1, 1994, Ohio adopted revised regulations that complied with the federal Subtitle D regulations for MSW landfill facilities. Ohio received a final determination of adequacy for its MSW permit program on June 13, 1994 from U.S. EPA. The federal regulations did not address solid waste transfer, composting, or incinerator facilities. Therefore, Ohio EPA did not have to update those rules once the federal regulations were adopted.

Although minor adjustments to the siting criteria have been made over the years through subsequent legislative and rule making efforts, the siting criteria in the current solid waste rules are fundamentally the same as those recommended in the original state plan.

Siting and the “1995 State Solid Waste Management Plan”

In 1994, when Ohio EPA and SWAC began updating the 1989 State Plan, Ohio’s solid waste program already contained a comprehensive set of siting criteria for most solid waste facilities. As a result, that update, which was adopted in October 1995, did not contain recommendations for either new or changes to the existing siting criteria. However, by adopting Senate Bill 165 in 1993, Ohio’s legislature required Ohio EPA to adopt rules, including siting criteria, to implement a scrap tire regulatory program. Thus, the *1995 State Solid Waste Management Plan* (1995 State Plan) acknowledged that siting criteria for scrap tire facilities would be incorporated into those rules. These rules were adopted on March 1, 1996 and included siting criteria for scrap tire monofill facilities, scrap tire storage and recovery facilities, and scrap tire collection facilities. The criteria adopted for scrap tire facilities were based on the existing siting criteria for solid waste facilities.

The 1995 State Plan also acknowledged that rules under development by Ohio EPA’s surface water program would likely redefine terms used in the solid waste rules. The 1995 State Plan anticipated that these new definitions could affect the siting criteria for solid waste landfill facilities. In reality, the changes in those definitions did not have an impact on the siting criteria for solid waste landfill facilities.

Siting and the “2001 State Solid Waste Management Plan”

Because Ohio’s siting criteria were already considered to be comprehensive at the time, no significant changes to the siting criteria for solid waste facilities were made between 1995 and 2001. However, in order to comply with the requirements of Ohio Revised Code (ORC) Section 119.032, which requires all state agencies to review all of their rules every five years, the Division of Solid and Infectious Waste Management (DSIWM) appointed a team of interagency personnel to review the siting criteria for municipal, industrial, and residual solid waste landfill facilities and for scrap tire monofills. A function of this team was to evaluate the existing siting criteria to determine whether changes (either deletions or additions) were warranted. The siting criteria for other types of solid waste facilities (composting facilities, transfer stations, and incinerators) were scheduled to be reviewed along with the other rules governing those types of facilities.

Like the 1995 State Plan, the *2001 State Solid Waste Management Plan* (2001 State Plan) did not contain recommendations for major revisions to the existing siting criteria. However, the workgroup assigned to reviewing the siting criteria for municipal,

industrial, and residual solid waste landfill facilities and for scrap tire monofills did propose changes to the existing criteria. The 2001 State Plan mirrored these proposed changes which were as follows:

- ***National Parks, Recreation Areas, and State Parks***

(Ohio Administrative Code (OAC) Rule 3745-27-07 (H)(1)) – The 2001 State Plan recommended that Ohio EPA establish a setback distance for these areas. At the time, the existing prohibition restricted landfill facilities from being located in these areas. The 2001 State Plan recommended prohibiting solid waste landfill facilities from being located within one thousand feet of these areas. This change would make that criterion consistent with OAC Rule 3745-27-07 (H)(4) which already prohibited landfill facilities from being located within one thousand feet of areas designed by the Ohio Department of Natural Resources (ODNR) as natural areas.

- ***Remove “unless deemed acceptable by the director” language from the siting criteria***

At the time, some of the siting criteria rules contained the phrase “unless deemed acceptable by the director.” This authority gave the director of Ohio EPA the ability to approve a deviation from certain siting criteria as long as the director had determined that the deviation was acceptable. Ohio EPA was in the process of developing a “variance rule” for the MSW landfill, industrial solid waste (ISW) landfill, and scrap tire programs (similar to the variance rule that already existed in the residual solid waste (RSW) landfill rules). Such a variance rule would authorize the director to approve acceptable deviations from the siting criteria and would serve the same purpose as the “unless deemed acceptable” language.

- ***Vertical expansion over unlined areas***

The existing rules allowed the owner or operator of a solid waste landfill facility to apply for and receive a permit-to-install (PTI) to expand the limits of waste placement vertically over an unlined area of the facility provided the expansion area met all of the siting criteria. The existing rules did not provide any direct consideration to the potential impact the unlined landfill could have had on ground water quality, a potential that may be compounded when additional waste is placed above the unlined area. Although the solution to the issue did not take the form of a siting criterion, the issue was discussed in the siting criteria chapter. The 2001 State Plan recommended that owners and operators be required to design and construct a separatory liner over emplaced waste before placing additional waste over unlined areas of the landfill facility.

• *Other Miscellaneous Amendments -*

Other recommendations of the 2001 State Plan included:

- Add definitions for “well head protection areas” and “ground water source water protection areas” to the five year time of travel criterion in OAC Rule 3745-27-07(H)(3)(a);
- Extend the set back from an up-gradient water supply well from 500 feet to 1,000 feet if gas migration is a concern;
- Clarify Ohio EPA’s interpretation of state nature preserves and surface waters; and
- Clarify that the “five year time of travel” criterion applies to only underground pathways.

All of the recommendations from the 2001 State Plan were incorporated into revised rules which became effective in August 2003.

Activities since the 2001 State Plan

In addition to the recommendations that were incorporated into rule in 2003, there have been a number of relatively minor changes to the siting criteria that have occurred as a result of the regular rule review process and legislative changes. Thus, the rules governing scrap tire monofills and composting facilities were revised to make the siting criteria for both types of facilities consistent with the criteria for landfill facilities.

Based on efforts of the teams assigned to conduct the required five year reviews of rules and research conducted by both Ohio EPA and ODNR, a number of new siting concepts have been introduced into the realm of waste management. As a result, this state plan contains recommendations for two new siting criteria as well as changes to five existing criteria. The concepts behind these changes are discussed later in this chapter.

Overview of Siting Requirements

As a result of the historical evolution of the siting criteria that was discussed in the beginning of this chapter, there are two basic categories of requirements that govern where a landfill facility can be located. The first category consists of the prohibitive siting criteria. The second category consists of location restrictions.

Siting Criteria

In general, the siting criteria refer to the prohibitions on where a solid waste facility can be located due to the presence or absence of specific site

characteristics. Many of the siting criteria specify that a facility must be located a minimum distance from whatever is being protected and are often referred to as “setbacks”. The siting criteria are exclusionary in that the only way an applicant for a PTI can reduce a setback distance or otherwise alter a siting criterion is by obtaining a variance from Ohio EPA. Without a variance, the siting criteria are absolute.

The siting criteria are some of the most powerful tools in Ohio’s solid waste regulatory program. If a potential site for a facility fails one or more of the siting criteria, it is very difficult for an applicant to demonstrate that the reduced protection resulting from altering the siting criterion is warranted. Thus, it is difficult for the applicant to obtain the variance necessary to site a facility in a location that does not meet the siting criteria.

There are four basic groups of siting criteria. Not all of the criteria from all four groups apply to all types of solid waste facilities. Thus, an MSW landfill facility cannot be located over a federally declared sole source aquifer. This prohibition does not apply to transfer, composting or incinerator facilities. In addition, a particular criterion may be applied to each type of solid waste facility differently. As an example, there are criteria that specify a facility’s proximity to a domicile for all types of solid waste facilities. However, a MSW landfill facility cannot be located within 1000 feet of a domicile whereas a solid waste transfer facility must be at least 250 feet from a domicile.

The four groups of siting criteria as well as the components of each group are as follows:

1. National and state park and recreation area setbacks:

- National parks and recreation areas;
- Candidate area for inclusion in the national park system;
- State park or established state park purchase area; and
- Property that lies within boundaries of a national park or recreation area but that has not been acquired or is not administered by the United States Department of the Interior.

2. Ground water aquifer protection:

- Sand/gravel pit;
- Limestone or sandstone quarry;
- Federally declared sole source aquifer;
- Unconsolidated aquifer capable of delivering 100 gallons per minute to a water supply well located within 1000 feet of the limits of waste placement; and,
- Isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner.

3. Ground water setbacks:

- Limits of waste placement or materials management cannot be within surface or subsurface areas:
 - surrounding a public supply well when contaminants may reach the public supply well through underground geologic or man-made pathways within five years, or;
 - in a wellhead protection area or drinking water source protection area for a public water system using ground water.
- Underground mine; and,
- Water supply well and developed spring.

4. General setbacks:

- Natural areas, including:
 - Areas designated by ODNR as a state nature preserve, a state wildlife area, or a state wild, scenic, or recreational river;
 - Areas designated, owned, and managed by the Ohio Historical Society as a nature preserve;
 - Areas designed by the United States Department of the Interior as a national wildlife refuge, or a national wild, scenic, or recreational river;
 - Areas designed by the United States Forest Service as either a special interest area or a research natural area in the Wayne National Forest; and
 - Stream segments designated by Ohio EPA as state resource water, a coldwater habitat, or an exceptional warmwater habitat.
- Property line;
- Domicile;
- Surface waters, including streams, lakes, and wetlands;
- Regulatory Floodplain; and
- Seismic Impact Zone.

Location Restrictions

The location restrictions were required by U.S. EPA, per Subtitle D of RCRA. The restrictions apply to only MSW landfill facilities and are found in OAC Rule 3745-27-20. Unlike with the siting criteria, a landfill facility can be located in a restricted area without specific approval from Ohio EPA. Thus, the applicant for a PTI must either demonstrate, in the application,

that the proposed site meets the restrictions or, if the site does not meet a restriction, demonstrate that the proposed facility can be engineered or operated to eliminate concerns or threats resulting from the facility being located within a restricted area.

Ohio's regulations contain five location restrictions:

1. Airports – (see 40 Code of Federal Regulations (CFR) 258.10)

Limits of waste placement not located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used by piston-type aircraft, unless owner or operator demonstrate that the landfill facility will not pose a bird hazard to aircraft.

2. Regulatory Floodplains – (see 40 CFR 258.11)

Limits of waste placement are not located in a regulatory floodplain unless the owner or operator demonstrates that the landfill facility will not restrict the flow of a 100-year flood, reduce temporary water storage capacity of the floodplain, or result in washout of solid waste.

3. Fault Areas – (see 40 CFR 258.13)

Landfill facility is not located within 200 feet of a Holocene fault unless the owner or operator demonstrates that the structural integrity of the landfill will not be damaged by a distance of less than 200 feet.

4. Seismic Impact Zones – (see 40 CFR 258.14)

Landfill facility is not located in a seismic impact zone unless the owner or operator demonstrates that all containment structures are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

5. Unstable Areas – (see 40 CFR 258.15)

Landfill facility is not located in an unstable area unless the owner or operator demonstrates that engineering measures have been incorporated into the design to ensure that the integrity of the structural components will not be disrupted.

Subtitle D of RCRA actually mandates six location restrictions. The sixth restriction applies to wetlands and prohibits owners and operators from building new or expanding existing landfills in wetlands. Ohio did not adopt the wetland restriction as a location restriction. Instead, Ohio relies on its wetland protection program administered under the 401 Water Quality Certification requirements of the Clean Water Act to regulate impacts to wetlands.

Table 5-1 illustrates how the siting criteria and location restrictions generally apply to each type of solid waste facility. For more specifics regarding how the siting criteria apply to each type of solid waste facility as well as the references from the Ohio Administrative Code for each requirement, please see Appendix G.

Table 5-1: Applicability of Siting Criteria to Solid Waste Facilities

Criteria	MSW Facility	Transfer Facility	Composting Facility	Incinerator	Scrap Tire Facility
Siting Criteria					
State or national park or recreation area	Yes	Yes	Yes, for all Classes	Yes	Yes
<i>Ground Water Aquifer Protection</i>					
Sand or gravel pit	Yes	No	No	No	No
Limestone or sandstone quarry	Yes	No	No	No	No
Federally declared sole source aquifer	Yes	No	No	No	Monofill only
Unconsolidated aquifer yielding 100 gal/min. to a well located within 1000 feet of waste placement	Yes	No	No	No	Monofill only
Isolation distance from uppermost aquifer	Yes	No	No	No	Monofill only
<i>Ground Water Setbacks</i>					
Areas surrounding wellhead of public supply well if contamination may reach wellhead within five years	Yes	No	No	No	Monofill only
Area of potential subsidence due to underground mine ^a	Yes	No	No	No	Monofill only
Water well or developed spring	Yes	No	Yes, for Classes I, II, and III	No	Monofill only
<i>General Setbacks</i>					
Natural areas	Yes	Yes	Yes, for Classes I, II, and III	Yes	Yes
Property line	Yes	No	No	No	Yes
Domicile	Yes	Yes	Yes, for Classes I, II, and III	Yes	Yes
Surface waters of the State	Yes	Yes	Yes, for all Classes	Yes	Yes
Stream, Lake, Wetland	Yes	No	No	No	No
Regulatory floodplain or floodway	Yes	Yes	Yes, for Classes I, II, and III	Yes	Yes
Seismic impact zone	No ^b	No	No	No	Monofill only
Location Restrictions					
Bird hazard to aircraft if facility is within 10,000'/5,000' of airport runway	Yes	No	No	No	No
Regulatory floodplain	Yes	No	No	No	No
Geologically unstable area	Yes	No	No	No	No
Holocene fault	Yes	No	No	No	No
Seismic impact zone	Yes	No	No	No	No

^a Although the underground mine siting criteria applies to MSW landfill facilities, the demonstration associated with the unstable area location restriction also addresses underground mines.

^b Applicants seeking to obtain a PTI for an MSW landfill facility must demonstrate compliance with the seismic impact zone requirement as a location restriction rather than through the siting criteria. The distinction is that the location restriction gives the applicant the ability to locate a MSW facility in a seismic impact zone without a specific approval whereas the siting criterion prohibits the facility from being located in the seismic impact zone unless specific approval is given.

Siting Criteria and This State Plan

The workgroup assigned to conduct the five-year review of the siting criteria for solid waste landfill facilities and scrap tire monofills has evaluated a number of concepts that could result in new siting criteria as well as changes to the existing criteria. Ohio EPA will evaluate these concepts during the rule making process for the siting criteria rules.

The following discussion explains the basic concepts behind possible new and possible changes to existing siting criteria. The state plan is intended to establish general siting criteria and present the overall concept without specifying the details of each criterion. Those details would be established during the rule development process and incorporated into the regulations as appropriate.

After the state plan is approved by SWAC and adopted by Ohio EPA, appropriate changes could be made to the siting criteria rules through the rule development and adoption process. Furthermore, interested parties would have a number of opportunities to provide input regarding these proposed siting criteria prior to being adopted into rule.

Possible New Siting Criteria

Stream Setback – The concept behind this possible criterion is twofold:

- to protect the landfill facility from natural fluctuations in a stream’s channel over time; and,
- to protect the stream from activities at the landfill facility during both the active life of the facility and following closure and post-closure care.

Once established, a landfill facility becomes a permanent structure that exists beyond operation and even post-closure care. Thus, it is important to ensure that the facility remains structurally sound over a long period of time. Unfortunately there are examples of facilities located near streams that are being impacted by and are in turn impacting the quality of the streams. In other instances stream erosion has resulted in expensive stabilization efforts to avoid impacts to the landfill facilities.

This criterion would protect the landfill facility by prohibiting the limits of waste placement, the liner system, the final cap system, embankments, and appurtenances of a landfill facility from being located within the area bounded by the width of the streamway. Furthermore, establishing a distance between the landfill facility and the streamway protects the stream from ongoing activities at the landfill, such as construction, monitoring, and blowing litter.

Stream experts at both Ohio EPA and ODNR recommend a siting criterion that is based on the width of the streamway to minimize property damage and protect water quality. In addition, the streamway concept was incorporated into ODNR’s Division of Soil and Water Resources’ manual titled *Rainwater and Land Development: Ohio’s Standards for Stormwater Management, Land Development and Urban Stream Protection*. This document defines Ohio’s standards and specifications for stormwater management practices to be incorporated into land development projects. The manual includes an empirical equation for calculating the width of the streamway. The manual aims to integrate water resource protection into development site planning in order to maintain or improve stream quality.

The practices established in ODNR’s manual are currently being followed by the construction industry. Because establishing a landfill facility involves significant construction and the need for stormwater management, it might be appropriate that the streamway concept be applied to landfill facilities.

The streamway width is based on the “...critical land area needed to sustain natural stream processes.”²⁰ The streamway width includes those areas where flooding, meander migration, and stream processes occur. Thus, the streamway includes the land on either side of the stream that would be affected by a shift in the stream’s channel and flooding.

Ohio EPA will continue to explore this concept through the rule development and adoption process.

Easements – The concept behind this possible criterion is to protect the landfill facility from activities that occur in nearby utility and transportation easements as well as ensure that those easements will not be impacted by activities at the landfill.

There have been several disposal facilities in Ohio where utilities pass under or through those facilities. Examples include water and sewer lines, surface water culverts, and power lines. These situations have occasionally caused problems at the facilities (e.g. impacts to the ground water monitoring program resulting from leaking sewer pipes) or raised concerns of service interruption (e.g. an accident involving overhead power lines). There has been at least one case in Ohio where an underground gas line passed through a disposal facility. That gas line caught fire, thereby representing a threat to the utility as well as increasing the risk of explosion and fire at the disposal facility.

This criterion would prohibit the limits of waste placement and all containment structures (e.g. berms and storage tanks) from being located in a utility easement; a right-of-way for a public road or a railroad; and a stream culvert.

It is recognized that facilities may need to have infrastructure such as rail lines and gas lines located directly within the facility boundary. This criterion would not prevent such infrastructure but would prevent waste placement or containment structures from being located within established easements.

Ohio EPA will continue to explore this concept through the rule development and adoption process.

Changes to Existing Siting Criteria:

Sand and Gravel Pits & Limestone and Sandstone Quarries – The concept behind this possible change is to make it possible for landfill facilities to be located in sand and gravel pits and stone quarries. Currently, these siting criteria place a total prohibition on locating a solid waste landfill in a sand or gravel pit or a stone quarry. In reality, some pits and quarries could make acceptable locations for landfill facilities once the facility owner or operator satisfies requirements that are protective of ground water and engineered components. Therefore, under such circumstances, the strict prohibition could be eliminated.

Ohio EPA will continue to explore this concept through the rule development and adoption process.

Floodplain – The concept behind this possible change is to extend the current prohibition on locating a solid waste facility in a regulatory floodplain to all floodplains. Ohio's current floodplain restriction is based on the restriction established in Subtitle D of RCRA. Thus, Ohio's current floodplain restriction is focused on regulatory floodplains. Regulatory floodplains are defined as those that have been mapped by the Federal Emergency Management Agency (FEMA). Because RCRA is a federal law, the floodplain restriction was developed based on FEMA's program. FEMA maps floodplains for emergency preparedness, insurance, and compensation purposes, not environmental protection.

Disposal facilities that are located in non-regulatory floodplains can worsen the extent of flooding and be damaged by flood events. Thus, the concept is to require applicants looking to site a landfill facility in an unmapped floodplain to determine the limits of the floodplain. This would be accomplished by calculating the 100 year floodplain using well-established methods.

Ohio EPA will continue to explore this concept through the rule development and adoption process.

Underground Mine – The concept behind this proposed change is to clarify what constitutes the angle of draw. Specifying the angle of draw is necessary to properly determine the extent of potential subsidence due to the collapse of an underground mine. Currently, the siting criterion does not quantify the angle of draw. The proposal is to define the angle of draw as not less than 15 degrees. Thus, the area of potential subsidence would extend from the underground mine to where the angle of draw intercepts the ground surface.

Applicants seeking PTIs for landfill facilities already routinely incorporate the angle of draw for potential subsidence into the location and design of proposed landfill facilities. Thus, although it is not currently captured in rule, the concept is already in practice. Adopting the angle of draw concept into rule simply codifies current industry practice.

Isolation Distance – At the time RCRA Subtitle D and Ohio's landfill design and construction rules were adopted, the design and construction specifications that were adopted represented the best available technology. Currently, Ohio's siting regulations require that at least 15 feet of geologic material exist between the uppermost aquifer system and the bottom of the recompacted soil liner. Ohio's design and construction regulations require that a sanitary landfill facility be constructed with a composite liner consisting of five feet of recompacted soil and a flexible membrane.

The liner composition and isolation distance required by Ohio's regulations are more protective than what is required through RCRA Subtitle D. Subtitle D requires the liner to consist of two feet of recompacted soil and a flexible membrane. Subtitle D does not require an isolation distance.

Ohio's regulations already provide a formula that a PTI applicant can use to justify a thinner recompacted soil liner than the default thickness. The calculation, contained in Appendix I to OAC Rule 3745-27-08, takes into account critical factors, including the time of travel and the thickness, type, and hydrolic conductivity of the underlying geologic material. The thickness of the recompacted soil liner can also be reduced by incorporating a geosynthetic clay liner into the overall liner design.

In 1998, Ohio EPA's Division of Drinking and Ground Water (DDAGW) conducted research to determine if there is a correlation between the impact of a disposal facility in Ohio on the ground water quality beneath the facility and the site setting and/or engineering. Based on the results of that study in

combination with information from a number of other reports, DDAGW confirmed a hypothesis that greater separation distances between the uppermost aquifer system and the bottom of the recompacted soil liner reduce the likelihood that there will be a release of leachate to the uppermost aquifer system.²¹ As a result, DDAGW determined that there was justification to create a relationship between the various liner designs and the amount of separation distance between the bottom of the liner and the uppermost aquifer system.

The concept being explored within Ohio EPA is to develop a relationship among the geology underlying a proposed facility, the toxicity of the waste that would be accepted, and the design of the liner. In this manner, MSW facilities proposed in locations with isolation distances greater than the minimum 15 feet of isolation distance could qualify to be designed and constructed with less complex liner systems and/or thinner recompacted soil liners than would otherwise be required. Under no circumstances, however, would the required liner thickness/complexity be less stringent than the federal standard of two feet of recompacted soil and a flexible membrane for those MSW landfill facilities that are subject to the Subtitle D requirements.

Because Ohio's design and construction regulations already provide for a relationship between the thickness of the recompacted soil layer and the isolation distance, the proposed change to the isolation distance siting criterion would further refine this existing concept.

Footnotes

²⁰ John Mathews, *Rainwater and Land Development: Ohio's Standards for Stormwater Management, Land Development and Urban Stream Protection*, (ODNR Division of Soil and Water Conservation, Columbus, Ohio, December 2006), 23.

²¹ Ohio EPA, Division of Drinking and Ground Waters, *Correlating Geologic Setting, Engineering and Groundwater Quality at Hazardous and Non-Hazardous Waste Storage, Treatment and Disposal Sites in Ohio* (Columbus, Ohio, September 4, 1998), 1.

Preface to Chapter 6

In the late 1980s, when House Bill 592 was being drafted, Ohio's solid waste professionals predicted that incinerating mixed municipal solid waste (MSW) would provide a means of reducing the volume of waste that needed to be disposed of. This prediction was made during a time when Ohio was perceived as being in the midst of a landfill capacity crisis. In order to further reduce Ohio's reliance on landfills to manage its solid waste, Ohio's General Assembly directed Ohio EPA and the Solid Waste Management Advisory Council (SWAC) to evaluate alternatives to landfill disposal to manage the potentially large quantities of ash that would be generated by solid waste incinerators. The combination of reducing the volume of waste through incineration and diverting ash away from disposal in landfills was intended to significantly reduce the need for additional landfill capacity.

Incineration never emerged as a management technique for significant quantities of solid waste for a number of reasons which are explained in this chapter. Consequently, developing alternative options for managing ash from solid waste incinerators never became a priority for Ohio. At the time this revision of the state solid waste management plan (state plan) was prepared, there were no operating mixed MSW incinerators in Ohio. Thus, significant updates to this chapter of the state plan were not necessary. With minor exceptions, the version of Chapter 6 in this state plan is the same as the version that was included in the 2001 revision of the state plan. Chapter 6 does contain an update regarding that status of Ohio EPA's training and certification program.

Recently, there has been a resurgence of interest in recovering energy by incinerating solid waste as well as through a number of other waste-to-energy technologies. In response, SWAC and Ohio EPA included a chapter in this version of the state plan to provide information about potential energy recovery technologies that are being investigated (See Chapter 10). These are technologies that can use solid waste as feedstock to either directly produce energy or to produce fuel that can then be used to produce energy. Chapter 10 also provides an analysis of the regulatory obstacles to implementing waste-to-energy technologies.

Many of the waste-to-energy technologies being investigated do not produce ash. Consequently, managing waste materials from those technologies does not fall under the scope of the ash management alternatives contemplated by House Bill 592. Furthermore, burning solid waste for energy recovery is not expected to become a significant management option in the foreseeable future. If conditions change by the time Ohio EPA and SWAC initiate the next revision of the state plan, then the information in this chapter will be updated during the revision process as appropriate.

Chapter 6

Management of Ash Resulting from the Burning of Mixed Municipal Solid Waste

Ohio Revised Code (ORC) Section 3734.50(E) requires the state solid waste management plan to “examine alternative methods of disposal for fly ash and bottom ash resulting from the burning of mixed municipal solid waste.”

Introduction

As solid waste management options, incineration and waste-to-energy have historically never been major components of Ohio’s overall waste management program. To illustrate, the management of solid waste via incineration and waste-to-energy ranged from seven percent of Ohio’s total waste stream in 1990 to 0.2 percent in 1997. Although incineration and waste-to-energy have never been major methods of waste management on a statewide basis, they were previously integral components of waste disposal in the cities of Columbus and Akron as well as in Montgomery County. However, in 1994, with the closure of the waste-to-energy facility in Columbus, Ohio’s publicly available solid waste incinerators and waste-to-energy facilities began closing, one-by-one, until the last operating facility ceased operations in 1997. The result is that, as of the date this state solid waste management plan (state plan) was adopted, there were no operating incinerators or waste-to-energy facilities accepting mixed MSW for combustion.

At the time House Bill 592 was passed, the combustion of solid waste was not only viable as a waste management alternative but was also expected to provide a means of reducing the volume of solid waste disposed of in Ohio’s then rapidly diminishing landfill airspace. To reduce the burden on Ohio’s landfill facilities even further, the statute, as can be seen from the reference above, requires the state plan to consider alternatives to disposal as methods for managing ash produced from the incineration of mixed MSW. In 1997, Ohio EPA initiated a program, known as the Integrated Alternative Waste Management Program (IAWMP), for the review and consideration of requests to manage waste materials outside of traditional disposal facilities. Although IAWMP is not specific to the alternative management of incineration ash, it is possible that alternative uses of ash could be approved through the program, if the management of incinerator ash becomes an issue in the future.

Mixed Municipal Combustion Ash Overview

Whenever solid waste material is burned, part of the original material is noncombustible and the result is ash. Under ideal operating conditions, approximately 10 percent of the volume and 32 percent of the weight of MSW remains after combustion. The ash residue from solid waste contains glass, cans, clays that are used in paper, stabilizers from plastics, pigments in inks, and minerals in organic wastes. The exact composition of the ash varies widely depending on what is burned, the type of combustion process involved, and other factors.

MSW incinerators produce two types of ash residue:

- **Bottom ash** is the residue that collects beneath the combustion chamber. It constitutes approximately 90 percent by weight of all ash.
- **Fly ash** is the powdery residue that is trapped in the plant’s emission control devices. It represents about 10 percent by weight of the total amount of ash that is generated.

The physical appearance of ash ranges from fine-grained to very coarse particles. Although the chemical content of ash varies according to the waste sources, the composition of the ash residue contains many of the same constituents present in the original waste. For example, ash residue typically contains relatively harmless materials, such as iron and silicon, as well as potentially toxic materials, such as lead and cadmium.

The following information is generally accepted about ash:

- Levels of dioxin in ash are linked to combustion practices.
- Fly ash typically contains heavy metals, predominantly lead and cadmium.
- Bottom ash is alkaline, while fly ash is acidic.

Typically, fly ash contains higher concentrations of toxic metals and may produce toxic leachate when disposed of in landfills. The bottom ash contains lower concentrations of heavy metal constituents. When fly ash and bottom ash are mixed into what is called “combined ash,” the metal concentrations in the mixture are usually diluted when compared to the levels in the segregated fly ash.

History of the Mixed Municipal Solid Waste Incinerator Ash Regulatory Program

At the time the *1989 State Solid Waste Management Plan* (1989 State Plan) was being developed, there wasn't a federal law that delineated whether ash from mixed-MSW combustion facilities (incinerators and waste-to-energy/resource recovery facilities) was subject to regulation as a solid waste or subject to regulation as a hazardous waste. In 1988, shortly after the adoption of House Bill 592, Ohio EPA strengthened its control over the disposal of this ash in Ohio by developing a policy that required toxicity testing prior to disposal and placed several restrictions on facilities that accept ash for disposal. This policy, titled "Interim Policy on the Disposal of Municipal Incinerator Ash" (Interim Policy), went into effect on October 8, 1988 and was incorporated into the *1989 State Plan*.

In accordance with Ohio EPA's Interim Policy, before accepting municipal incinerator ash, owners and operators of disposal facilities were required to verify that the ash did not qualify as a hazardous waste when analyzed for the Toxicity Characteristic (TC). The ash was to be periodically sampled and the sample results statistically analyzed. If the results of the statistical analyses of the ash samples exceeded the limits for TC, the material could be rendered nonhazardous on-site where it was generated, as necessary to meet the TC limits or taken to a hazardous waste treatment or disposal facility. Under the Interim Policy, if the ash safely met the testing criteria as nonhazardous, it could be disposed of at a solid waste disposal facility that has a ground water monitoring system in place, but the ash was required to be kept physically isolated from other solid wastes.

Ohio's Interim Policy applied to only ash generated from municipal incinerator facilities where the incoming waste stream consisted solely of household waste and nonhazardous commercial and industrial waste. Following the development of Ohio's Interim Policy in 1988, additional guidance regarding the testing and disposal of ash from the incineration of solid waste came from the United States Environmental Protection Agency (U.S. EPA) and the courts. This guidance is discussed below. While much of Ohio's Interim Policy remained unaffected by that guidance, some changes and clarifications were needed in order to maintain consistency with federal policy. These changes and clarifications were primarily related to the sampling and analysis procedures that were prescribed by Ohio's Interim Policy.

Ohio's Incinerator Rules

In 1991, Ohio EPA promulgated new rules governing the permitting, operation, closure, and financial assurance of solid waste incinerator facilities (Ohio Administrative Code (OAC) Rules 3745-27-50 through -53). These rules became effective on May 31, 1991 and exist relatively unchanged today. The incinerator rules, as they are usually referred to, require applicants for a permit-to-install (PTI) for a solid waste incinerator to prepare and submit ash management plans that, at a minimum, address the ash disposal requirements established in the Interim Policy and contained in the *1989 State Plan*. Additional provisions of OAC Section 3745-27-50(C) require discussion of ash removal, handling and storage practices at solid waste incineration facilities.

Since the adoption of Ohio's first solid waste regulations in 1976, resource recovery facilities (including waste-to-energy facilities) had been exempted in OAC Rule 3745-27-03(N) from Ohio's solid waste regulations. This exemption status did not change with the adoption of the regulations governing solid waste incinerators. Thus, facilities such as those that were operated by the cities of Akron and Columbus were exempted from the solid waste incinerator regulations. Because resource recovery facilities were not regulated as solid waste facilities, there were no requirements for operators of resource recovery facilities to have approved ash management plans. The result was that it was not clear, in Ohio, whether or not ash from resource recovery facilities that burned solid waste was subject to the requirements in Ohio's Interim Policy.

On September 18, 1992, U.S. EPA Administrator William K. Reilly announced that MSW combustion ash would be exempted from regulation at the federal level under Section 3001 (i) of RCRA. This decision was effectively overturned on May 2, 1994, when the U.S. Supreme Court issued an opinion interpreting Section 3001(i). (*City of Chicago v. EDF*, No. 92-1639) The Court held that Section 3001(i) does not exempt ash generated at resource recovery facilities (i.e., waste-to-energy facilities) burning household wastes and nonhazardous commercial wastes from the hazardous waste requirements of RCRA Subtitle C. As of the effective date of the Court's decision (June 1, 1994), operators of such facilities must determine through sampling whether the ash generated is characterized as a hazardous waste. Ash that is determined, through sampling, to be characteristically hazardous must be managed in compliance with all applicable hazardous waste regulations. The decision further clarified that if the ash is not a hazardous waste according to the test results, it may continue to be disposed of at a licensed solid waste landfill that meets U.S. EPA standards under Subtitle D of RCRA.

U.S. EPA Guidance

On May 20, 1994, U.S. EPA issued a draft guidance document titled *Sampling and Analysis of Municipal Refuse Incinerator Ash*. Through written correspondence dated May 27, 1994, Ohio EPA notified operators of Ohio's four MSW combustors that, because of the U.S. Supreme Court's ruling, Ohio's Interim Policy had been replaced by U.S. EPA's *Draft Sampling and Analysis of Municipal Refuse Incineration Ash*. That correspondence conveyed the need to follow the sampling and analysis procedures in the federal draft guidance rather than in Ohio's Interim Policy and that Ohio's Interim Policy would be revised as part of the first revision to the state plan. The ultimate effect of these actions was to eliminate the previous uncertainty over the regulatory status of ash from solid waste resource recovery facilities and to make ash from solid waste resource recovery facilities subject to the same testing requirements as ash from municipal incinerators.

This draft sampling protocol prescribed by U.S. EPA's sampling and analysis document is quite similar in principle to the requirements of Ohio's Interim Policy, with slightly different sampling frequencies. For the initial waste characterization, the combustion facility operator must take two eight-hour composite samples each day for one week's operation, for a total of fourteen grab samples. (An eight-hour composite sample involves taking one grab sample from the designated sampling area each hour for eight hours and then combining the samples. Another eight-hour composite sample must be taken during another shift.) The sample analysis method to be used is U.S. EPA SW-846 Toxicity Characteristic Leaching Procedure (TCLP) method 1311, applying the Student's t-test from U.S. EPA SW-846 for statistical data evaluation. The TCLP test covers 40 different organics and metals. It is recommended that subsequent testing be conducted at least quarterly to determine the ash variability over time. Using the sample data from each sampling period, the operator must determine if the ash exhibits toxic characteristics. If the statistical analysis fails the limits for TC, the ash is to be disposed of as hazardous waste, unless rendered nonhazardous prior to the point of disposal.

Because of questions about whether fly ash and bottom ash from these facilities could be combined prior to sampling, U.S. EPA published in the *Federal Register* effective February 3, 1995, a *Determination of Point at which RCRA Subtitle C Jurisdiction begins for Municipal Waste Combustion Ash at Waste-to-Energy Facilities*. This point was determined to be the point at which the ash exits the combustion building following the combustion and air pollution control processes. While within the combustion building, ash handling is exempt from regulation under Subtitle C. Fly and bottom ash may be combined prior to

sampling for hazardous waste characteristics, as long as the combining of the ash types takes place within the combustion building prior to either ash having been collected or deposited outside the building.

All four solid waste incinerator and resource recovery facilities operating in Ohio utilized U.S. EPA's sampling protocol from May 1994, until operations ceased. During this time, no facility owners reported having exceeded the TCLP limits following U.S. EPA's sampling protocol.

The *1995 State Solid Waste Management Plan* (1995 State Plan) mentioned that the Ohio's Interim Policy would be revised to remove the inconsistencies between the Interim Policy and U.S. EPA's policy and that these revisions would be incorporated into rule during the 1995-96 time frame. While the Interim Policy itself has not been revised, Ohio EPA, in 1996, in conjunction with the promulgation of new rules governing scrap tire facilities, removed the exemption for resource recovery facilities from OAC Rule 3745-27-03(N). This change brought oversight of resource recovery facilities that burn mixed MSW under the rules governing the permitting, operation, financial assurance, and closure of solid waste incinerators and made Ohio's program consistent with federal policy.

In 1997, the Division of Solid and Infectious Waste Management (DSIWM) conducted a review of the rules governing the permitting, operation, and closure of MSW incineration facilities in accordance with House Bill 473, and, in 1998, the rules were readopted without any changes.²² DSIWM conducted another five-year review of the incinerator rules in 2002 and again the rules were readopted without changes. The rules were amended in 2004 to remove references to OAC Rule 3745-31 (PTI for New Sources of Pollution). In 2007, the rules were again reviewed to meet the five-year rule review requirements and were adopted without changes. Consequently, Ohio EPA has not made significant changes to the rules governing solid waste incinerators since they were initially adopted in 1991.

History of Solid Waste Incineration in Ohio and State Plan Updates

In 1989, at the time the original state solid waste management plan was adopted, there were five public MSW incinerators that were licensed to operate in Ohio. Of those, four were active and one was inactive. There were also two resource recovery facilities that incinerated MSW to generate steam or steam plus electricity. These two facilities were not required to be permitted or licensed. The seven facilities incinerated a total of 1,331,062 tons, or approximately seven percent of all waste disposed of in licensed solid waste disposal facilities in Ohio.

In January of 1995, during the time that the first update of the state plan was being prepared, Ohio had four publically-available solid waste incinerators that were licensed to accept mixed MSW and one resource recovery incinerator. Of those facilities, two of the incinerators were active for all of 1995, two were inactive for all of 1995, and the resource recovery incinerator operated for part of the year. By the time the 1995 State Plan was adopted, the resource recovery incinerator had closed.

The active solid waste incinerators were the Montgomery County North Incinerator (600 tons per day) and the Montgomery County South Incinerator (800 tons per day). The resource recovery incinerator was the Akron Recycle Energy System Resource Recovery Incinerator. The Akron Recycle Energy System Resource Recovery Incinerator closed in May 1995 after accepting waste for several months.

In 1995, approximately two percent (369,479 tons) of the 18,805,828 tons of solid waste disposed of in solid waste disposal facilities in Ohio were delivered to the three solid waste incinerators. Of the 369,479 tons that were incinerated, approximately, 192,744 tons of ash were delivered to solid waste disposal facilities. The two Montgomery County incinerators accepted a total of 318,894 tons of solid waste. The Akron Recycle Energy System Resource Recovery Incinerator accepted 47,918 tons during the portion of 1995 that it was operated.

The Montgomery County South Incinerator closed in December of 1996. In 1996, the number of tons of solid waste delivered to solid waste incinerators decreased to 1.1 percent (238,897 tons) of all waste disposed of in solid waste disposal facilities. 134,793 tons of resulting ash were disposed of in solid waste landfills. In May 1997, the Montgomery County North Incinerator ceased operations. Thus, by May of 1997, all of the previously operating, large,

publicly-owned MSW incinerator and waste-to-energy facilities in Ohio had ceased operating. The amount of waste incinerated in 1997 decreased to 42,937 tons, or 0.2% of all solid waste disposed of in solid waste disposal facilities. In 1997, 28,082 tons of ash were disposed of in solid waste disposal facilities.

There is currently one active incinerator that is licensed to accept mixed MSW. That facility is the Stericycle facility located in Trumbull County (the Geauga-Trumbull Joint Solid Waste Management District). However, that facility primarily burns infectious waste. The small amounts of solid waste burned at the facility generally consist of hospital records and other office waste. In 2007, the Stericycle facility reported having accepted a total of 34.43 tons of solid waste.

While there aren't any operating solid waste incinerators or waste-to-energy facilities that burn mixed MSW, there are a number of small incinerators operated by schools and similar institutions that burn solid waste generated on the premises. Because the tonnage of ash produced by these individual incinerators is not monitored, it is not known how much ash is being disposed of in Ohio's landfills. However, it is safe to assume that the overall tonnage is relatively insignificant. It is also possible that Ohio imports MSW incinerator ash from other states that still utilize incineration as a waste management alternative. As with ash produced by institutionally-operated incinerators, there aren't any available estimates regarding how much, if any, out-of-state ash is being disposed of in Ohio's solid waste landfill facilities.

Closure of Ohio's Solid Waste Incinerators and Waste-to-energy Facilities

As was mentioned above, by May 1997 all of the existing, large, publicly-owned MSW incinerators and resource recovery incinerators in Ohio had ceased operations. There are many factors that caused these closures to occur. Two of these factors are the inability of local communities to utilize flow control due to the unconstitutionality of such practices and the new air standards. While both of these factors are discussed individually in the text that follows, the closure of Ohio's solid waste incinerators was the result of these factors combined.

Flow Control

At the time House Bill 592 was adopted into law in 1988, the legislation intended that all solid waste management districts (SWMDs) would have the ability to designate which disposal facilities were to receive solid waste generated within that SWMD. In this manner, not only would the SWMD be able to easily trace the flow of its solid waste, but the SWMD would also be able to ensure that a sufficient quantity of solid waste was delivered to publicly financed disposal facilities to keep those facilities financially solvent. These practices, coined “flow control”, were subsequently deemed unconstitutional by a U.S. Supreme Court decision which overturned a local flow control ordinance in New York (*C & A Carbone, Inc. v. Town of Clarkstown, New York*, No. 92-1402, May 16, 1994.) It is highly likely that this decision adversely affected the ability of owners and operators of MSW incineration and resource recovery facilities to compete economically with owners and operators of landfills and other solid waste management alternatives. The decision may also have affected the ability of owners and operators of these facilities to attract sufficient volumes of waste to ensure repayment of facility financing.

New Air Standards

There are both state and federal regulations that apply to MSW combustion. U.S. EPA regulates air emissions from combustion facilities through its “New Source Performance Standards” (NSPS) and “Prevention of Significant Deterioration” (PSD) permitting process. Whenever a new facility is proposed, plant operators must prepare a detailed calculation of air emissions to determine whether compliance will be achieved with federal and state rules. U.S. EPA also requires such facilities to install best available control technology (BACT) on large facilities.

Ohio regulates particulate incinerator stack emissions through the Particulate Matter Standards that are contained in OAC Chapter 3745-17. These regulations address all new and existing facilities by: setting standards that regulate particulate emissions for stationary sources; controlling fugitive dust emissions from various sources; and setting specific restrictions on particulate emissions and odors from incinerators. In addition, all new facilities must install BACT to reduce all pollutants in accordance with Ohio EPA PTI rules.

When materials are burned, gases and other by-products are formed and must be controlled to mitigate air pollution. Modern resource recovery plants

are designed to solve this problem by achieving extremely high temperatures (1800 to 2200 degrees Fahrenheit) to minimize the formation of complex chemical compounds such as dioxin, and by using pollution control devices. BACT requirements, such as scrubbers, electrostatic precipitators, and fabric filters, can reduce emissions by up to 99 percent.

An efficient pollution control system generally transfers metal oxides from the flue gas to the fly ash or scrubber sludge. This is why fly ash tends to contain metals.

The Clean Air Act Amendments of 1990 required U.S. EPA to promulgate additional requirements for the control of emissions from existing and new MSW combustors. The standards for MSW combustor units of greater than 35 metric tons per day capacity were promulgated in final form on December 19, 1995. A series of challenges and court-ordered amendments resulted in a redefinition of size categories. This resulted in separate standards for “small” MSW combustor units of 35 to 250 tons per day capacity and “large” MSW combustor units above 250 tons per day capacity.

The standards for large MSW combustor units became effective in 1997. These standards apply to large MSW combustors (greater than 250 tpd of combustion capacity) constructed on or before September 20, 1994. The standards for small units became effective on January 31, 2003. These standards apply to combustor units with capacity of 35 to 250 tons per day and that were constructed on or before August 30, 1999. States have the option of writing their own rules for existing units, which may equal or exceed the stringency of the federal guidelines. Until a state-based program is approved, the states must operate under the federal requirements. Ohio has chosen not to adopt its own rules because there are no operating units that would be affected by the requirements. The closure of all of the existing units appears to have resulted from poor economics of operation in the absence of flow control and the necessity of upgrading control equipment to meet new emission limits.

Implementation of the 1990 federal Clean Air Act Amendments has resulted in tighter controls over mercury and dioxin emissions from MSW incinerators and resource recovery facilities, requiring extensive upgrades at many facilities. U.S. EPA has also conducted a multi-year dioxin reassessment to evaluate dioxin tolerance levels. Based on the results of this report and in response to citizen concerns, U.S. EPA may place additional requirements on these facilities in an effort to reduce dioxin emissions.

Uses for Mixed Municipal Solid Waste Combustion Ash

SWAC encourages methods to reuse nonhazardous ash that are demonstrated by scientifically valid research to be beneficial and environmentally sound. If the incinerator ash is not hazardous based on the TCLP test, it can be disposed of in a solid waste facility meeting RCRA Subtitle D standards, or possibly reused. Many reuse technologies remain experimental and will require additional testing to determine their environmental suitability.

Ash usually must undergo some form of treatment before it can be reused. Solidification and chemical stabilization are the most widely used forms of treatment. The processes include mixing ash with lime or portland cement to form less soluble metals. A number of companies currently offer stabilization technologies for municipal combustion ash. Once stabilized, the ash can be used for construction materials or road foundation, provided it meets construction specifications.

Interim Alternative Waste Management Program (IAWMP)

The IAWMP was issued as a management directive on July 1, 1997 from the chiefs of DSIWM and the Division of Surface Water (DSW) to all staff in those divisions. The ultimate purpose of IAWMP is to expedite the approval of alternate uses of waste materials. The purpose of the directive was to clarify which division, DSIWM or DSW, is to review a particular type of alternative waste management proposal, under what authority to review that proposal, and what type of response/approval/authorization is appropriate for the proposal under consideration. Through IAWMP, Ohio EPA utilizes current statutory and regulatory authorities and, as result, the directive was not intended to alter, in any significant way, past practices of DSW and the policies it utilizes under its existing "beneficial use" program. Ohio EPA does, however, employ existing regulatory authorities in OAC Chapter 3734-27 which, prior to IAWMP, had never before been utilized. Requests to manage solid waste incinerator ash in ways other than disposal in landfill facilities could be considered and, if acceptable, approved through IAWMP.

Controlling the Content of the Ash Residue from Mixed Municipal Solid Waste Combustion Facilities

The content of the ash residue from mixed MSW combustion depends on a number of factors, including the types of materials burned, the air emissions requirements, the efficiency of the combustion process, and the competency of the operator. Eliminating certain materials from the combustion process is one means of affecting the quality of the resulting ash. This is most easily accomplished through source separation and waste diversion programs. Ensuring that solid waste incinerators are operated by competent and knowledgeable staff can be accomplished through an operator training and certification program.

Role of Source Separation

Many materials destined for combustion at resource recovery facilities or for incineration can be separated from other wastes at the point of generation. Materials containing heavy metals and other potentially harmful components should not be burned. Eliminating such materials from the combustion process can have a positive effect on the quality of the resulting ash requiring disposal. To accomplish this, SWAC recommends that state and local solid waste management programs encourage citizens and businesses to adopt aggressive pollution prevention programs to reduce the generation of not only wastes containing potentially harmful substances, but also all wastes. SWAC further recommends that wastes that cannot be eliminated through pollution prevention strategies be recycled whenever possible and wherever recycling programs are feasible.

Role of Diverting Wastes from Mixed Municipal Combustion Facilities

Certain wastes, such as lead-acid batteries, contribute hazardous constituents (especially toxic organics and heavy metals) to emissions and ash. Chapters 4 and 8 provide strategies for handling these materials. Owners and operators of MSW solid waste incinerators must implement measures to divert wastes with hazardous constituents from the waste stream. SWAC recommends diverting these materials and recycling them whenever feasible.

OAC Section 3745-27-52(T) specifies that MSW solid waste incinerator facilities shall not accept the following:

- (1) Hazardous wastes;
- (2) Asbestos or asbestos-containing waste material that is subject to the provisions of NESHAP, 40 CFR Part 61, Subpart M;
- (3) Infectious wastes...that have not been treated to render them noninfectious, unless the facility is an infectious waste treatment facility operated in accordance with state infectious waste rules, or unless the facility holds a solid waste disposal license with a notation that the facility treats infectious wastes;
- (4) Explosive materials;
- (5) Lead-Acid (automotive) batteries;
- (6) Yard waste after December 1, 1993, except logs and brush;
- (7) Whole waste tires after January 1, 1993, unless the facility is otherwise authorized to incinerate whole waste tires; and
- (8) Shredded waste tires after January 1, 1995, unless the facility is otherwise authorized to incinerate shredded waste tires.

In addition, SWAC recommends that all SWMDs that utilize or will utilize incineration or waste-to-energy facilities in the future, to the greatest extent practical, recycle certain materials. These materials include glass and other materials not usable as fuels, materials which may have greater value if recycled, and materials which may interfere with efficient incinerator operation if not removed.

Separation and recycling may be met through community-based programs such as curbside, drop-off or other programs, or by a program initiated at a transfer station, or at the incinerator or waste-to-energy facility itself.

Because Ohio EPA does not have authority to regulate generators or transporters of solid waste, some of these materials such as yard waste and lead acid batteries cannot be effectively banned once mixed with other solid wastes. The *1995 State Plan* indicated that in State Fiscal Year 1996, the incinerator rules would be revised and that the language banning solid waste incinerator facilities from accepting yard waste and lead-acid batteries would be clarified to

apply to source-separated materials. Modifications were made to the yard-waste portion of these restrictions, clarifying that the restriction applies only to source-separated yard waste. These modifications became effective January 1, 1995.

As was explained in Chapter IV, rules banning lead-acid batteries from solid waste incinerators became effective on May 31, 1991. The ban on accepting lead-acid batteries at landfill facilities did not become effective until April 25, 2008. The ban on accepting lead-acid batteries at solid waste incinerators remains in place, unmodified from its original version. Thus, the lead-acid battery restriction is not limited to source-separated batteries, but applies to mixed loads as well.

Certification Training

Training and certification programs can assist in ensuring safe and effective operation of incinerators and pollution control equipment as well as help operators determine which wastes should be burned. Ohio EPA is required by law to develop a certification and training program that addresses all operators of solid waste facilities, and infectious waste treatment facilities as well as health department personnel who are responsible for enforcing the solid and infectious waste laws and rules (see ORC Section 3734.02(L) for details.). In 1992, Ohio EPA proposed rules necessary to create this program. Opposition to these rules was significant, primarily from health departments who lacked adequate funding to complete the proposed training and certification requirements. To date, these rules have not been finalized.

The *1995 State Plan* projected that the certification and training program would be implemented during the 1996-97 biennium, which began July 1, 1995. This did not happen. A report published in 1998 which documents a review that was conducted of the *1995 State Plan* indicated that an Ohio EPA/Ohio Environmental Health Association Workgroup was working on developing a recommendation for this issue. In addition, the report indicated that legislation to address health department funding had been introduced into the Ohio General Assembly. The report further stated that pending the outcome of this issue, work on the certification program was scheduled to continue during the 1998-99 biennium. Since publication of the 1998 report, the legislation regarding health department funding was tabled and meetings of the Ohio EPA/Environmental Health Association Workgroup ended.

In August 2004, Ohio EPA's Division of Solid and Infectious Waste Management (DSIWM) hired an environmental specialist whose major assignment was to facilitate development of the certification and training program. From 2004 to January 2006, DSIWM put forth extensive effort into researching certification programs in other states as well as methods of providing effective training. During this same time, DSIWM put forth efforts to develop draft rules to implement the certification program.

On January 14, 2005, Governor Taft signed new construction and demolition debris (C&DD) legislation, Amended Substitute House Bill 432, into law. The law, which became effective on April 15, 2005, improved funding support to approved health district C&DD programs through a new fee of \$0.60/ton or \$0.30/cubic yard on the disposal of C&DD. This funding would have provided health departments with the money necessary to allow staff to attend the certification training once that training was offered.

In December 2005, Ohio's General Assembly adopted House Bill 397, legislation that made major changes to Ohio's construction and demolition debris (C&DD) law. House Bill 397 required Ohio EPA to adopt rules governing ground water and leachate monitoring, closure and post-closure care, pulverized debris, and rejected load reporting, among other requirements. The bill also requires owners and operators of C&DD facilities to obtain a PTI for a new construction and demolition debris facility. House Bill 397 further instructed Ohio EPA to develop the permitting program within 180 days.

Given the ambitious schedule mandated by House Bill 397, DSIWM was forced to prioritize development of the C&DD rules over the certification program. Development of the certification program ceased as a result. In October 2007, the environmental specialist that had been dedicated to developing the certification program left Ohio EPA, and the position had not been filled to date.

In 2009, DSIWM intends to hire a new environmental specialist to fill the vacant position and reestablish the certification program as a priority.

The Future of Ash Management in Ohio

Given the absence of large, publicly-owned MSW incinerators in Ohio, the management of MSW combustion ash is not a pressing issue for Ohio at this point in time. As was mentioned in the Preface, there has been talk in the waste management industry about whether or not the time has come to look into the feasibility of incinerating solid waste for energy recovery. Even so, the amount of time it would take to go through the permitting process means that a solid waste incinerator or energy recovery facility will not begin operating in the immediate future. Furthermore, Ohio EPA does not anticipate that incineration will become a significant solid waste management option in Ohio in the foreseeable future.

In addition to incinerating waste to recover energy, there are a number of other technologies for producing energy from waste that are being discussed in the waste industry. For this reason, Ohio EPA and SWAC included a new chapter in this version of the state plan. This chapter, Chapter 10, provides an overview of some of the major technologies being evaluated as well as discussions regarding the benefits and drawbacks of waste-to-energy technologies and regulatory barriers to implementing the technologies.

Footnotes

²² H. B. 473 instituted the requirement that all state of Ohio agencies review their rules every five years. During the review, each agency must review its rules for specific purposes enumerated in ORC Section 119.032(C)(1) – (4). Beginning 1997 and into 1998, Ohio EPA conducted the first five-year review for the solid waste incinerator rules.

Chapter 7

A Statewide Strategy for Managing Scrap Tires

Ohio Revised Code Section 3734.50(F) requires the state solid waste management plan to “Establish a statewide strategy for managing scrap tires, which shall include identification of locations within the state that qualify as scrap tire facilities and accumulations. In developing the strategy, the director shall examine the feasibility of recycling or recovering materials or energy from scrap tires and landfilling scrap tires in abandoned coal strip mines as well as other methods for managing scrap tires.”

Introduction

In 1989, when House Bill 592 was passed, Ohio lacked a regulatory program to ensure that scrap tires were managed properly. The result was that a large number of scrap tires were disposed of through illegal means, such as open dumping and illegal tire dumps, and stockpiled in vast quantities for perceived future value. In a report published in 1987 and titled *Used Tire Recovery in Ohio*, Ohio EPA estimated that 47 percent of scrap tires were unaccounted for and presumed to be illegally dumped or stored. Of those scrap tires that were considered to be properly managed, 33 percent were recycled and 20 percent were properly disposed of.

In the 1990s, Ohio’s legislature adopted a scrap tire law that allowed the State to force Ohioans to manage scrap tires properly.

Today, Ohio’s scrap tire program has successfully resolved most of Ohio’s scrap tire

Ohioans are estimated to generate more than 12 million scrap tires each year. If Ohioans were still managing scrap tires like we were in 1987, then more than 5.6 million scrap tires would be improperly managed annually. That equates to almost 640 scrap tires per hour that the scrap tire program has ensured are being managed properly

management problems. The scrap tire regulatory program created a structure in which the majority of scrap tires are recycled rather than dumped or stockpiled. However, Ohio EPA and local governments have had to expend millions of dollars and other resources to address scrap tires that were managed illegally in the past.

One illegal scrap tire facility, the Kirby Tire Recycling, Inc. site, exemplified why Ohio needed a comprehensive regulatory program for scrap tires (see the text box on page 10 for details regarding this site).

Hazards of Improperly Managed Scrap Tires

Improperly managed scrap tires represent public health threats and environmental hazards. Because they can hold water, scrap tires make ideal breeding habitat for disease spreading vectors, particularly mosquitoes. Not only do water logged scrap tires contribute to local mosquito populations, but transporting those tires also provides a vehicle for spreading mosquito eggs and larvae, and thus disease, to other areas. Given the increased threats posed by and the rapid spread of such diseases as West Nile Virus, it is crucial that potential sources of mosquitoes are eliminated.

West Nile Virus

West Nile Virus is a viral disease that can cause encephalitis and that was, until 1999, seen only in Africa, Asia, and Southern Europe. The virus is spread to humans by the bite of an infected mosquito. Mosquitoes first become exposed to the virus when they feed on birds that are infected. Once the mosquito is infected, it may transmit the virus to people or other animals when it bites them.

West Nile Virus first appeared in the United States in 1999 in the greater New York City area. By 2005, the virus had spread to the 48 continental states. It has caused illness and death in humans as well as wild and domestic animals, especially birds and horses.

The first human case of West Nile Virus in Ohio was reported in August 2002. Since then, the virus has been found in all of Ohio’s 88 counties. According to the Ohio Department of Health, as of December 31, 2007, there have been 394 confirmed cases of West Nile Virus in humans and 51 human fatalities.

Continued spread of West Nile Virus is anticipated. Thus, it is important that breeding grounds for mosquitoes are eliminated to the greatest extent possible. This makes the proper management of scrap tires and the continued removal of all illegally managed scrap tires an absolute necessity.

Stockpiled tires also represent a fire hazard because, once ignited, a scrap tire pile is very difficult to extinguish. While burning, tires release large quantities of oil and noxious emissions. The runoff from a tire fire can destroy aquatic life in nearby streams and seep into ground water.

Even tires that were considered to be properly disposed of, such as in a municipal solid waste (MSW) landfill were problematic. Whole scrap tires are difficult to manage in landfills because they do not compact, because they tend to trap gas, and because they tend to migrate to the surface of a landfill where they can disturb the cap system allowing water to penetrate the landfill and produce leachate. Furthermore, scrap tires represent a valuable source of not just recyclable material but also potential energy production. For these reasons, the *1989 State Solid Waste Management Plan* (1989 State Plan) recommended that whole scrap tires be banned from disposal in solid waste landfill facilities.

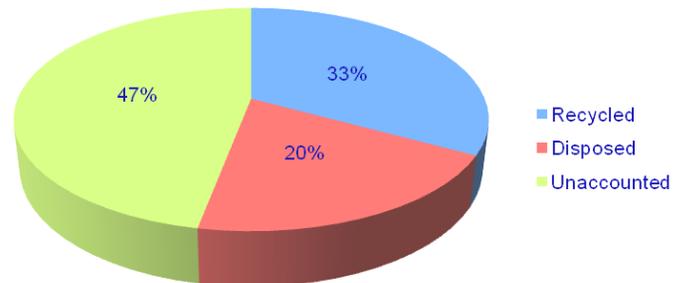
A Successful Program in Ohio

Ohio's scrap tire law was passed in 1993. This law gave Ohio EPA the ability to build a scrap tire regulatory program that has significantly improved scrap tire management not just from a health and safety perspective, but also from a resource management perspective. Ohio's first scrap tire rules became effective in March 1996. With those rules, Ohio instituted the ban on the disposal of whole scrap tires in solid waste landfill facilities that was initially envisioned in the 1989 State Plan. The law and the rules do allow scrap tires to be disposed of in dedicated scrap tire disposal facilities (i.e. scrap tire monofills) and dedicated units of solid waste landfill facilities (i.e. scrap tire monocells). In addition, as a result of a change to the rules that was adopted in 2007, scrap tires that cannot be processed at a scrap tire recovery facility (such as tires from aircraft and forklifts) can now be disposed of in an MSW landfill facility.

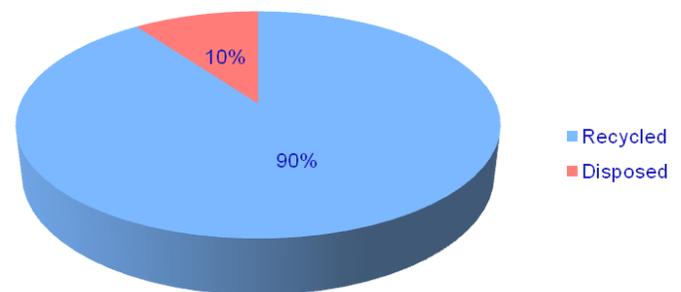
The comprehensive scope of the Ohio's rules combined with the ban on general disposal of scrap tires forced Ohioans to find ways to responsibly manage scrap tires. The success of Ohio's scrap tire program is reflected in the ways that scrap tires are currently managed. In 2005, Ohio EPA estimated that 90 percent of the 10.6 million tires that were received by scrap tire facilities were recycled. The remaining scrap tires were either disposed of in scrap tire monofills in Ohio or sent to disposal facilities located in other states. As illustrated in Figure 7-1, there were no unaccounted scrap tires in 2005.²⁵ Consequently, the scrap tire law and regulations have helped Ohio achieve one of the original goals of House Bill 592 – recycling scrap tires.

**Figure 7-1:
Comparison of Scrap Tire Management
1987 and 2005**

How Scrap Tires Were Managed 1987



How Scrap Tires Were Managed 2005



Ohio's scrap tire program has been so successful that in 2006 it was recognized by both environmental professionals and the tire industry for outstanding achievement. The National Registry of Environmental Professionals presented its 2006 abatement award to Ohio for the Kirby abatement effort as well as for Ohio's overall cleanup program. The Rubber Manufacturers' Association ranked Ohio's scrap tire program as seventh best program out of the 50 states. The Rubber Manufacturer's Association also judged Ohio's program to be one of the top three state programs with the most improvement over the previous two years.

Structure of Remaining Chapter

The majority of the remaining text in this chapter is devoted to providing information about four main components of Ohio's scrap tire program as established in law. These components are as follows:

- The scrap tire regulatory and enforcement program;
- The scrap tire management fund and the scrap tire fee;
- The scrap tire abatement program; and,
- The scrap tire grant program.

Following the discussions of these four components are a discussion of programs solid waste management districts (SWMDs) provide for scrap tire management, a discussion regarding the use of scrap tires to reclaim coal strip mines, and a summary of changes that have been made to the scrap tire rules since 2001.

Scrap Tire Regulatory and Enforcement Program

Ohio's scrap tire law governs the management of a scrap tire from the time it becomes a scrap tire until the scrap tire is recycled into another product, converted into energy, or properly disposed of. This comprehensive regulatory program governs the transportation, collection, storage, recovery, beneficial use, and disposal of scrap tires. In essence, Ohio's regulatory program applies to anyone who comes into contact with a scrap tire. The law also provides enhanced authority for Ohio EPA to force parties responsible for illegal scrap tire accumulations to clean up the tires. When those efforts are unsuccessful, the law provides a source of funding to be used by the State to remediate abandoned scrap tire piles.

Although Ohio EPA has primary authority for regulating scrap tires, there are other entities that perform regulatory and enforcement functions under the scrap tire program. Local health departments that are approved to administer the solid waste program within their jurisdictions and local law enforcement personnel work to deter and respond to complaints of illegal tire dumping. Approved health departments process and issue annual operating licenses for owners and operators of facilities as well as inspect scrap tire facilities. Health departments and local law enforcement personnel assist Ohio EPA with identifying and remediating scrap tire accumulations. Local judicial systems and the Office of the Ohio Attorney General (AGO) are involved in prosecuting offenders. It is through the cooperation of all parties involved that Ohio's scrap tire program has been so successful.

There are three "arms" of Ohio's scrap tire regulatory program that are discussed in this chapter. These are as follows:

- Registering, permitting, and licensing scrap tire transporters and facilities
- Shipping paper system
- Compliance and enforcement

Registration, Permitting, and Licensing

Anyone wanting to transport scrap tires or operate a scrap tire facility within the state of Ohio must first obtain all of the necessary authorizations. The scrap tire law does provide for limited exceptions from the authorization requirements. As an example, anyone who transports ten or fewer scrap tires in a single load doesn't need to be registered as a transporter. Generally, however, anyone wanting to operate as a "typical" scrap tire transporter or operate a "typical" scrap tire facility must first be authorized. Figure 7-2 presents a breakdown of the types of facilities that were authorized to operate in 2008.

Figure 7-2 Scrap Tire Facilities in 2008

In Ohio in 2008 there were...

- 16 Licensed Scrap Tire Collection Facilities
- 13 Licensed Scrap Tire Recovery Facilities
- Two Licensed Mobile Scrap Tire Recovery Facilities
- One Licensed Scrap Tire Storage Facility
- One Licensed and Permitted Scrap Tire Monocell
- One Licensed and Permitted Scrap Tire Monofill
- 70 Registered Scrap Tire Transporters

Transporting Scrap Tires

Anyone wanting to transport scrap tires into or out of Ohio must first register with Ohio EPA. This registration must be renewed annually. Registration as a scrap tire transporter in another state is not sufficient to satisfy Ohio's regulatory requirements. In addition to registering, a scrap tire transporter must pay an annual registration fee and demonstrate having adequate financial assurance as stipulated in law.

Scrap Tire Facilities

Anyone wanting to collect, store, process/recover, beneficially use, or dispose of scrap tires in Ohio must first obtain the appropriate authorizations which generally consist of a permit-to-install (PTI) or registration and an annual operating license. Ohio EPA is the agency that issues the PTI or registration. The licensing authority is either the local health department, if approved by Ohio EPA to administer the solid & infectious waste program, or Ohio EPA if the health department is not approved.

In order to promote the reuse and recycling of scrap tires, the rules allow scrap tires to be beneficially used. There are two types of beneficial uses: those that are approved-by-rule in accordance with paragraphs (D) and (E) of OAC Rule 3745-27-78; and those that must be approved through a project plan. If a proposed project is not listed as pre-approved, then a project plan must be submitted and approved by Ohio EPA before the project may be implemented.

Table 7-1 below presents the authorizing documents that are required for each type of scrap tire facility.

**Table 7-1
Authorization Needed to Operate a
Scrap Tire Facility**

Facility Type	Permit Needed	Registration Needed	Annual Operating License Needed
Scrap tire collection	No	Yes	Yes
Scrap tire storage	Yes, for only class 1	Yes, for only class 2	Yes
Scrap tire recovery	Yes, for only class 1	Yes, for only class 1 and mobile units	Yes
Scrap tire disposal ^a	Yes	No	Yes
Scrap tire beneficial use	No ^b	No ^b	No ^b

^a Disposal of scrap tires in Ohio can occur only at permitted and licensed scrap tire monofills or scrap tire monocells. A scrap tire monofill is a sanitary landfill facility that accepts only scrap tires for disposal. A scrap tire monocell is an individual unit or cell at a solid waste landfill facility that accepts only scrap tires for disposal.

^b Ohio Law requires anyone wanting to beneficially use whole or processed scrap tires to obtain specific authorization from Ohio EPA before beginning any type of project. Beneficial uses of scrap tires are authorized through two means - either by rule (i.e. pre-approved by OAC Rule 3745-27-78(D) or E)) or through a project plan approved by Ohio EPA.

Shipping Paper System

Shipping papers are used to document the transportation of scrap tires to and from destinations in Ohio. This shipping paper system, along with the registration and licensing of transporters and facilities, makes it possible for Ohio EPA to review the movement of scrap tires once they leave a generator. This helps to ensure that scrap tires are managed legally. The shipping paper system also makes it possible for tire dealers, automotive repair shops, gas stations, salvage dealers and other businesses that generate scrap tires to know that they are dealing with legitimate scrap tire businesses rather than illegal operators.

Shipping papers are generated each time a transporter picks up scrap tires from any source or delivers scrap tires to authorized facilities, such as approved storage, recovery or disposal facilities or beneficial use sites. When a transporter picks up scrap tires, a shipping paper form is completed. One copy of the completed form remains with the transporter and the other copy is left with the generator. Likewise, when a scrap tire transporter delivers scrap tires to a licensed scrap tire facility, another shipping paper form is completed, and each party to the transaction must keep a copy of the form to document the delivery and receipt of the scrap tires. Although these forms are not submitted to Ohio EPA, all parties are required to keep copies of the forms on file for three years. The forms must be available if Ohio EPA or local health department inspectors request to review the forms. Transporters and facility owners/operators are required to submit a summary of the shipping papers, in the form of an annual report, to Ohio EPA each year. The summary of tires in table 7-2 was prepared using those annual reports.

**Table 7-2
Composition of the 12 million scrap tires
generated annually**

Units	Passenger Tires	Semi-truck Tires	Off-road Tires	Total Tires
Percent of all tires	84%	15%	1%	100%
Number of Tires	10,080,000	1,800,000	120,000	12,000,000
PTEs	10,080,000	9,000,000	1,080,000	20,160,000
Percent of all PTEs	50%	45%	5%	100%

Compliance and Enforcement

Ohio EPA and approved local health departments are responsible for ensuring that scrap tire transporters and facility owners and operators maintain compliance with the scrap tire law and regulations. In those instances where violations are observed, Ohio EPA and the local approved health department attempt to bring the violators back into compliance with the requirements by providing technical and compliance assistance. When violations cannot be resolved, when a violator is recalcitrant, or when further action is warranted, Ohio EPA may initiate an enforcement action against the violator.

A local health department that is approved to administer the solid waste program within its jurisdiction is also responsible for enforcing provisions of the scrap tire rules. In addition, health departments can pursue enforcement actions for open dumping and nuisance violations. Furthermore, the local health departments assist Ohio EPA in identifying and prioritizing scrap tire dumpsites for locally and state funded abatement actions. Local health departments and SWMDs are encouraged to work together in the oversight of scrap tire facilities and dumpsites.

Senate Bill 165, which became effective in 1993, provided a funding mechanism to approved local health departments for compliance monitoring and enforcement activities related to the scrap tire management regulatory program. Thus, approved local boards of health receive an annual license fee from owners/operators of all scrap tire facilities. The board of health retains the entire amount of any fee that is less than \$15,000 and the first \$15,000 of any fee over \$15,000. The remainder, if any, of each license fee collected by a board of health is transmitted to Ohio EPA for deposit into the Scrap Tire Management Fund. This fund is explained in more depth in the next section.

Ohio EPA is also responsible for ensuring that illegal scrap tire dumps are abated. This abatement is performed through Ohio EPA's enforcement authority. More specifics regarding Ohio EPA's abatement efforts are provided later in this chapter.

Enforcement represents a significant portion of the workload for not just Ohio EPA but also the AGO. Most scrap tire enforcement actions are initiated to force responsible parties and property owners to clean up illegal scrap tire accumulations. When the responsible parties or property owners fail to clean up the scrap tires, Ohio EPA must obtain access to the property, can hire a contractor to clean up the property and seeks cost recovery from the responsible party or places a lien on the property.

A state-funded abatement project cannot occur at a scrap tire site until local and state enforcement efforts have been exhausted. Under the procedure established in the law, Ohio EPA or the local approved health department must first identify the party

responsible for the accumulation of tires and issue orders to that party to remove the tires. The responsible party has 120 days to undertake cleanup efforts. If the responsible party doesn't take action, then Ohio EPA requests access to the site from the property owner. If the property owner denies access, then Ohio EPA requests that the AGO obtain court-ordered access. Once access is obtained, Ohio EPA may use state funding to remove the tires and is required to pursue legal action to recover the cost of the cleanup. If the responsible party fails to pay the full cost of the cleanup, then a lien may be placed against the property. Ohio EPA uses a standard public bid process to contract with scrap tire recovery facilities and disposal facilities for removal and proper management of the scrap tires.

The Scrap Tire Fee and the Scrap Tire Management Fund

Ohio's scrap tire law established a source of revenue to fund Ohio EPA's scrap tire program. This revenue source, the scrap tire fee, is assessed on the first sale (i.e. wholesale) of new tires. The fee was originally set at \$0.50 per tire and generated an annual income of approximately \$3.5 million. In 2001, the legislature approved an increase to the scrap tire fee in response to the expenses Ohio EPA was incurring by responding to the fire at the Kirby site. Thus the tire fee was increased to \$1.00 per tire, and revenues from the higher fee averaged almost \$7 million annually. The law stipulates that at least 65 percent of the revenue from the \$0.50 increase must be spent for abatement of the Kirby site. In April 2008, after Kirby Tire cleanup was completed, the Director of Ohio EPA recommended retaining the full \$1.00 per tire fee through June 2011 to expedite Ohio EPA's efforts to abate remaining scrap tire accumulations.

Revenue received from the scrap tire fee is deposited into Ohio's Scrap Tire Management Fund along with revenue Ohio EPA receives from license, permit, and registration fees. The scrap tire law specifies that money from the Scrap Tire Management Fund is to be spent as follows:

- A maximum of \$750,000 is to be used by Ohio EPA annually to implement, administer, and enforce the scrap tire law and rules.
- Each fiscal year, one million dollars are to be deposited in the scrap tire grant fund which is currently administered by the Ohio Department of Natural Resources, Division of Recycling and Litter Prevention (ODNR, DRLP). However, if more than seven million dollars are deposited into the scrap tire management fund in a fiscal year, then one half of the excess money can be used for scrap tire grants.

- A maximum of \$4.5 million is to be used each fiscal year to conduct removal actions. More than \$4.5 million may be used in a fiscal year if revenues from the scrap tire fee are higher than expected or if there are balances remaining in the scrap tire management fund from previous fiscal years.

Ohio EPA continues to meet the spending objectives established in law. Expenditures for implementing, administering, and enforcing the scrap tire provisions have been, on average, below the \$750,000 annual limit set by law. Funds that are not used for program administration are added to the money used for abatement projects.

Scrap Tire Abatement

Prioritization of Scrap Tire Sites for Abatement

The Kirby Tire site, while the largest scrap tire accumulation in Ohio, was the sixth state-funded cleanup site to be initiated. The Kirby Tire site was not the first site to be remediated due to enforcement activities that were ongoing at the Kirby Tire site at the time.

The scrap tire law stipulates that sites that meet the following criteria should receive priority (listed in descending order of importance):

- Accumulations that constitute a fire hazard or threat to public health.
- Accumulations that contain more than one million scrap tires.
- Accumulations located in densely population areas.
- Accumulations that are determined to constitute a public nuisance by the local health department.
- Accumulations located on premises being operated without a valid license.

Until just recently, these priorities kept Ohio EPA's abatement efforts focused on the largest scrap tire accumulations. However, in State Fiscal Year 2006, funds were available for the first time to allow Ohio EPA to implement the consensual cleanup of sites containing less than 2,000 scrap tires. This existing portion of the scrap tire law applies in

instances specified in ORC 3734.85(E). These specifications basically limit qualifying instances to two, as follows:

- Someone inherits property that had an accumulation of scrap tires at the time the property was inherited; and
- Victims of open dumping who had no knowledge that tires were being dumped on their property and who did not profit in any way from the open dumping.

Under these circumstances and with the consent of the property owner, Ohio EPA can clean-up the tires without having to recover the clean-up costs from the property owner and without having to place a lien on the property. In essence, Ohio EPA can abate small tire accumulations without the need for a lengthy enforcement process. Ohio EPA has completed abatement of at least 37 sites through consensual agreements resulting in the abatement of approximately 100,000 PTEs.

Additional information regarding the scrap tire abatement program, including a complete list of the scrap tire abatement contracts that have been awarded to date, is provided in Appendix H.

What is a PTE?

A **passenger tire equivalent**, or PTE, is the standard unit of measure used by Ohio EPA for quantifying scrap tires. A PTE is equivalent to the weight of an average passenger tire - 20 pounds - and is defined in Ohio Administrative Code Rule 3745-27-61, Appendix 1.

Different types of vehicle tires can vary widely in size and weight. As an example, the average weight of one whole semi-truck tire is 100 pounds. Thus, an average semi-truck tire is the equivalent of five average passenger tires. It costs more to process or dispose of a large truck tire than a passenger tire.

For estimating the costs associated with processing scrap tires and abating scrap tire dumps, the weight of tires is more useful than the number of tires. The PTE provides a standard that can be used to convert numbers of different types of tires into an estimated weight for all tires at a dump site. This weight is then used to estimate the costs of abating a dump site.

State Abatement Efforts

Abating open dumps of scrap tires is an important part of Ohio's scrap tire program. The first state-funded scrap tire abatement project was begun in 1998. From 1998 to April 2008, 64 scrap tire abatement projects, including the Kirby Tire site, were initiated at priority scrap tire sites. Of those projects, 64, including abatement of the Kirby Tire site, were completed at the time this state plan was prepared. Ohio EPA was in the process of abating the Goss scrap tire dump in Muskingum County. From the 65 sites (including the portions of the Goss site that had been remediated by April 2008), more than 36.4 million illegally managed PTEs were removed at a cost of almost \$28 million.

Local Abatement Efforts

While Ohio's scrap tire management fund provides money to clean-up the larger illegal scrap tire sites, local resources have been invaluable in cleaning up many smaller abandoned scrap tire piles. Locally-funded scrap tire cleanups, using only local resources, have typically dealt with many smaller sites where the site owner has failed to comply with clean-up orders issued by local boards of health. Because of the priority setting process discussed earlier, most of these sites would not have been cleaned up as quickly under Ohio EPA's abatement program.

Ohio's solid waste law allows SWMDs to use revenue collected from statutory fees (i.e. solid waste generation and disposal fees) to fund scrap tire removal activities. Recognizing that state funding would not be available to timely address all existing scrap tire piles, some local SWMDs have funded the cleanup of local dump sites that pose an immediate public health or fire concern. A number of SWMDs also provide tire collection programs to their residents to deter open dumping. Other SWMDs fund and organize roadside and stream bank cleanup events.

Locally-funded scrap tire abatement projects have resulted in the removal of more than 10.8 million tires from at least 169 sites around the state.

Privately Funded Abatement Efforts

Voluntary, private clean-ups of smaller sites continue. The parties responsible for these sites often opt to voluntarily clean-up their sites once the enforcement process has begun. In these circumstances, the responsible parties realize that Ohio EPA will abate the sites and seek cost recovery through the AGO. As a result, the responsible parties often recognize that it is in their best interests to clean-up their sites on their own.

The Kirby Tire Recycling, Inc. Abatement Project

The Kirby Tire Recycling, Inc. (Kirby Tire) property is located in Sycamore, Ohio in Wyandot County. The Kirby Tire site consisted of 110 acres and was used to accumulate tires since the 1950s. Ohio EPA initially estimated that there were 15 to 20 million tires on site and that it would take 15 to 20 years to remove all of the tires. The Kirby Tire site was the largest accumulation of scrap tires in Ohio and was one of the largest tire dumps in the nation. Ohio EPA and the Wyandot County Health Department worked with the owners of Kirby Tire for many years to bring the site into compliance. On September 22, 1998, Ohio EPA issued a scrap tire abatement order that required Kirby Tire to remove all of the scrap tires from the site by January 20, 1999. Kirby Tire failed to comply with that order, and Ohio EPA's contractor began removing tires from the site in July 1999.

Although the Kirby Tire site was by far the largest accumulation of tires in Ohio, it was not the first site to be remediated. It was actually the sixth site in Ohio for Ohio EPA to begin remediation activities. This was due to enforcement activities that were ongoing at the time. Regardless, the number of tires at the Kirby Tire site was so immense that it was ranked as not just the largest illegal tire accumulation in Ohio, but also one of the largest accumulations in the United States.

On August 21, 1999, arsonists set fire to the Kirby Tire site. An estimated five to seven million tires were burned. The fire was so large that the smoke plume could be seen as far away as 60 miles from the site. Ohio EPA incurred \$3.7 million in fire-related emergency expenses, and the United States Environmental Protection Agency expended \$2.2 million during the initial fire-fighting response. Pyrolytic oil produced during the fire flowed into surface waters requiring Ohio EPA to contract for testing and remediation of the contaminated waters. The expenses involved in cleaning up the site ultimately caused Ohio's legislature to increase the scrap tire fee from \$0.50 to \$1.00 per tire. Cleaning up just the fire residuals required \$11.2 million. In addition, Ohio EPA spent almost seven million dollars providing security, water treatment, and ground water monitoring at the site following the arson fire.

With the additional funding from the scrap tire fee increase, Ohio EPA was able to accelerate abatement activities at the Kirby Tire site and complete removal of all tires outside of the fire area by June 2006. Thus, cleanup of the non-fire related portions of the site took a little less than seven years instead of the 15 to 20 years initially predicted. In that time, Ohio EPA's contractors removed more than 23 million passenger tire equivalents and 38,000 tons of solid waste from the site under five separate contracts. Ohio EPA's contractors completed cleaning up the fire residuals in April 2008. In total, the state of Ohio spent \$32.5 million to abate the Kirby Tire Site. This does not include \$2.5 million that the U.S. EPA spent on fire-fighting costs.

Since the scrap tire law was passed in October 1993, locally funded and privately funded cleanups have removed a combined total of more than 12 million tires from over 200 sites around Ohio.

Scrap Tire Grant Program

The scrap tire law established a scrap tire grant program in an effort to encourage recycling and other uses of scrap tires rather than disposal of scrap tires. When the scrap tire law was first adopted, the authority for administering the grant program was given to the Ohio Department of Development (ODOD). In 2001, Ohio's Legislature transferred oversight of the program from ODOD to ODNR, DRLP.

As was explained earlier in this chapter, one million dollars from the scrap tire management fund are made available annually for scrap tire grants. This money is transferred from Ohio EPA to ODNR annually. Grants are awarded for projects that:

- establish or expand private manufacturing facilities that utilize scrap tire material;
- develop civil engineering projects using scrap tires; and,
- foster market development research for scrap tires.

State Fiscal Year 2007 (beginning July 1, 2006) represented the first time that more than seven million dollars were deposited into the scrap tire management fund. As was explained earlier, any monies in excess of seven million dollars are to be split between scrap tire grants and abatement efforts. As a result, an additional \$70,000 was transferred to the scrap tire grant program for future scrap tire grants.

Grant funding is to be used by private businesses and non-profit organizations, but businesses and non-profits cannot apply for the grant directly. An agency of the state of Ohio must submit the application on behalf of an Ohio business or non-profit organization. The intent behind that requirement is to form a cooperative enterprise. Qualifying agencies include municipal corporations, counties, townships, state colleges or universities, SWMDs and authorities, park districts, and boards of education/joint vocational school districts.

Projects funded through grants have established new reuse and recycling facilities for scrap tires generated in Ohio. Priority is given to those projects that utilize large volumes of scrap tires on an annual basis and that can be sustained without additional government subsidies. ODNR, DRLP believes that the following types of projects, listed in priority order, are the most viable for achieving the mission of the grant program:

- Burning of scrap tires/tire-derived fuel in Ohio EPA-approved facilities;
- Beneficial use of scrap tires in civil engineering and other applications; and,
- Recycling of scrap tires into high-value new finished products.

Since authority for the grant program was transferred to ODNR, more than \$5.8 million were awarded to help private companies process or create an end use product for a reported 396,619 tons of scrap tire material (or more than 31.7 million PTEs).

The text box below and continued on the next page provides overviews of two of the projects funded through the grant round for 2006 (State Fiscal Year 2007).

Market Development Through Scrap Tire Grants

Two projects that the Ohio Department of Natural Resources, Division of Recycling and Litter Prevention (ODNR, DRLP) funded through the 2006 Scrap Tire Grant round have the potential to consume large quantities of scrap tires. The first grant involves recycling scrap tires into a new commercial product. The second project involves converting scrap tires into tire derived fuel to run a cement kiln. The projects together have the potential to recycle at least 2.6 million scrap tires annually.

Ashtabula County Solid Waste Management District and Iten Industries

In 2006, ODNR, DRLP awarded the Ashtabula County Solid Waste Management a grant of \$251,632 for a market development project to be performed by Iten Industries. ODNR, DRLP issued 11 grants in 2006, and the grant awarded to the Ashtabula County Solid Waste Management District was the second highest award.

Iten Industries is a manufacturer of plastics, composites fabrication, injection molding, pultrusion, and high-pressure laminates. The company will use the grant funding, along with \$650,000 of matching funds, to purchase equipment to manufacture a decorative patio brick using rubber from scrap tires. To do this, the company will purchase equipment that will convert scrap tires into crumb rubber and equipment to manufacture the bricks. Using this equipment, Iten Industries will use an extrusion process to manufacture decorative landscape pavers using the crumb rubber.

The project has the potential to use the equivalent of at least one million passenger tires annually. Some of the scrap tires will come from the area. In addition, the company plans to hire at least three additional employees. All in all, between the grant funding and the matching funding from the company, Iten Industries will spend almost one million dollars for capital expenses.

Greene County Solid Waste Management District and CEMEX

During the 2006 Scrap Tire Grant round, ODNR, DRLP awarded the Greene County Solid Waste Management District a grant of \$350,000 for a market development project to be performed by CEMEX at the Fairborn Cement Plant. For 2006, this grant was the highest grant awarded by ODNR, DRLP and was the maximum amount of funding available for a single project.

CEMEX is a manufacturer of cement and concrete products and will use the grant funding, along with approximately 2.1 million dollars in matching funds, for a tire derived fuel project. Implementing the project will involve the purchasing equipment to blend tire derived fuel with petroleum coke for use in the company's cement kiln.

CEMEX anticipates that it will use at least 1.6 million scrap tires per year, and, between the grant award and matching funds, will spend an estimated \$2,400,000 to implement this project.

SWMD Programs for Scrap Tire Management

Although Ohio's regulatory program and the ban on disposing of scrap tires in MSW landfills have significantly improved scrap tire recycling, SWMDs also have boosted Ohio's scrap tire recycling rate through programs provided at the local level.

SWMDs are required to provide at least one strategy to address scrap tire management. The specific strategy or strategies that a SWMD chooses to provide are at the discretion of each SWMD. The programs that are provided by Ohio's 52 SWMDs range from providing information and outreach regarding the proper management of scrap tires and available outlets for scrap tires to sponsoring collection events and funding abatement projects for abandoned scrap tires.

Summary of SWMD Programs

All 52 SWMDs reported having a program to address scrap tire management in 2006. Many SWMDs reported having two or even multiple scrap tire programs. These programs can be categorized into the following:

- **Education, outreach and technical assistance programs.** These programs consisted of making printed materials available regarding the proper management of scrap tires, providing information via the Internet and distributing lists of outlets for scrap tires. 24 SWMDs reported having provided some type of outreach program in 2006.

- **Clean-up of abandoned tires.** This category includes: abatement activities performed by scrap tire companies under contract with the SWMD; provision of funding, either through grants or loans, to communities for local cleanup efforts; financing the removal and disposal of scrap tires abandoned on county roadways; reimbursements to communities for disposal of scrap tires removed from roadways; and providing funding to local health departments for scrap tire enforcement and abatement activities. For 2006, 18 SWMDs reported having programs to address scrap tire clean-up activities.
- **Scrap tire collection opportunities.** For 2006, 40 SWMDs reported having provided scrap tire collection opportunities to their residents. These collection opportunities are described in more detail below.

Scrap Tire Collection Opportunities

Although SWMDs are not required to provide collection opportunities for scrap tires, more than half of the SWMDs offer some sort of collection opportunity to their residents. How these opportunities are provided varies from one SWMD to another as is illustrated in the following bulleted points:

- Some collection opportunities are temporary, annual collection events offered for one day or several days. Other opportunities are available to residents for an extended period of time, either on a semi-permanent or even a permanent basis.
- Some SWMDs collect tires at publicly owned facilities, such as recycling centers, transfer facilities, landfill facilities, and other county-owned properties. Many SWMDs sponsor a collection event that is provided through an approved scrap tire facility.
- A number of SWMDs charge residents a user fee for participating in the collection event. The fee is usually assessed on a per tire basis. Other solid waste management pay the costs of providing the collection event out of their annual operating budgets and make the events "free" to participants.
- Some SWMDs have a single collection location per county whereas other SWMDs provide multiple collection locations.
- Some SWMDs directly finance collection opportunities and others distribute funds to local communities who then coordinate providing the collection opportunities in their jurisdictions.

For 2006, 40 SWMDs reported having provided their residents with a collection opportunity for scrap tires. Of those 40 SWMDs:

- 27 reported having provided temporary collection events;
- 8 reported having provided semi-permanent and permanent collection opportunities; and,
- 5 reported having provided a combination of temporary and semi-permanent/permanent collection opportunities.

In 2006, SWMDs reported having recycled a total of 121,833 tons of scrap tires.

For 2008, 32 SWMDs provided scrap tire collection opportunities to residents. Of those 32 SWMDs:

- 20 provided temporary collection events;
- 10 provided semi-permanent and permanent collection opportunities; and,
- 2 provided a combination of temporary and semi-permanent/permanent collection opportunities.

Of the 12 SWMDs that provided semi-permanent/permanent collection programs:

- 8 SWMDs collected tires at recycling centers owned and operated by the SWMD;
- 2 SWMDs collected scrap tires at a county owned landfill; and,
- 2 SWMDs contracted with local companies to provide drop-off centers for residents.

Landfilling of Scrap Tires in Abandoned Coal Strip Mines

House Bill 592 required the Director of Ohio EPA, through the state solid waste management plan, to evaluate the feasibility of reclaiming abandoned coal strip mines by turning them into scrap tire disposal sites. Coal strip mines represent environmental threats due to acid mine drainage, landslides, floods, and contamination from sediments all of which can have severe consequences for rivers, drainage pathways, and bottomlands. Thus, it is in Ohio's best interests for these abandoned lands to be reclaimed.

When House Bill 592 was passed, Ohio was concerned about how to properly dispose of scrap tires. It was believed that a large percentage of scrap tires would be disposed of and that reclaiming abandoned coal strip mines would provide adequate disposal capacity for a difficult to manage waste stream. Contrary to predictions, Ohio's reliance on scrap tire disposal facilities has been minimal. In fact, to date, there has been only one approved scrap tire disposal site involving an abandoned coal strip mine in Ohio. In addition, there have been only three

approved disposal facilities for scrap tires. The lack of needed disposal capacity is due to the value of scrap tires which has increased to the point where a much larger percentage of scrap tires are being recycled than originally anticipated.

The disposal facility involving abandoned coal strip land was approved by Ohio EPA as a pilot disposal facility in Stark County. This project was made possible through a cooperative effort between ODNR, Division of Mineral Resource Management (formerly the Division of Mines and Reclamation) and Ohio EPA. Because the scrap tire rules were not effective at the time, the pilot project was approved through director's final findings and orders and incorporated exemptions from some of the solid waste requirements. Under the current scrap tire rules, the facility would be approved through a PTI for a scrap tire monofill. However, for all intents and purposes, the facility was a scrap tire monofill. The project was approved in 1995, and the approval was issued to C & E Coal, the lessee of the property and the operator of the disposal facility. Following approval of the pilot project, the scrap tire rules were adopted in 1996.

C & E began accepting tires at the site in 1997 and ceased accepting tires at the end of 2004. In that time, an estimated 95,579 tons of scrap tires, or 9,557,915 PTEs, were disposed of at the project site.

The C & E Coal Pilot Project demonstrated that it is feasible to construct a scrap tire disposal facility not just on abandoned mine lands, but anywhere. While there has been only one scrap tire disposal facility constructed on abandoned mine lands, PTIs for three other scrap tire disposal facilities were issued in subsequent years. Two of these facilities were scrap tire monofills – the C & E Coal Scrap Tire Monofill (later purchased by Liberty Tire Services of Ohio LLC) and the American Tire Monofill - and one was a scrap tire monocell associated with the Pike Sanitation Landfill, an MSW landfill facility.

The American Tire Monofill ceased accepting scrap tires in 2006, and all buried scrap tires were removed. Pike Sanitation, Inc. hasn't placed any scrap tires in its monocell since 2003. Instead of disposing of the tires, Pike Sanitation, Inc. is using the tires as tire-derived chips in place of aggregate material in the leachate collection system in its MSW landfill. Liberty Tire Services continues to accept small amounts of scrap tires for disposal in its monofill which is now called the Minerva Scrap Tire Facility.

Even though Ohio doesn't currently need additional disposal capacity for scrap tires, the lessons learned from the pilot project were used as the basis for changes to the scrap tire monofill rules that were adopted in 2003 and 2004. Furthermore, because it was the first "approved" disposal facility, the pilot project served as a model for subsequent and future disposal facilities.

Changes in the Scrap Tire Rules Since 2001

March 2002

The *2001 State Solid Waste Management Plan* contained a discussion of changes to the scrap tire rules that were being proposed by the workgroup assigned to review the rules to satisfy the statutory five-year rule review requirements. These proposed changes were adopted in March 2002. The changes that were adopted refined the existing program rather than significantly changing the program. The most significant change involved including additional beneficial uses as approved by rule. As a result, two specific uses of tire chips are now approved by rule. These are the use of tire chips as a gravel substitute around building foundations and in home septic systems. The impetus for adding these two uses is the potential market for scrap tires that was created. While each of these uses consumes only 800 to 1,000 scrap tires per project, the large number of homes being built and septic systems being built or replaced could result in millions of tires being used.

November 2007

A second revision of the scrap tire rules was drafted in 2007 and became effective on November 1, 2007. Details of the changes made during this revision effort are provided in Appendix I. In general, the changes made during this effort were more significant than those made in 2002. However, as with the 2002 changes, the revisions made in 2007 were intended to strengthen the existing program rather than redirect the program.

The Future

Although Ohio's scrap tire problems are under control, and the largest scrap tire dumps have either been eliminated or will soon be abated, the scrap tire law and regulations need to remain in place to protect the gains that Ohio has made. States that have rescinded their scrap tire laws after existing conditions improved have experienced a rapid return to former practices of open dumping and stockpiling of scrap tires.

As was mentioned earlier, the majority of the large scrap tire sites have been abated or are slated to be abated in the very near future. Abatement of the Kirby Tire Site which consumed vast resources over nine years was completed in 2008. While ground water monitoring will continue at the site for an additional three years, completion of abatement at the Kirby Tire Site allows Ohio EPA to redirect its attention to other sites.

In its *Scrap Tire Cleanup Plan for SFY 2008*²³, Ohio EPA stated that Ohio EPA is tracking local enforcement efforts on over 60 scrap tire sites containing an estimated total of two million scrap tires. The size of these sites drops rapidly after the few remaining large sites. Of the remaining sites:

- Six large sites have between 250,000 to 50,000 tires per site;
- 15 medium sized sites have between 50,000 and 10,000 tires per site; and,
- Over 45 small sites have less than 10,000 per site.

Old scrap tire sites that may have existed for years continue to be identified each year. Many of these old sites are not visible from public-rights-of-way, and Ohio EPA has to wait for complaints or aerial photography to identify them. New scrap tire dump sites tend to be small, isolated open dumping events. The sites range from having one to four tires dumped by individuals to hundreds of tires dumped by illegal scrap tire transporters. Ongoing, small scale dumping continues to be a financial burden to local communities. Stiffer penalties for illegally transporting and dumping scrap tires may be needed to eliminate the problems.

Implementation of the program for the consensual cleanup of sites containing under 2,000 scrap tires is expected to remain a popular option. This program is particularly popular with local authorities and property owners who are victims of open dumping.

Footnotes

²³ Percentages of tires are based on information reported by registered scrap tire transporters and licensed scrap tire facilities. It is estimated that these reports capture almost all scrap tires generated in Ohio. Local government officials report that they continue to deal with scrap tires being illegally dumped in small numbers. Many of these illegally dumped tires are included in the numbers reported by Ohio's registered scrap tire transporters, as the transporters are often hired by local governments to haul the tires cleaned up from open dump sites to licensed scrap tire facilities.

Chapter 8

A Program for Managing Household Hazardous Waste

Ohio Revised Code Section 3734.50(H) requires the state solid waste management plan to “Establish a program for the proper separation and disposal of hazardous waste generated by households.”

Introduction

Most people associate hazardous waste with chemicals used by and discarded by large industrial plants and the manufacturing sector. However, many common household products contain the same chemicals that are found in products used by industrial companies. As a result, the use of those household products and the resulting wastes pose the same potential threats to human health and the environment as the wastes generated by industries. However, hazardous waste generated by businesses is regulated under Ohio’s hazardous waste program whereas the hazardous waste generated by households is not. While, businesses generally generate hazardous waste in much larger quantities and in a wider array than households, it is appropriate that the state solid waste management plan (state plan) address the proper management of hazardous waste from households.

Miscellaneous Facts about Household Hazardous Waste

- The average homeowner accumulates as much as 100 pounds of household hazardous waste in the basement, garage, and other storage areas.
- The average household generates 15 pounds of household hazardous waste a year.
- Paint and paint-related wastes comprise more than 36 percent of the household hazardous waste generated.^a
- U.S. EPA estimates that, on average, 1 percent of all the municipal solid waste that we generate consists of household hazardous waste. For Ohio, this amounts to 147,180 tons of household hazardous waste generated by Ohioans in 2007.

^aKansas Department of Health and Environment, *Household Hazardous Waste: Facts and Figures*, http://www.kdheks.gov/kdsi/pg09_hhw_facts.htm (April 8, 2008).

There are also items commonly found in households that people likely do not think of as being hazardous or containing hazardous materials. Examples include: electronics such as televisions, computers, cellular telephones, and many other portable electronic devices; propane tanks; thermometers, thermostats, and other mercury-containing items; and, fluorescent light bulbs.

The hazardous waste generated by households is referred to as household hazardous waste, or HHW. HHW includes any material discarded from a home that, because of the material’s chemical nature, may pose a threat to human health and the environment when handled incorrectly. Categories of common household products that can be hazardous waste include:

- household cleaners;
- automotive fluids such as antifreeze, gasoline, and oil;
- lawn and garden products, such as pesticides, fertilizers, and weed killers;
- paint and paint-related products, such as oil-based paint, paint stripper, stains, and turpentine;
- pool chemicals;
- photographic chemicals; and,
- compressed gas tanks.

What Makes Something a Hazardous Waste?

There are two ways that a waste can be classified as hazardous. Ohio’s hazardous waste regulations contain four lists of wastes that are known hazardous wastes (see Administrative Code (OAC), rules 3745-51-31 through 3745-51-33). If a waste or a constituent that is found in the waste appears on any one of those lists, then that waste is a designated hazardous waste.

If a waste does not appear on the four lists in the regulations, then the waste may still be regulated as a hazardous waste if the waste possesses a hazardous characteristic. Under the regulations, there are four characteristics that could cause a waste to be regulated as hazardous. These four characteristics are:

- **Ignitable** - The waste can easily be set on fire or ignited. Examples of ignitable wastes include charcoal lighter fluid, turpentine, gasoline, and nail polish remover.

- **Toxic** - The waste is poisonous and is capable of causing injury or death through ingestion, inhalation, or absorption. Examples include pesticides, antifreeze, weed killers, and bleach.
- **Corrosive** - The waste is caustic and has either a very low or a very high pH. As such, the waste can burn and destroy living tissue upon contact. Examples include oven cleaners, lye, drain openers, and lime.
- **Reactive** - The waste can detonate, explode, or product toxic vapors through exposure to heat, sudden shock, or pressure. Examples include strong acids, fireworks, and compressed gas cylinders.

How is HHW Regulated?

Although it can have many of the same properties as industrial hazardous waste, HHW is not regulated under either the federal or Ohio's hazardous waste regulations. This is because the amount of HHW generated by each household is very small. Furthermore, it is not practical for Ohio EPA to regulate every household in Ohio. For these reasons, HHW is specifically excluded from regulation as hazardous waste by both the federal hazardous waste program in the Code of Federal Regulations [40 CFR § 261.4(b)(1)] and Ohio's hazardous waste program [OAC Rule 3745-51-04]. As a result, hazardous wastes that are generated by households can be disposed of along with all other trash as municipal solid waste (MSW). That doesn't mean disposal is the best option; it just means that disposal is not prohibited for households. Homeowners should still manage HHW responsibly.

Even though each household generates only a small amount of hazardous waste, the cumulative effects of HHW can be as harmful to the environment as a spill or discharge from an industrial generator. It is important to understand that the same waste, if generated by a business, an institution, or any organization other than a household, would likely be regulated as a hazardous waste, and management of the waste would need to occur through a hazardous waste treatment, storage, or disposal facility. Thus, it is important that homeowners find alternatives to creating and disposing of HHW whenever possible. That is why HHW is specifically targeted by the state plan.

Solid Waste Management District Programs for Addressing HHW

Ohio's solid waste statute requires the state plan to contain a strategy for managing HHW. In turn, the state plan requires each of Ohio's 52 solid waste management districts (SWMDs) to provide a strategy for addressing HHW. Because the state plan does not prescribe the strategies that must be provided, SWMDs have maximum flexibility for determining which strategies are the most appropriate for their individual circumstances and their residents. Thus, the programs offered by SWMDs range from education and outreach programs to full scale collection programs.

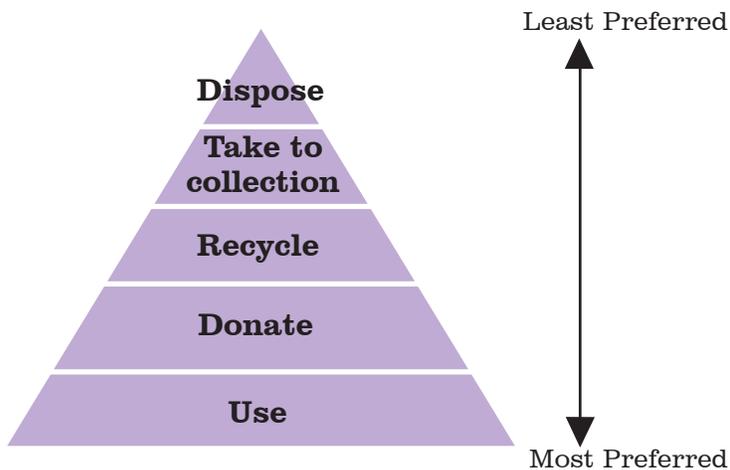
Education and Outreach

Education and outreach are powerful tools that SWMDs can use not only to change a homeowner's use of hazardous products but also to direct a homeowner to proper management options for HHW. Consequently, a SWMD's education and outreach program should address all aspects of HHW generation and management.

The best management alternative for HHW is to avoid generating it. A well-rounded HHW education and outreach program provides information about the dangers associated with using products that contain hazardous chemicals, the proper way to use and store those products, and the importance of purchasing and using only the amount of a product that is needed. It is also important to provide homeowners with recommendations for non-hazardous alternatives to dangerous products. Greater public awareness about the purchase, dangers, and use of products that contain hazardous substances enables the consumer to make informed decisions regarding the products they choose. This can lead to a reduced reliance on hazardous products and less HHW that must be managed.

Regardless of how comprehensive a SWMD's prevention education program is, residents are going to generate HHW. The goal is to direct the HHW to the safest and most appropriate management technique. As is illustrated in Figure 8-1, management options that safely keep HHW out of MSW are preferred over disposal in landfills. Therefore, while a SWMD's outreach program should provide information on all management options, the SWMD should emphasize those options to divert HHW from landfills.

**Figure 8-1:
Hierarchy for Managing Unwanted/Used
Household Hazardous Products**



When possible, homeowners should look for opportunities to foster the use of leftover hazardous household products. In some cases, this could involve the homeowner using a product as intended until it is gone. For some leftover and unwanted hazardous household products, residents may be able to donate the remaining product to someone who can use it. For those products that are not usable and for wastes generated from using hazardous products, the homeowner should participate in local collection programs. Some of these collection programs, such as those for used motor oil, are designed to recycle the waste. Other collection programs, such as those sponsored by SWMDs, are intended to collect HHW for proper treatment and disposal.

In those areas not served by a collection program or for wastes not accepted through collection programs, homeowners should prepare the HHW for disposal. In some cases, disposal may involve flushing the HHW down the drain. In particular, if using a hazardous product as intended results in the product being flushed down the drain, then it may be acceptable to dispose of any unused product the same way. Disposal in this manner is only an option for homes that are connected to a sanitary sewer system (i.e. not a septic system). Furthermore, homeowners should contact the wastewater treatment plant prior to flushing large quantities of products down the drain. This is to ensure that the product can be removed during the treatment process and to obtain recommendations from the plant operator regarding diluting the product.

In other cases, disposal will involve disposal as MSW. As was mentioned earlier, it is not illegal for a homeowner to dispose of HHW in the trash. However, there are ways for the responsible homeowner to safely dispose of HHW. An example is using a solid material (such as kitty litter, sawdust, paper, etc.) to absorb liquid HHW. As another option, the homeowner can put the HHW in a rigid container or in multiple trash bags to reduce the likelihood that the HHW will be released in the collection vehicle and the landfill.

In their annual district reports (ADRs) for 2007, 38 SWMDs reported having provided HHW education, outreach, and technical assistance. The remaining 14 SWMDs reported having provided another program related to HHW, usually a collection program or a dedicated HHW hotline. Many SWMDs reported having provided education and outreach in addition to other HHW programs.

Collection Programs

SWMDs are not required to provide collection programs for HHW, or any material, to their residents. However, more than half of Ohio's SWMDs do provide some form of a HHW collection program. Providing a collection program is one of the most visible ways that a SWMD makes itself available to residents, and HHW collection programs are very popular with residents. However, offering a HHW collection program generally is a costly endeavor and one that can be difficult to discontinue once started.

HHW collection programs range from single-material drop-offs to full-scale, permanent collection options. Some SWMDs provide more than one type of collection option, and some SWMDs collect other materials, such as scrap tires, appliances, and electronics, along with HHW. A number of SWMDs provide collection programs at recycling centers owned and operated by the SWMDs.

In 2008, 32 SWMDs, representing 58 counties, provided a general HHW collection program to residents. For purposes of this document, "general" refers to a collection program for typical HHW with few restrictions on the materials that are managed through the program. The most common restrictions imposed by SWMDs are on ammunition, explosives, and radioactive materials. Many SWMDs also limit the size of any one container that will be accepted. In order to remain unregulated under Ohio's hazardous waste program, SWMDs cannot accept hazardous waste from any generator other than a household regardless of the amount of waste involved. Otherwise, the SWMD would be regulated under the hazardous waste regulations.

In addition to the typical waste restrictions, several SWMDs have stopped accepting latex paint through HHW collection programs. Latex paint is not a hazardous waste and does not need to be managed as a hazardous waste (see the text box to the right for more information about latex paint). Some SWMDs have also ceased accepting wastes that have other established outlets. Examples include used oil, automotive batteries, and rechargeable batteries. All three of those wastes are easily recycled through other entities.

Of the 32 SWMDs that offered general collection programs in 2008:

- seven single county SWMDs offered permanent or semi-permanent collection programs.
- two SWMDs offered both semi-permanent and temporary collection programs.
- 23 SWMDs representing 47 counties, held temporary general collection events.
- six of the 32 SWMDs operate their HHW collection programs at facilities, usually recycling centers, operated by the SWMD.

Latex Paint the “Non-hazardous, Household Hazardous Waste”

The United States Environmental Protection Agency estimates that 10 percent of all paint purchased in the United States becomes leftover paint. Because latex paint comprises most of the consumer paint sold, the vast majority of leftover paint in homes is latex paint.

Although paint used to contain heavy metals, such as lead and mercury, and was considered to be hazardous waste, lead and mercury were banned from paint in 1973 and 1991, respectively. The result is that modern latex paint does not meet the criteria to make it a hazardous waste.

Even though most of the paint sold is latex paint, paint typically comprises from 40 to 70 percent of the waste brought to local HHW collection programs.^a The majority of this paint is latex paint. Many homes still contain stored paint that is oil-based and therefore hazardous waste. Thus, some SWMDs do continue to receive hazardous paint at collection events.

Because providing HHW collection programs are usually costly endeavors, managing a non-hazardous material, like latex paint, through those programs is not cost effective. For this reason, an increasing number of SWMDs have stopped accepting latex paint at HHW collection events.

SWMDs that don't accept latex paint have opted to provide education on proper disposal methods for leftover paint and ways to reduce paint waste. Some SWMDs also distribute a commercial product that hardens paint to residents that bring latex paint to the collection events.

^aShirley Niemeyer et. al., *Handling Household Wastes: Paints and Paint Related Products*, Health Goods, http://www.healthgoods.com/Education/Healthy_Home_Information/Home_Health_Hazards/handling_waste_paint.htm. (April 9, 2008).

An additional four SWMDs provided temporary collection programs for either limited materials or limited service areas.

Permanent and Semi-Permanent General HHW Collection Programs

For purposes of this summary, a permanent general HHW collection program is one that is available to residents all year long, at least during regular business hours, for typical HHW. The Preble County SWMD is the only SWMD to offer a truly permanent collection program to its residents. The Preble County SWMD's program is stationed at the Preble County Landfill and is available to residents Monday through Friday from 8:30 a.m. to 4:00 p.m. and on Saturdays from 8:30 a.m. to 12:00 p.m.

A semi-permanent general collection program is one that is available to residents on an extended basis (i.e. weekly, monthly, and/or seasonally) for typical HHW. These programs are available more regularly than temporary collection events, but not on a truly permanent basis.

In 2008, nine SWMDs provided semi-permanent, general collection programs. Of those, six SWMDs collect HHW at a recycling center or other facility owned and operated by the SWMD. The Geauga-Trumbull Joint SWMD and the Solid Waste Authority of Central Ohio (representing Franklin County) offered both semi-permanent and temporary collection events to their residents. The nine SWMDs offering semi-permanent programs and specifics regarding those programs are listed in Table 8-1.

Two of the SWMDs – the Lucas County and Hamilton County SWMDs - offer their semi-permanent collection programs in conjunction with commercial hazardous waste companies. The Lucas County SWMD's program is a by-appointment program that is provided through Heritage Environmental Services. The Hamilton County's program is provided through Environmental Enterprises. For more information regarding these semi-permanent collection programs, see the text box that begins on the next page.

Temporary, General Collection Events

Historically, most SWMDs have held temporary general collection events, usually on an annual basis. Most often, temporary collection events last for one day on a weekend and are held at county-owned property or facility, such as fairgrounds. Some SWMDs offer more than one, single day collection event each year. Still others provide collection events over two or more consecutive days. Three SWMDs that sponsor temporary collection events do so less frequently than annually, such as every other year or even triennially. None of these three SWMDs offered collection events in 2008.

**Table 8-1:
Semi-permanent Collection Programs
for HHW**

SWMD	Availability (2008)		
	Months	Days	Hours
Butler	June 5-Sept. 25	Thursdays	2-7 pm
Franklin/ SWACO ^a	Nov.-March	Wednesdays Thursdays	2-6 pm 9 am-4 pm
	April-Oct.	Wednesdays Thursdays	2-7 pm 9 am-5 pm
Geauga- Trumbull ¹	May 7-Sept. 24	Wednesdays	10 am-6 pm
Greene	Monthly March - Sept	Second Saturday	9 am-1 pm
Hamilton (2 locations)	March 1-Nov. 22	Tuesdays (location 1)	2-6 pm
		Wednesdays (location 2)	2-6 pm
		Saturdays (location 1)	9 am-1 pm
Logan	June 7-Aug. 30	Wednesdays	4 pm-7pm
		Saturdays	9 am-12 pm
Lucas	All year		
Mont. (2 locations)	All year	Tuesdays (North location)	8 am- 2 pm
		Saturdays (South location)	8 am- 2 pm
Summit/ Akron	April 1-Oct. 1	Tuesdays Wednesdays	1-4 pm 6:30-9:30 pm

^aOffered both semi-permanent and temporary collection events in 2008.

In total, 23 SWMDs representing 47 counties held strictly temporary general collection events in 2008. Another four SWMDs sponsored limited collection events. The events for the Fayette, Highland, Pickaway, Ross Joint and Wood County SWMDs were for limited service areas. The events for the Defiance, Fulton, Paulding, Williams Joint and Medina County SWMDs were for limited wastes, primarily automobile fluids and paint.

In recent years, several SWMDs that previously provided temporary collection events have switched to providing permanent or semi-permanent collection programs. Regardless, the temporary collection event is still, by far, the collection option most often chosen by SWMDs.

**Figure 8-2:
SWMDs that Offered Temporary General
Collection Events for HHW in 2008**

- Allen, Champaign, Hardin, Madison, Shelby, Union
- Ashland
- Ashtabula
- Auglaize
- Belmont-Jefferson
- Brown
- Carroll, Columbia, Harrison
- Coshocton, Fairfield, Licking, Perry
- Crawford
- Cuyahoga
- Delaware, Knox, Marion, Morrow
- Franklin (SWACO)^a
- Geauga-Trumbull^a
- Guernsey, Monroe, Morgan, Muskingum, Noble, Washington
- Hancock
- Lake
- Lawrence-Scioto
- Lorain
- Mahoning
- Mercer
- Miami
- Ottawa, Sandusky, Seneca
- Pike
- Stark, Tuscarawas, Wayne
- Wyandot

^aOffered both semi-permanent and temporary collection events in 2008.

HHW Drop-offs and Miscellaneous Collection Programs

A number of SWMDs provide collection opportunities for limited wastes. Most of these opportunities are considered to be drop-off programs. However, several SWMDs also sponsor or coordinate collection events for specific, targeted wastes.

A drop-off is a location where, during designated times, residents can deliver specified waste for a qualified service provider to manage appropriately. Usually, the service provider is a commercial hazardous waste company that is under contract with the SWMD for servicing the drop-off. For many of these drop-offs, the SWMD partners with another entity to provide the location. Residents are then able to take collected wastes to the drop-off during the operating hours of the partnering entity. Typical locations for HHW drop-offs include government buildings, libraries, schools, health departments, retail establishments, and SWMD-operated recycling centers.

Materials commonly accepted at HHW drop-offs include: household batteries, both alkaline and rechargeable; cellular telephones; paint and paint-related wastes; used oil; mercury and mercury-containing devices; fluorescent light bulbs and ballasts; and, ink jet and toner cartridges.

Providing Collection of Household Hazardous Waste Through Public-Private Partnerships

By working in partnership with commercial hazardous waste management companies, SWMDs are able to provide non-traditional, regular programs for collecting HHW from residents. The programs offered by the Lucas County and Hamilton County SWMDs are two examples of such partnerships.

Hamilton County Solid Waste Management District

To provide its residents with more convenient access to a HHW collection program, the Hamilton County Solid Waste Management District (Hamilton SWMD) switched from providing a temporary collection event to a semi-permanent program in 2004.

To test the feasibility of providing an expanded collection program, the Hamilton SWMD conducted a pilot project from June to September 2004. The concept of the pilot project was to allow residents to take their HHW to a commercial hazardous waste company. The Hamilton SWMD contracted with Environmental Enterprises in Cincinnati as the service provider. Under the pilot project, residents were instructed to take HHW to one of Environmental Enterprises facilities during business hours. Residents were not charged for the service, but they were required to obtain a voucher from the Hamilton SWMD prior to visiting Environmental Enterprises. The Hamilton SWMD reimbursed Environmental Enterprises directly.

The results of the pilot project demonstrated that contracting with a private company for expanded HHW services using the company's facility was both feasible and more economical than the traditional one-day collection event. Consequently, the Hamilton SWMD has continued to provide the expanded collection program, with several modifications, every year since 2004.

The table below presents data for 2003, the last year the Hamilton SWMD offered one-day temporary collection events, 2004, the year new collection program was piloted, and 2005 through 2007 during which the current collection program was offered:

Year	Events/locations	Total HHW Collected (tons)	HHW Recycled (tons)	Percent Recycled	Cars Served	Total Cost	Cost per Car
2003	4 events	572	412	72%	8,220	\$438,574	\$53
2004	1 location	146	108	74%	2,798	\$ 61,556	\$22
2005	2 locations	323	260	80%	7,120	\$156,311	\$22
2006	2 locations	492	349	71%	10,272	\$224,840	\$22
2007	2 locations	525	395	75%	9,288	\$264,610	\$29

As can be seen from the data above, the Hamilton SWMD was able to offer a collection program more frequently to its residents at a much lower cost than the Hamilton SWMD was able to provide through temporary collection events. Not only is the overall cost of the program lower than before, the cost per car served is less under the new program. This created a win-win situation for the Hamilton SWMD, its residents, and for the environment.

Lucas County Solid Waste Management District

In the 1990s, the Lucas County Solid Waste Management District (Lucas SWMD) provided its residents with a collection opportunity through an annual one-day event called "Pitch Old Paint Day". Although the event was geared toward collecting paint from residents, the Lucas SWMD accepted other HHW that was brought by residents. Due to the overall cost of the one-day events as well as a desire to make the HHW collection program more convenient for residents, the Lucas SWMD decided to evaluate the feasibility of providing a more regular program.

In 1998 and 1999, the Lucas SWMD implemented a pilot HHW drop-off program with two private service providers, Heritage Environmental Services and Cousins/Philips. Under the pilot, both companies served as drop-offs for HHW. Residents were required to register with the Lucas SWMD to take HHW to either facility while the Lucas SWMD covered the cost of recycling and disposal. In early 1999, Cousins/Philips opted to end its arrangement with the Lucas SWMD, but Heritage continued to accept HHW materials from Lucas County residents. Through the pilot project, the Lucas SWMD collected a total of 4,666 pounds of HHW and recycled 3,437 pounds of that total. Based on the results of the pilot project, the Lucas SWMD opted to contract with Heritage Environmental Services to offer a drop-off location for HHW.

Residents are required to pre-register with the Lucas SWMD prior to visiting the drop-off site. Residents can register either by calling the Lucas SWMD or through the Lucas SWMD's Web site. When registering, a resident must provide their name, phone number, city and zip code along with an inventory of the items and amounts they want to drop-off. The resident also selects a day and time to visit the drop-off.

In the beginning, participation in the program was limited to April through December, to one and a half days per week, and to one location, Heritage's facility in Toledo. In 2002, the Lucas SWMD made the program available to residents on the same weekly schedule, but on a year-round basis. In 2005, the Lucas SWMD expanded the program to three and a half days. In 2006, the Lucas SWMD began providing a second drop-off site. This site, a satellite site, consists of a trailer and gaylords that are used to collect HHW, and Heritage transports the HHW from the satellite site to its facility. During the hours that it is available, the satellite drop-off is manned by an employee of the Lucas SWMD. As a result of these changes, residents currently have access to HHW drop-offs three days a week, one and a half days at each site. Most recently, the Lucas SWMD expanded the list of items accepted through the HHW collection program to include electronics and scrap ties.

The table below presents data for 1997, the last year the Lucas SWMD offered one-day the one-day collection events, and 2001 through 2007, the years the drop-off program has been offered.

Year	Events/locations	Total HHW Collected (tons)	HHW Recycled (tons)	Percent Recycled	Cars Served	Total Cost	Cost per Car
1997	1 event ^a	151	151	100%	3299	\$ 84,663	\$26
2001	1 location	104	100	96%	2247	\$109,944	\$49
2002	1 location	127	121	95%	1738	\$132,324	\$76
2003	1 location	112	108	96%	N/R	\$210,293	N/A
2004	1 location	99	97	97%	N/R	\$150,000	N/A
2005	1 location	101	93	92%	N/R	\$128,515	N/A
2006	2 locations	100	92	92%	1700	\$113,000	\$66
2007	2 locations	101	93	92%	1,198	\$ 80,000	\$67

^a For limited materials, primarily paint

Although the Lucas SWMD is spending more money on its HHW collection program than in the past, residents are receiving much more convenient service. Furthermore, the Lucas SWMD is providing residents with a management option for a greater variety of difficult-to-manage wastes. As a result, the Lucas SWMD is pleased with the expanded collection program.

For 2008, 12 SWMDs provided HHW drop-offs. Four SWMDs held temporary, material-specific collection events. Finally, the largest municipality in one SWMD collects household batteries through its curbside recycling program. These programs are summarized in Table 8-2.

Table 8-2: Miscellaneous HHW Collection Programs

SWMD	Program Type	Material Collected	Location	Notes
Ashland	Drop-off	Ink jet & toner cartridges Rechargeable batteries	Recycling center	
Auglaize	Drop-off	Used oil	Specified recycling drop-offs	
Butler	Drop-off	Household batteries	Government buildings, libraries, schools, and retail establishments	
Clark	Drop-off	Paint	Recycling center	For a fee
Clinton	Collection event	Used Oil	County Engineer's Office	
Cuyahoga	Drop-off	Mercury	Fire stations, health departments, regional sewer district	
Defiance, Fulton, Paulding, Williams	Drop off	Mercury	Health Departments	Defiance and Williams Counties Defiance County
	Drop-off	Rechargeable Batteries	Health Departments	
Erie	Drop-off	Household batteries Mercury	Primarily retailers Fire stations	
Guernsey, Monroe, Morgan, Muskingum, Noble, Washington	Collection event	Paint		Washington County only
Hancock	Collection event	Used oil	Blanchard Valley Farmers Cooperative, Inc.	Provided by Blanchard Valley Farmers Cooperative and Hancock Future Farmers of America
Lake	Drop-off	Mercury	Health district	
Logan	Curbside recycling program	Household Batteries	City of Bellefontaine	
Lorain	Drop-off	Household batteries	Schools	City of Elyria only Monthly
	Collection event	Fluorescent light bulbs and ballasts	Government building	
	Drop-off	Printer cartridges	Government office	
Mahoning	Drop-off	Household batteries	Government offices, libraries, some schools	
Portage	Drop-off	Paint	Recycling center	
Van Wert	Drop-off	Used oil	Recycling center	

Other Collection Programs

Although SWMDs are typically the providers of HHW collection opportunities, other entities provide collection programs as well. As an example, many automobile service stations and some auto parts stores accept used motor oil from residents as a public service. Another example is the rechargeable battery recycling program that is provided through the Rechargeable Battery Recycling Corporation. Home Depot accepts compact fluorescent light bulbs. The Bowling Green Elemental Mercury Collection Program is yet another example of a collection program provided through another entity. This program is described in the text box to the right.

Electronics as Hazardous Waste

Most people do not think about electronic devices as being hazardous waste. Unlike many other products that contain hazardous constituents, the intended use and proper storage of electronic devices do not generally constitute human health risks. In fact, it isn't until an electronic device is unwanted that concerns related to managing the device arise.

Electronics often contain substances that can cause environmental and health problems if the electronics are not properly managed. In addition, many electronic devices require batteries which also contain hazardous substances. Some of the substances of concern include:

- Lead
- Chromium
- Mercury
- Flame Retardants, particularly brominated
- Cadmium
- Arsenic
- Beryllium
- Other Heavy Metals

Figure 8-3: Products Considered to be Consumer Electronics

Televisions and Monitors
 Video Cameras
 Computers
 Telephones
 Computer Peripherals
 Fax and Copy Machines
 Audio/Stereo Equipment
 Cellular Phones
 VCRs
 Wireless Devices
 DVD Players
 Video-Game Consoles

A Program for Collecting Elemental Mercury

In 1998, in response to increasing reports of mercury spills, particularly at schools and involving children, Bowling Green State University (BGSU) began a mercury collection and reclamation program. The purpose of the program is to remove mercury and mercury-containing devices from homes and organizations so that the mercury can be properly managed. Through this program, BGSU is decreasing the risk of mercury spills and the potential for unnecessary human exposure to mercury and environmental contamination.

Common sources of elemental mercury include thermometers, manometers, barometers, blood pressure measurement devices, mercury containing thermostats, mercury switches, and containers of mercury. BGSU encourages anyone who has unwanted elementary mercury or mercury-containing devices to take advantage of this valuable program. Thus, the program is available to academic institutions, small businesses, industries, medical and dental offices, emergency response and other governmental agencies, spill response companies, and homeowners.

Although participation in the program is free, BGSU established a foundation for tax-free donations from participants. Donations help offset some of the costs of providing the service and are appreciated by BGSU.

Other partners in the program include Ohio EPA's Division of Emergency and Remedial Response (in the district offices), Rader Environmental Services, Elemental Services and Consulting, and Toledo Environmental Services. These partners serve as primary contacts for entities that have unwanted mercury or mercury-containing devices and as coordinators for BGSU. The Wood County Emergency Management Agency and the Wood County Health Department have also assisted with the program.

An entity with elemental mercury or a mercury-containing device contacts one of the primary contacts (listed in the preceding paragraph) to arrange for the mercury or device to be collected and to learn how to properly package the mercury or device. The primary contact collects the mercury or device according to the pick-up arrangements. The mercury or device is transported to BGSU's hazardous waste storage facility where it is sorted, consolidated, and packaged for shipment by Rader Environmental Services. The packaged bulk mercury and mercury-containing devices are then transported, using a regulated transport vehicle, to recycling companies in several locations, including Wisconsin and Pennsylvania.

Since the program began, BGSU has collected almost 23,000 pounds of mercury from not just sources in Ohio, but from at least 12 other states. BGSU also assists communities with programs for exchanging mercury-containing thermometers with digital thermometers. BGSU is currently working with Ohio EPA's Office of Compliance Assistance and Pollution Prevention on a program for helping hospitals and other medical care facilities evaluate pollution prevention programs.

Electronic waste, or e-waste, is one of the fastest growing sources of waste in the United States. This is because the rate of obsolescence for consumer electronics has been rapidly increasing in recent years. The result is that the number of electronic devices reaching the end of their “useful” lives is increasing at a very high rate. Consequently, finding appropriate management options for obsolete electronics is now a priority for waste management professionals.

The sheer volume of end-of-life electronics entering the waste stream makes the potential problems associated with mismanagement even more concerning. In fact, according to U.S. EPA, it is likely that electronics now represent the largest contributor of heavy metals to the solid waste stream.

Figure 8-4: Management of End-of-Life Electronics in 2005²⁴



Compounding the potential environment and health concerns is the landfill space that all of these electronics will consume if other management options are not utilized. Given that many electronic devices contain valuable, reusable materials, disposing of them in landfills is a waste of resources and an unnecessary use of landfill space. Therefore, finding ways to divert electronics from landfills are appropriate local and national priorities.

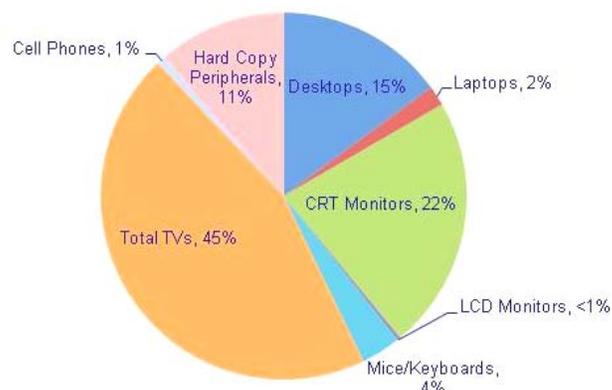
As can be seen in the pie graph in Figure 8-4, for 2005, U.S. EPA estimated that, nationwide, of the end-of-life electronics generated:

- 43 percent were landfilled;
- 11 percent were recycled;
- 1 percent were incinerated; and,
- 45 percent were either stored or reused.³²

The challenge for waste management professionals is to divert unwanted electronic equipment from being disposed of in landfills. To do this, it is essential to make available and promote reuse and recycling options for unwanted electronics. The graph in

Figure 8-5 presents the breakdown, by type, of the electronics that were generated in 2005.

Figure 8-5: Estimated Composition of End of Life Electronics in 2005²⁵



Solid Waste Management District Programs for Addressing Electronics

The 2001 State Plan was the first version of the state solid waste management plan to require that SWMDs provide a strategy to address electronics. As with general HHW, the 2001 State Plan did not specify the type of program that was to be provided.

Solid Waste Management District Collection Programs for Electronics

As with general HHW, SWMDs are not required to provide collection opportunities for electronics. Regardless, a large number of SWMDs do provide collection opportunities for electronics to their residents. In fact, the number of SWMDs offering collection programs for electronics continues to grow each year. In 2000, at the time the *2001 State Solid Waste Management Plan* was being prepared, only three SWMDs sponsored electronics collection programs. By 2006, 33 SWMDs reported having provided electronics collection programs to their residents that year. For 2008, 39 SWMDs provided some type of a collection program for electronics.

Many of the collection programs sponsored by SWMDs are primarily for computers and computer related equipment. A number of SWMDs also collect other types of electronics, such as VCRs, handheld electronics, cellular telephones, and other similar devices. At least one SWMD accepts “anything with a cord”. In recent years, some SWMDs have begun collecting televisions. However, as is explained in the text box to the left, recycling televisions is a more daunting task for SWMDs than recycling computer equipment.

The Television Dilemma

On June 12, 2009 (formerly February 17, 2009), television stations in America will cease broadcasting using analog signals and will broadcast exclusively in digital signals. Consumers do not have to purchase a new television in order to receive the digital signal provided that service is received either through cable or satellite or through a converter box. However it is expected that the conversion to the digital signal will motivate many consumers who have delayed purchasing a new television to finally do so.

The Consumer Electronics Association estimates that as many as 15 million television sets will become unwanted by 2010. Solid waste professionals are concerned about how to manage those televisions so they don't end up in landfill facilities.

In Ohio, many SWMDs provide collection opportunities for at least computers. The reuse and recycling infrastructure for computers is strong enough that offering these collection programs is relatively inexpensive. The same cannot be said for televisions.

Reusing and recycling televisions are difficult for a number of reasons including:

- Normal reuse outlets, such as charities, may be reluctant to accept televisions that will be perceived as obsolete;
- It frequently costs from \$5.00 to \$10.00 per television to have them recycled;
- There is a very limited infrastructure for recycling televisions; and
- Disassembling televisions is labor intensive and time consuming.

Because most residents don't have access to convenient recycling options, it doesn't make sense to initiate a blanket message promoting recycling televisions at this time. Until a comprehensive television recycling infrastructure is made available, education and outreach efforts should be focused on informing consumers how to continue using their existing televisions rather than purchasing replacements.

As with HHW, the majority of SWMDs sponsor temporary collection events for electronics. In 2006, 22 SWMDs sponsored temporary collection events. In 2008, 23 SWMDs offered temporary collection events. Two more offered limited collection events. However, the number of SWMDs that provide semi-permanent and permanent collection programs is increasing. In 2000, no SWMDs provided long-term collection programs. In 2006, 10 SWMDs reported having provided longer-term collection programs - six provided permanent collection programs and four provided semi-permanent collection programs. By 2008, there were 16 SWMDs that offered longer-term programs - six offered permanent collection programs and ten provided semi-permanent collection programs.

Permanent and Semi-Permanent Electronics Collection Programs

As with HHW, permanent refers to a collection program that is available to residents all year long during the business hours of the facility where the HHW is collected. A semi-permanent collection program is one that is available to residents on an extended basis (i.e. weekly, monthly, and/or seasonally). Semi-permanent programs are available more regularly than temporary collection events, but not on a truly permanent basis. The SWMDs that offered semi-permanent and permanent collection programs and the specifics of the programs are presented in Table 8-3.

Of the 16 SWMDs that sponsored semi-permanent and permanent electronics collection programs, 12 collected electronics at recycling, transfer, and landfill facilities that the SWMDs own and operate or that a member county owns or operates.

Temporary Electronics Collection Programs

As with HHW, the electronics collection program offered by the most SWMDs is the temporary collection event. Typically, SWMDs that sponsor temporary collection events do so annually. Most often, temporary collection events last for one day on a weekend. Some SWMDs offer more than one, single day collection event each year. Still others provide temporary collection events that last more than one day.

In total, 23 SWMDs representing 69 counties held temporary collection events for 2008. Two of those SWMDs offered both a temporary collection event and either a semi-permanent or permanent collection program. Two other SWMDs offered temporary collection events for limited service areas. The SWMDs that offered temporary collection events are listed in Figure 8-6.

Table 8-3: Permanent and Semi-permanent Collection Programs for Electronics

SWMD	Availability (2008)		
	Months	Days	Hours
Ashland	All year	Mon, Tues, Wed, Fri, Sat.	9 am – 4 pm 9 am – 12 pm
Butler	April – June, Aug, Sept. July	first and third Saturday of month second and third Saturday of month	9 am – 1 pm 9 am – 1 pm
Clark	All year	Thursdays first Saturday of month	9 am - 12 pm 9 am - 12 pm
Crawford	All Year	Monday-Friday Saturday	8 am - 4 pm 8 am – 12 pm
Gallia, Jackson, Meigs, Vinton	All year	Business hours	Business hours
Geauga-Trumbull	May 7 – Sept. 24	Wednesdays	10 am – 6 pm
Greene	Monthly	second Saturday of month	9 am – 1 pm
Hamilton	March 31-Dec. 30	Monday - Friday	9 am – 4 pm
Logan	June 7 – Aug. 30	Wednesdays Saturdays	4 pm – 7 pm 9 am – 12 pm
Lucas	All year	By appointment only	
Montgomery (2 locations)	All year	Tuesdays (North location) Saturdays (South location)	8 am – 2 pm 8 am – 2 pm
Preble	All year	Monday – Friday Saturday	8:30 am – 4 pm 8:30 am – 12 pm
Richland	All year	Tuesday – Saturday	8 am – 4:30 pm
Summit/Akron	April 1 – Oct. 1	Tuesdays Wednesdays	1 – 4 pm 6:30 – 9:30 pm
Van Wert	All year	Mondays, Wednesdays, Fridays first and third Saturdays of month	9 am – 5 pm 8 am – 12 pm
Wyandot	All year	Monday – Friday Saturdays	8 am – 4:30 pm 8 am – 12 pm

Figure 8-6: SWMDs that Offered Temporary Electronics Collection Events in 2008

Adams-Clermont (Clermont only)
 Allen, Champaign, Hardin, Madison, Shelby, Union
 Auglaize
 Belmont-Jefferson
 Brown
 Carroll, Columbiana, Harrison
 Cuyahoga
 Darke
 Defiance, Fulton, Paulding, Williams
 Delaware, Knox, Marion, Morrow
 Erie
 Gallia, Jackson, Meigs, Vinton
 Geauga-Trumbull
 Guernsey, Morgan, Monroe, Muskingum, Noble,
 Washington
 Hancock
 Lake
 Lawrence-Scioto
 Lorain
 Mahoning
 Miami
 Ottawa, Sandusky, Seneca
 Pike
 Portage
 Stark, Tuscarawas, Wayne
 Wood (for limited communities)

Private and Other Recycling Programs

Nationwide, there has been significant growth in the infrastructure for recycling electronic devices since the last update of the state plan. Examples include computers, cellular telephones, and computer-related equipment and supplies. On a state-by-state level the availability of outlets for end-of-life electronics varies considerably. This variation becomes even more pronounced at the local level.

Many of the major computer manufacturers now offer take-back programs for their products. The structure of these programs varies from one manufacturer to another. Thus, some manufacturers require the consumer to purchase a new computer in order to have an unwanted computer recycled for no additional charge. Other manufacturers offer pay-to-participate programs for the consumer to recycle a computer without purchasing a new unit. Through some programs, the consumer has to mail an unwanted computer to the manufacturer or the manufacturer's recycler. A limited number of manufacturers will accept any computer brand, but most manufacturers accept strictly their own brands.

Although the computer manufacturers are offering recycling services, the lack of consistency among the manufacturer-based take-back programs makes it confusing for the consumer to determine the requirements that apply to recycling their computer equipment.

Retail chains have begun to offer collection programs to consumers. See the text box below for a description of the electronics collection program offered by *Best Buy*.

Best Buy: Collecting Electronics from Consumers

Recently, *Best Buy* implemented a nationwide, mail-in program for recycling end-of-life consumer electronics. Through this program, consumers not only can recycle unwanted electronics, but they also receive gift cards to offset the price of purchasing new electronics from *Best Buy*.

Electronic devices collected by *Best Buy* include: Apple® iPods, digital camcorders, car audio systems, GPS navigation devices, digital cameras, game systems, home audio receivers, tablet PCs, PC and Apple® desktop computers and notebooks, mobile phones, monitors, multimedia projectors, PDAs, and servers.

A consumer interested in participating first estimates the trade-in value of their electronic devices on *Best Buy's* Web site. From the Web site, the consumer prints a shipping label that will allow the consumer to ship the device(s) free of charge. The consumer boxes the item(s), attaches the shipping label, and sends the package to *Best Buy's* trade-in center through United Parcel Service (UPS). 10 to 14 days after the package is received at the trade-in Center, *Best Buy* sends the consumer a gift card that can be used towards a *Best Buy* purchase.

In addition to the mail-in program, *Best Buy* hosts weekend recycling events at its retail stores nationwide. In addition, *Best Buy* offers grants for community-based collection programs.

Source: *Best Buy, Trade-in at Best Buy, <http://www.bestbuytradein.com/bb/>* (February 24, 2009).

There is more consistency nationwide for consumers to recycle cellular telephones. Many of the cellular telephone service providers offer take back programs for unwanted cellular telephones. Most of these service providers will accept any make and model of cellular telephone at either their retail stores or through the mail. A number of non-profit organizations accept cellular telephones for reuse and for recycling. Some of the non-profit groups reprogram usable cellular telephones to be distributed to domestic violence shelters and victims of abuse. Other non-profit organizations use proceeds earned through the sale of donated cellular telephones to promote cellular telephone recycling, provide funding for collection programs, and for public outreach.

In Ohio, there are a number of organizations involved in finding reuse options for operable equipment and recycling obsolete or non-functioning equipment. These organizations include private companies, non-profit organizations as well as state and federal facilities. As would be expected, these organizations are most prevalent in urban and metropolitan areas. This means that residents in Ohio do not have equal access, and in many areas have no access, to local recycling options. The electronic devices accepted differ from one organization to another as does the service that each organization provides. Many of these organizations accept electronics that are collected by SWMDs through electronics collection programs that the SWMDs sponsor.

Compact Fluorescent Light Bulbs

As a result of increasing fuel costs, consumers are being encouraged to save energy whenever possible. One way of saving energy is to switch from traditional light bulbs to compact fluorescent light bulbs (CFLs).

U.S. EPA reports that Energy Star qualified CFLs use 75 percent less energy than incandescent bulbs and save about \$30 in electricity costs over the life of each bulb.

CFLs do contain a small amount of mercury. However, the mercury in a CFL is minimal and remains contained in the bulb unless the bulb is broken. In comparison, coal-fired power plants account for 40 percent of mercury emissions in the U.S. The use of CFLs reduces power demand which in turn helps to reduce mercury emissions from power plants.

Along with increased use of CFLs come questions about the proper management of used CFLs. Although it is best to recycle the used CFLs, the availability of recycling opportunities varies locally. It is expected that a network of recycling programs will develop over time. As an example, *Home Depot* launched a program for recycling CFLs at all of the company's retail stores nationwide. Until recycling programs are widely available, however, residents that do not have access to recycling options are encouraged to place used CFLs in plastic bags and put the bagged CFLs in the trash.

Although disposing of CFLs in landfills is not the perfect management option, modern landfills are constructed to contain wastes in the landfill. Prevailing thought is that it is better to use CFLs and dispose of them in landfills where mercury is more easily contained than it is to emit mercury to the atmosphere through increased reliance on coal-produced electricity.

Source:

Energy Star, *Compact Fluorescent Light Bulbs*, http://www.energystar.gov/index.cfm?c=cfls.pr_cfls (March 3, 2009).

The Future

There are a number of products that contain hazardous materials that are rapidly entering the solid waste stream. Many of these products are difficult to manage at the end of their useful lives. An example is the compact fluorescent light bulb. Other examples include the many types of hand-held electronic devices that are becoming more commonplace.

Although it remains to be seen what affect the switch from analog broadcasting to digital transmission will have on the generation of unwanted televisions, the cathode ray tube television is becoming a thing of the past. Thus, not only does the waste industry have to appropriately manage the large number of older televisions, but it must also adapt to the introduction of new technologies to the waste stream.

In Ohio, SWMDs and local governments have traditionally borne the burden of providing alternative management options for not just HHW but also other hard to manage wastes. Thus far, this has held true for electronics as well. However, with current and projected future budgetary pressures combined with the glut of electronics estimated to enter the waste stream, local governments will likely be unable to keep up with the expenses involved in providing these options. Solid waste management professionals are exploring new ways of providing alternative waste management options.

The answer to many of the management issues may lie in developing public-private partnerships and requiring manufacturer responsibility for managing end-of-life products. This has been the trend for end of life computers. At least 22 states have adopted some form of legislation addressing electronic waste. Many others have introduced proposed legislation for consideration. To date, at least 18 states and one city have enacted product stewardship/manufacturer responsibility legislation for electronics. These states and city along with the adoption date and type of legislation are presented in Table 8-4.

Table 8-4: States (and City) with Producer Responsibility Legislation²⁶

State or City	Date Adopted	Type of Recycling Program
California	September 25, 2003	Advanced Recycling Fee
Maine	2004	Extended Producer Fee
Maryland	May 2005	Extended Producer Fee
Washington	March 2006	Extended Producer Fee
Minnesota	May 8, 2007	Extended Producer Fee
Oregon	June 7, 2007	Extended Producer Fee
Texas	June 17, 2007	Extended Producer Fee
Connecticut	July 6, 2007	Extended Producer Fee
North Carolina	August 31, 2007	Extended Producer Fee
New Jersey	January 15, 2008	Extended Producer Fee
Virginia	March 11, 2008	Extended Producer Fee
New York City	April 1, 2008	Extended Producer Fee
West Virginia	April 1, 2008	Extended Producer Fee
Oklahoma	May 13, 2008	Extended Producer Fee
Missouri	June 16, 2008	Extended Producer Fee
Rhode Island	June 2008	Extended Producer Fee
Hawaii	July 2008	Extended Producer Fee
Illinois	September 17, 2008	Extended Producer Fee
Michigan	December 26, 2008	Extended Producer Fee

Although the electronic devices covered by each state's legislation differ as do the programs established, the message is clear – other entities besides governments and consumers are expected to help bear the burden of managing end-of-life electronics. The trend of requiring increased stewardship on the part of manufacturers and distributors for their products is one that is expected to continue gaining momentum not just in the United States but also worldwide.

Ohio has yet to develop a legislative response to the electronics management problem. Ohio EPA will continue to monitor national trends and keep Ohio's decision makers informed of these trends.

Footnotes:

²⁴ U.S. EPA, *Fact Sheet: Management of Electronic Waste in the United States* (Washington, D.C., July 2008), 10.

²⁵ U.S. EPA, *Fact Sheet*, 7 (Table 2).

²⁶ Electronics TakeBack Coalition, *State Legislation on E-Waste*, http://www.computertakeback.com/legislation.state_legislation.html (January 21, 2009).

Chapter 9

Recycling Market Development

Ohio Revised Code (ORC) Section 3734.50(g) requires the state solid waste management plan to “Establish a strategy that contains specific recommendations for legislative and administrative action to promote markets for products containing recycled materials generally and for promoting the use by state governments of products containing recycled materials.”

Introduction

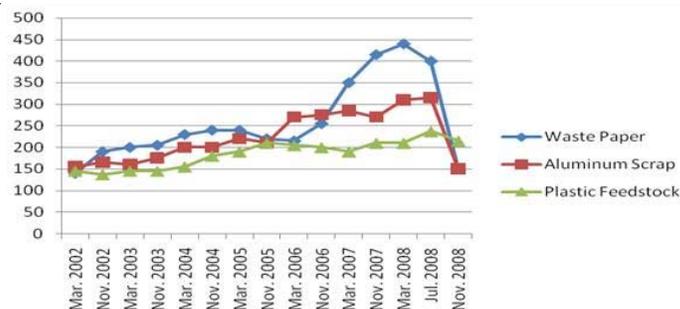
Having adequate demand for recyclable materials is widely acknowledged as a critical component for the success of recycling programs. Strong demand translates into strong markets for and higher prices paid for recovered materials. Higher prices increase the economic incentive for collecting materials, stimulate investment by private waste companies in improved processing and collection systems, and may lead private companies to more aggressively expand their customer bases. Strong demand and markets also make creating and expanding recycling services more attractive for the public sector, as the net costs associated with these programs decrease due to the increased return on the collected materials. The same dynamics make recycling more attractive for commercial and industrial generators of waste. Ultimately, strong demand for recyclable materials results in the high value of those materials as well as improved economic return and lower costs associated with recycling activities. These factors make recycling a more attractive choice when compared to the alternative management option – disposing of the materials in landfills.

Recyclable Material Markets

No discussion regarding market development strategies would be complete without factoring that discussion into the context of the current global financial situation. As is discussed below, Ohio’s and the nation’s waste reduction and recycling efforts faced potential set-backs in 2009 as a result of the depressed global economy.

Between 2001 and 2006, prices of recycled commodities remained relatively stable and generally increased over time. Beginning in late 2006, the prices of recycled materials began to rise rapidly. One driving force behind these increases was the price of raw materials. The prices of oil, metals, and other raw materials began to rise, driven by the economic “bubble” that was affecting the larger economy.

Figure 9-1:
Producer Price Index
(Inflation-Adjusted: 1982 = 100)



Source: U.S. Bureau of Labor Statistics

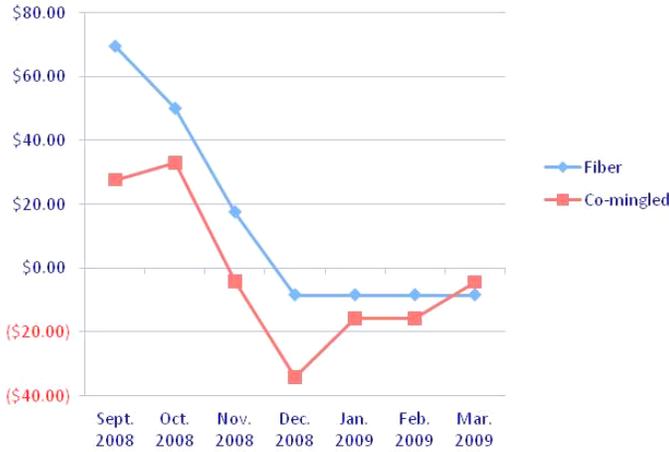
In late 2008, the market for post-consumer recycled commodities plunged sharply in the fallout from global economic problems. The recovered fiber market was the hardest hit. “While many recycling industry professionals had expected a downturn, the speed and severity with which the market for recovered fiber contracted caught everyone by surprise.”²⁷ Within a span of less than 60 days the producer price index for recovered fiber plunged and metals markets were similarly affected (see Figure 9-1).²⁸ In the plastics sector, prices were more stable; however, recyclers who relied heavily on Asian export markets were hit much harder than those who relied on domestic markets.

Impacts on Ohio Programs

Lucas County Solid Waste Management District (Lucas County SWMD) - The rapid decline in fiber and co-mingled container prices impacted recycling programs across Ohio in late 2008 and early 2009. One of the hardest hit solid waste management districts (SWMDs) was the Lucas County SWMD. The Lucas County SWMD is a large, urban-industrial SWMD in Northern Ohio; the Lucas County SWMD’s largest city is Toledo. The city of Toledo’s curbside recycling program and the Lucas County SWMD’s dual stream drop-off collection system suffered a financial shock from the rapid market shift that took place during 2008. In October of 2008, the Lucas County SWMD was receiving \$50.08 per ton in revenue for fiber and \$32.19 per ton for co-mingled containers. By December of 2008, the Lucas County SWMD was faced with a cost of \$8.42 per ton for fiber and \$4.09 per ton for co-mingled. Including the losses incurred in November and December of 2008, the

Lucas County SWMD earned \$481,500 in revenue from materials in 2008. During the first quarter of 2009, the Lucas County SWMD was processing recyclables at a net loss (see Figure 9-2).

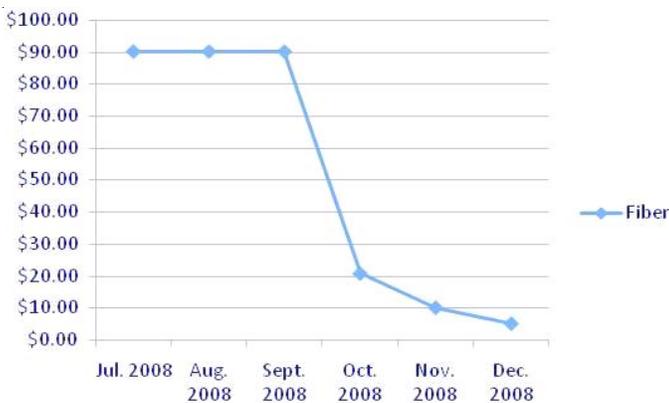
Figure 9-2: Lucas County SWMD Price Per Ton Received for Recyclables



Source: Jim Walters. Coordinator, Lucas County SWMD. Correspondence. March 2009.

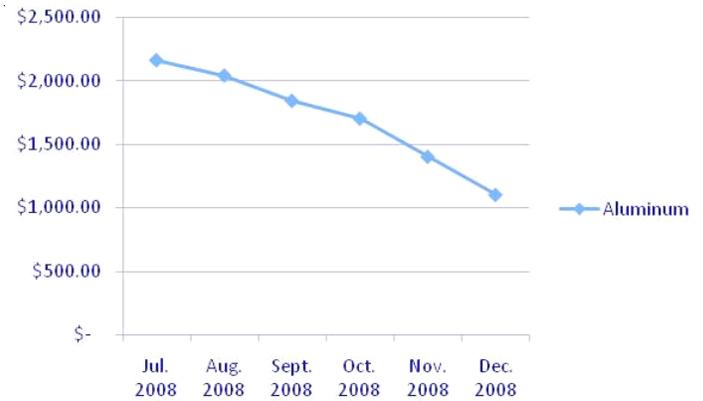
The Brown County Solid Waste Authority (Brown County SWA) – The Brown County SWA is a rural solid waste authority in southern Ohio. The price that the Brown County SWA received for its fiber was likewise impacted by market conditions in 2008 (see Figure 9-3). The Brown County SWA had been receiving a relatively steady \$90 per ton for fiber

Figure 9-3: Brown County SWA Price Per Ton Received for Mixed Fiber



Source: Dan Wickerham. Coordinator, Brown County SWA. Correspondence. March 2009.

Figure 9-4: Brown County SWA Price Per Ton Received for Aluminum UBCs



Source: Dan Wickerham. Coordinator, Brown County SWA. Correspondence. March 2009.

during most of 2008. By December, the price the Brown County SWA received for fiber had dropped nearly 90 percent to \$5 per ton. The price for recovered aluminum used beverage cans (UBCs) dropped by about 50 percent during the last few months of 2008 (see Figure 9-4). Aluminum returns remained positive, but, because the inherent price of aluminum was less, the impact on revenue was still significant.

Potential Market Stimulus Funding

Due to the global recession, the federal and state of Ohio governments quickly developed significant financial programs to stimulate economic recovery. These new programs along with existing financial programs may assist in improving recovered material markets. Some of these programs include:

- The American Recovery and Reinvestment Act of 2009
- Ohio Bipartisan Job Stimulus Plan
- Third Frontier Project

At the time this version of the state plan was being prepared, many stimulus initiatives were being implemented. As a result, the effects of those initiatives on recovered material markets had not been realized. The purpose of indentifying these initiatives is to recognize that there are significant financial resources at the federal and state levels that go far beyond traditional resources available through the Ohio Department of Natural Resources (ODNR), the Ohio Environmental Protection Agency (Ohio EPA), and other state agencies. The key is to tap into these resources by making interested parties aware of their existence.

American Recovery and Reinvestment Act of 2009

The American Recovery and Reinvestment Act has five purposes:

- (1) To preserve and create jobs and promote economic recovery;
- (2) To assist those most impacted by the recession;
- (3) To provide investments needed to increase economic efficiency by spurring technological advances in science and health;
- (4) To invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits; and,
- (5) To stabilize state and local government budgets, in order to minimize and avoid reductions in essential services and counter-productive state and local tax increases.

Billions of dollars in funds will flow from the federal government to the state of Ohio as a result of American Recovery and Reinvestment Act. Many of these funds will be channeled through Ohio EPA, ODNR, and the Ohio Department of Development (ODOD). To the extent possible, these funds should be used to create and retain jobs in the waste management industry and advance strategies to meet the goals of this state plan.

Ohio Bipartisan Job Stimulus Plan

The state of Ohio adopted this stimulus plan in 2008. The Bipartisan Job Stimulus Plan includes a \$150 million advanced energy component to:

- Create and retain jobs;
- Attract new investment to Ohio's industries;
- Focus primarily on commercialization and production;
- Build upon Ohio's manufacturing strength;
- Advance energy technology development toward commercialization; and,
- Prepare Ohio's workforce for the future.

In part, eligible projects for funding include waste-to-energy technologies that result in lower greenhouse gas emissions and technologies and management practices that support reduced consumption of fuel and production of cleaner fuels.

The state of Ohio must disseminate information regarding these programs and ensure that SWMDs and private sectors partners are eligible for funding. Ohio governmental agencies must further offer assistance to parties interested in pursuing funding for eligible projects.

Third Frontier Project

This project was initiated by ODOD in 2002. The Third Frontier Project is Ohio's largest-ever commitment to expanding the State's high-tech research capabilities and promoting innovation and company formation that will create high-paying jobs. Through the Third Frontier Project and related initiatives, the State offers a comprehensive set of programs that support world-class research, commercialization, training, and information technology infrastructure, all designed to accelerate company growth and job creation throughout Ohio. Specifically, the 10-year, \$1.6 billion initiative is designed to:

- Build world-class research capacity;
- Support early stage capital formation and develop new products; and,
- Finance advanced manufacturing technologies to help existing industries become more productive.

The Third Frontier Project is administered by the Third Frontier Commission, which was created legislatively in 2003. The Commission is responsible allocating funds appropriated by Ohio's General Assembly to support programs and activities associated with the Third Frontier Project. In addition, a 16-member Third Frontier Advisory Board advises on strategic planning and general management and coordination of programs administered by the Commission.

The Third Frontier Commission adopted the following strategies for the Third Frontier Project:

- Increase the quantity of high quality research that has commercial relevance for Ohio.
- Expand the availability of investment capital needed to form and grow new companies.
- Grow and nurture an increasingly experienced pool of entrepreneurial management talent supported by organized systems of services and networking.
- Expand the availability of capital and assistance to support product innovation in established companies.
- Attract new-to-Ohio company activity that grows and strengthens the function of specific clusters of excellence.

The Third Frontier Project is a potential source of funding for entrepreneurs in the waste management industry to the extent that their projects and technologies can be shaped in the emphasis areas of materials and composites and energy and fuels. Both are prime areas for new market development opportunities and expansion of existing markets.

Alternative Energy

There are a host of other federally funded financial assistance programs being developed by the United States Departments of Energy and Agriculture to deal with energy issues. Many of these potential programs address converting biomass to fuel and energy. To the extent that Ohio based companies can compete and receive awards through these assistance programs, the funding can help Ohio achieve its waste reduction goals and create new jobs. Funding awarded to Ohio companies can simultaneously create new technologies that can be shared with other states as part of a larger economic development effort.

ODNR's Market Development Grant

ODNR's Market Development Grant program is the cornerstone of Ohio's overall strategy for improving markets for recovered materials. Through Market Development Grants, ODNR annually makes financing available to Ohio businesses that propose to create the infrastructure necessary to sustain successful markets for recyclable materials and related products. ODNR emphasizes projects that impact the largest Ohio market area and consume the largest volume of recyclable materials. The types of projects and materials that ODNR targets typically change from one grant round to the next.

For the 2008 grant round, ODNR targeted the following materials for grant funding:

- carpet & padding;
- Cⅅ
- deconstruction material;
- electronics;
- glass;
- office paper;
- old corrugated cardboard;
- old newsprint;
- organic (food & fiber-based) material; and
- plastic.

The following types of projects were grant-eligible in 2008, provided the projects involved one or more of the targeted materials:

- **Recycling C&DD** – for C&DD facility operators seeking equipment to pre-process material received at the site of operations.
- **Manufacturing and processing** – for owners of manufacturing or processing facilities seeking to expand their capabilities to process base material or manufacture a finished product.
- **Material recovery facility (MRF) recycling** – for the owner/operator of a private MRF seeking funds to expand operational capacity.

- **Organics Recycling** – for owners/operators of facilities capable of or seeking to handle food waste and proposing to install an “in-vessel” or similar processing system.

Market Development Grants are targeted to Ohio business owners, but a business owner cannot apply for a grant. The application must be submitted by a municipality, a county, or a SWMD on behalf of the business owner. This creates a public-private partnership for implementing the project.

The maximum grant amount is \$250,000, and grant recipients are required to provide a 100 percent cash match. In 2008, ODNR awarded more than \$2.2 million to eight recipients. See Appendix K for a list of grant recipients from the 2007 and 2008 grant rounds.

Material Specific Issues

The state of Ohio has identified that there is inadequate infrastructure in the markets for the following materials:

- Construction and Demolition Debris (C&DD);
- End-of-Life Consumer Electronics;
- Glass;
- Organic Material (i.e. Food Scraps);
- Paper and Fiber-based Materials;
- Plastics; and
- Scrap Tires.

ODNR has targeted and will target grant funding to establishing infrastructure for the materials listed above. Providing this financial support should strengthen the markets for the materials and make those markets more economically sustainable.

Recycling Construction and Demolition Debris (C&DD)

Summary

The most common C&DD materials are:

- Concrete;
- Wood;
- Drywall;
- Metal;
- Asphalt Shingles;
- Asphalt Pavement; and
- Cardboard.

The seven materials listed above typically comprise 70 to 95 percent of the discarded material at a residential or commercial site where C&DD is generated. Many of these materials are often discarded despite being valuable commodities that

can be recycled into new products or used in many new ways. When these materials are perceived as wastes, disposing of them is often viewed as simply part of the cost of doing business. Consequently, reusing and recycling the materials are sometimes overlooked as management options. Recycling benefits both a construction business's bottom line and the environment.

In Ohio, the C&DD management industry has existed for many years. Only recently has that industry emerged as a more modern industrial sector. At the time this state plan was prepared, Ohio had 52 licensed C&DD disposal facilities with significant design and operational disparity among the facilities. Most C&DD disposal facilities lack scales to weigh incoming waste, and few have recycling operations.

The growing national interest in constructing "green" buildings is likely to generate more interest in recycling C&DD materials. Increasing numbers of construction contractors, building management companies, and building owners are incorporating green building design into their projects and are attempting to obtain green building certification for their structures. One of the facets of a building being certified as a green building involves demonstrating that C&DD was diverted from disposal.

The most common method of green building certification in the United States is through the United States Green Building Council's (USGBC) *Leadership in Energy and Environmental Design* (LEED) certification program. LEED is a rating system that promotes environmentally sustainable building design, construction, and operation. According to USGBC's website,

*"LEED is a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality."*²⁹

In order to become LEED certified, construction projects are assigned points for various green attributes, including energy savings, material usage, indoor environmental quality, and efficient water usage. Certification is granted during the construction phase. Points are awarded for reusing materials, using materials with recycled-content, and recycling waste that is produced at the construction site. Different levels of certification can be attained depending upon the number of points accumulated for a particular building project. Even if a construction company does not intend to obtain LEED certification for construction projects, committing to incorporat-

ing LEED concepts can be a beneficial marketing tool that can give the company an edge over its competition.

Future Direction

Through its Market Development Grant program, ODNR has targeted C&DD for funding. Ohio should continue to provide financial and technical assistance to both the public and private sectors to facilitate developing MRFs at designated C&DD disposal facilities. These facilities would then extract the valuable and marketable materials from the waste stream prior to disposing of the waste in the disposal facility. This is the most cost effective and operationally feasible strategy to recycle C&DD material.

Agencies that can provide knowledge regarding how to recycle C&DD materials are vital assets to a green building project. Therefore, Ohio's agencies should work with the organizations that are responsible for demolishing abandoned homes and buildings to divert material for reuse in other construction projects. Ohio agencies should further develop partnerships with builder, construction, and disposal facility associations to educate construction and demolition contractors about the benefits of recycling C&DD.

Recycling End-of-Life Electronic Devices

Summary

End-of-life electronic devices, commonly referred to as "e-waste", include all obsolete, outdated, and unwanted computers, televisions, cellular telephones, printers, PDAs, mp3 players, and the numerous other technologies commonly used in offices, homes, businesses, and by people on-the-go. The global technological revolution is fueling the rapidly increasing e-waste problem by speeding up the rate of obsolescence through newer and newer products. Many of these products contain hazardous materials that, when not managed appropriately, can constitute threats to both human health and environmental quality (e.g., leaded glass from cathode ray tubes). Furthermore, many of the materials used in electronics, such as metals, are valuable resources that are wasted when the electronics are disposed of.

The environmentally safe management of e-waste has increasingly become a problematic issue over the past decade. Technological advances and legislation on all governmental levels has vaulted e-waste recycling into an evolving, multi-billion dollar industry. In response, some manufacturers of electronics have voluntarily implemented programs for recycling their products. Regardless of these voluntary efforts, an increasing number of states have enacted regulatory-based efforts to establish e-waste recovery programs. Even so, at the state and local levels, available management options and requirements

vary considerably. In addition, liability and ethical concerns regarding the final destination of both processed and unprocessed materials have made identifying and confirming the proper outlets for collected materials a necessity. The issues associated with end-of-life electronics gained additional attention with the transition of television broadcasting from analog signals to digital technology.

In Ohio, the challenges of managing e-waste have been and continue to include inadequate collection infrastructure, processing capacity, and stable outlets to support recycling the various e-waste devices. In particular, many homeowners have limited outlets for recycling unwanted electronics devices. SWMDs have assumed the primary responsibility for providing homeowners with convenient recycling options. As was relayed in Chapter 8, 39 of Ohio's 52 SWMDs provided their residents with collection programs for e-waste in 2008. However, local budgets likely cannot support the infrastructure that is needed to provide a permanent solution to the e-waste problem.

As new technologies are introduced, the need for better processing techniques and more markets remain pressing concerns for the waste management and e-waste recycling communities.

Future Direction

Through its Market Development Grant program, ODNR, DRLP has targeted e-waste as one of the materials most in need of additional outlets. Funding through the grant program can be used to build new processing facilities, to purchase new equipment, and to upgrade existing facilities and equipment.

As was discussed in Chapter 5, a number of states have enacted legislation mandating that manufacturers of consumer electronics implement programs to recover their products. Because this legislation is being passed on a state-by-state basis, requirements from one state to another can differ. Ohio supports developing federal legislation to create a consistent manufacturer responsibility program nationwide.

The regulatory community must work to ensure that the e-waste is processed safely and marketed to those destinations that are considered to be protective of human health and the environment.

Recycling Glass

Summary

Historically, recovered glass as a commodity has never generated large amounts of revenue in Ohio. This is due to two main factors - the long-standing, low market price for glass and the high cost of transporting glass. The result is that, unless a potential end user is located near a processing center, the cost to transport the glass is often higher than the value of the glass. Additionally, some potential end

users require that glass cullet be separated by color or have minimal contaminants. Most processors are unable to provide this type of high quality cullet due to the trend toward single stream collection and processing technologies. This trend reduces the quality of the resulting cullet thereby making it less marketable to end users that manufacture new glass containers or fiberglass. Another negative pressure on the value of recovered glass is the damage that glass causes to processing equipment.

Because container glass makes up 80 percent of the glass that is thrown away, collection efforts in Ohio focus primarily on bottles and jars and other types of container glass.³⁰ Like aluminum and steel, recycling glass saves a great deal of energy and conserves Ohio's resources. Also like metals, glass can be reused for glass-to-glass manufacturing in perpetuity without affecting the quality of the material. In Ohio, recycled containers are collected primarily through public and private recycling centers, curbside collection programs, and drop-off programs.

Compounding the current depreciation in the value of recyclables, the market for glass in the Ohio has been weakened in recent years as the bottling industry has replaced glass with plastic as the primary source for beverage containers with other materials. As a result, there is much less demand for glass cullet by manufacturers of glass bottles. The one market that still represents an outlet for significant quantities of glass is the insulation industry. However, the quality specifications for glass as a feedstock are difficult to meet and tend to eliminate much of the available glass cullet.

The ability of Ohio to produce high quality glass cullet began improving in 2004 due to a new glass processing center in Dayton. This facility, owned and operated by Rumpke Consolidated Companies, Inc., is the result of a partnership between ODNR and Rumpke. In 2003, ODNR awarded Rumpke with a Market Development Grant of \$65,000 to which Rumpke added \$133,000 to construct the glass processing center. The facility, which began operating in 2004, uses a trommel and air system to remove contaminants. The resulting glass cullet is transported to fiberglass plants.

A number of companies, both within Ohio and in adjacent states, have expressed a need for additional quantities of glass for use in their manufacturing plants. The increasingly stringent regulations, such

Did You Know?

Recycling one glass bottle saves enough energy to power a 60-watt bulb for four hours, or a computer for 30 minutes.

Source: Glass Packaging Institute, *Recycle Glass*, <http://www.gpi.org/recycleglass/> (April 2, 2009).

as those to minimize greenhouse gas emissions, are one motivating factor behind this demand. Glass manufacturers can reduce their environmental impact and energy usage by using recovered glass. If Ohio can find a way to increase the quality of its glass cullet and make transporting glass to distant markets affordable, then those efforts may result in further stability of glass markets in Ohio as well as assisting industry in achieving its regulatory obligations.

Future Direction

In order to increase Ohio's glass recovery rate, it is necessary to connect the sources of glass cullet with the markets for the material. This can be accomplished by increasing the number of available outlets for recovered glass cullet, by reducing the cost of or offering subsidies for transporting glass cullet, and by improving the quality of cullet from recovered glass.

Increasing available outlets for recovered glass cullet can be accomplished by targeting grant funding to technologies that either create additional uses for recovered glass cullet or result in a higher quality commodity. Finding additional uses for recovered glass could increase the number of companies in Ohio using the cullet. Improving the quality of recovered glass cullet could open up existing markets that have been unable to accept the cullet due to contamination. However, increasing the supply of glass by supporting local recycling programs without increasing the demand for that glass will only serve to reduce the value of glass cullet further.

Technological advances have resulted in processing equipment that can process recovered glass without causing damage to the equipment. This equipment also results in a higher quality end product. Grant funding must be directed to this new technology for processing, particularly to improve the extraction of various impurities so the end-product has a better opportunity to meet industry standards. Grant funding must also be directed to new technologies and products that use the recovered glass cullet.

Recycling Organic Food Waste

Summary

According to the U.S. EPA, food waste comprised 12.5 percent, about 37.1 million tons, of the municipal solid waste (MSW) that was generated in the United States in 2007. Of the food waste generated, less than three percent was recovered. U.S. EPA reports that food leftovers are the single-largest component of the waste stream by weight in the United States. Americans throw away more than 25 percent of the food we prepare.³¹ To dispose of this food waste, the nation spends about one billion dollars a year. Given the small percentage of food waste that is recovered, waste disposal represents a significant and increasing

operating cost for establishments that generate food waste and for the U.S. food sector in general.

In recent years, recovering a larger portion of the food waste that is generated has become a focus for not just U.S. EPA, but also for state and local governments, various associations, and business owners. U.S. EPA has identified food processing facilities, supermarkets, convention/conference centers, sports venues, schools/universities, hotels, and restaurants as major commercial organics generators. Smaller food establishments such as coffee shops and bakeries also generate quantities of organic food waste. These generators have become the focus of efforts to increase food waste composting.

Of all food waste generators, supermarkets, by virtue of their product offering and need to maintain high quality standards, generate one of the largest (if not the largest) ratios of organic waste to total waste of all food waste generators. Supermarkets are also recognized as a retail sector operating within extremely slim profit margins.

After recycling corrugated cardboard, as much as 50 to 70 percent of the remaining waste stream is biodegradable (compostable). Because composting is a lower cost alternative to landfill disposal and incineration, supermarkets represent an obvious commercial sector for targeted food waste composting marketing efforts.

When supermarket operators (and other food waste generators) incorporate composting organics in a comprehensive diversion program including recycling, they can significantly minimize their reliance on disposal. In order to maximize diversion, the supermarket operator must segregate organics, recyclables, and garbage. Because organics make up the vast majority of supermarket waste, proper segregation maximizes the amount of uncontaminated organics available for composting. Recyclables, such as corrugated cardboard, plastics, glass, and metals can be diverted to recycling programs. In many instances, by diverting recyclable commodities, supermarket operators can achieve an incremental reduction in waste expenses and/or increase in revenue for their efforts.

Efforts to include complementary recycling activities at the generator's place of business and creating operational/economic partnerships with service vendors (such as transporters, processors, and end users) are fundamental to maximizing organics diversion ratios and reducing waste management costs.

As was explained in Chapter 2, Ohio's regulatory program for composting facilities classifies composting facilities primarily based on the wastes that can be accepted at the facility. Thus, there are four classes of composting facilities, and each class is regulated differently. The result is a spectrum of facilities ranging from the most stringently regulated facilities – Class I facilities (for mixed MSW) – to the

Organics Composting in the Supermarket Industry

In 2008, the Ohio Grocers Association (OGA), the Ohio Grocers Foundation (OGF), the Ohio Department of Natural Resources, Division of Recycling and Litter Prevention (ODNR, DRLP), and Ohio EPA worked with a number of supermarket owners and compost facility operators to demonstrate that supermarkets can be operated in a more environmentally sustainable way. By composting their organic waste, supermarket operators can significantly reduce the amount of waste that must be disposed thereby saving money and improving their environmental marketability. To demonstrate the benefits of a comprehensive organics waste diversion program, OGA, OGF, and ODNR coordinated a pilot organics composting project. The result of this pilot project was a guide, the “Composting and Diversion Guide” that was published in January 2009. This guide, which is targeted to the supermarket sector, provides a format for developing and implementing an effective food waste collection program.

The pilot project involved a grocery store chain, solid waste transporters, and owners/operators of Class II composting facilities. From July to October 2008, Kroger separated organic materials from other wastes at 24 participating retail locations. Kroger contracted with commercial waste transporters to transport source-separated food waste to Class II composting facilities operated by the Barnes Nursery in Erie County and the Garick Corporation (Paygro) in Clark County.

A number of other operators of grocery stores participated in the pilot by performing the initial assessment phase of the diversion program. Participating stores included: Bassett’s Market, Dorothy Lane Markets, Fresh Encounter, Giant Eagle, Howard’s IGA, and the Hills Market.

The pilot project was so successful that Kroger has continued to separate and send its organic waste to be composted. Kroger intends to expand the program to include additional retail locations in Ohio and in Michigan.

Source: Ohio Grocers Association and Ohio Grocers Foundation, *Composting and Diversion Guide*, (Columbus, Ohio, January 2009), 1.

least stringently regulated facilities – Class IV facilities (yard waste).

Organic food waste is composted at Class II facilities. Class II facilities can be used to manage yard waste, vegetable and fruit waste, agricultural plant material, and animal waste. Upon prior approval from Ohio EPA, Class II facilities can also be used to compost wild and domestic animal carcasses, rendering waste, and other source-separated organic waste (such as food waste). In order to establish and operate a Class II facility, the owner/operator must first register the facility, obtain an operating license, and provide financial assurance. At the time this document was prepared, there were 25 licensed Class II facilities in Ohio.

Keeping the costs of transporting organics to

composting facilities low is a key factor to making organics composting a successful, widespread management option. Many generators of organic food waste do not have convenient, low-cost access to Class II facilities. For those generators, sending their organics to a composting facility is not economically feasible. Therefore aligning generators with geographically proximate Class II-permitted composting facilities, identifying organics-niche hauling companies, and implementing a comprehensive program that includes the recycling of cardboard and other commodities such as plastics, glass, and metals are key to enticing generators to move toward organics recycling programs.

In Ohio, landfill costs are relatively low compared to some states in more densely populated regions of the country. Tipping fees at Ohio’s MSW landfill facilities averaged \$32 per ton in 2007 and ranged from a low of \$16 per ton to a high of \$58 per ton. These low disposal costs represent one economic challenge that faces generators attempting to reduce operating expense through organics recycling. This economic challenge extends as well to the composting facilities as defined by their need to offer a competitive disposal fee for organics yet be profitable, and to the organics-niche hauling companies as defined by their need to build profitable route density as a foundation for low pick-up/hauling fees per stop.

Future Direction

To make organics composting successful, Ohio must focus on establishing additional composting facilities. These facilities need to be distributed throughout the state to reduce transportation costs. ODNR’s Market Development Grant program can provide start-up funds for new composting facilities.

There are a number of other factors that must be considered. These factors include the following:

Industry Needs

- An organics diversion system must be industry driven. This is key to ensuring that the system is sustainable, that businesses are committed, and that diverting organic materials to regional composting facilities becomes a preferred business practice. This type of program succeeds through hands-on execution, realization of operational and economic results, and ongoing efforts to continuously improve.
- Generators will need to have adequate internal systems for training staff.
- Institutionalizing the composting culture in an organization such as a supermarket chain or large institution can be challenging. Support from senior organizational leadership and/or the business owners will also be critical.

Recoverable Materials

- Processes and infrastructure for waxed and soiled cardboard recycling are important to long-term success and participation for the supermarkets. This could be the critical component leading to a positive financial return of this program for the supermarkets.
- An optimal diversion program must also include processes for segregating and recycling other material such as shrink-wrap, plastic containers, glass, metals, and corrugated cardboard. The logistics of these programs are sometimes difficult to execute for the smaller generators.
- Organics generators must be able to provide “clean” compostables. In order to maintain high quality feedstocks as well as to provide generators with data, composting facility operators must provide timely and direct feedback to their customers.

Outreach and Promotion

- Any organics diversion program must involve: continually recruiting new generators; providing education, training, and networking; continued follow up; and, public relations/marketing.
- Creating and promoting the concept of synergistic generator/processor/hauler business relationships will help achieve a sustainable system. Ohio can encourage a paradigm shift in the transportation community and/or support businesses willing to engage in partnerships with new organics-niche hauling companies.
- ODNR, Ohio EPA, SWMDs, and local governments should support, encourage, and foster an increase in the number of businesses participating in organics recycling and increasing the number of tons diverted at each location.
- Recognizing businesses that divert their organics to composting at both the industry level and within the communities served will lead to continued growth of organics recycling through positive motivation, community awareness, positive public relations, and the creation of a competitive advantage for generators utilizing this recognition to advance their programs.

Recycling Paper

Summary

According to U.S. EPA, paper and paperboard comprised 32.7 percent of the national waste stream in 2007. Of the quantity generated, 54.5 percent was recovered nationwide.³²

Through the 2003 Ohio-specific waste characterization study that was described in Chapter II, ODNR found that paper fiber comprised 41 percent by weight and 44 percent by volume of the waste delivered for disposal in loads that were sorted. National and Ohio-specific statistics demonstrate that there is significant potential to divert additional paper fiber into recycling programs.

As was demonstrated earlier in this chapter, the market for recovered paper is currently in a depressed state following

a period of strong commodity prices. The paper market continues to remain volatile, but, at the time this document was prepared, the value of paper appeared to be rising. The cause for the crash in the value of paper was due primarily to a decrease in China's demand for recovered paper. That decreased demand in combination with the resulting glut of available recovered fiber caused the value to plummet.

Did You Know?

Recycling 1 ton of paper saves:

- 17 trees
- 7,000 gallons of water
- 3 cubic yards of landfill space
- 2 barrels of oil, and
- 4,100 kilowatt-hours of electricity.

The energy saved can power the average American home for five months!

Source: U.S. EPA, *Paper Recycling*, <http://www.epa.gov/osw/conservation/materials/paper/basics/index.htm#benefits> (Aug. 31, 2009).

Future Direction

The paper manufacturing and paper recovery/processing industries both need investments in new equipment. Many of Ohio's paper mills are old facilities, and the existing equipment is outdated making it inefficient and expensive to operate. This inefficiency exists regardless of whether the mills use virgin or recovered materials. The paper manufacturing industry needs to invest in new equipment that improves efficiency in production speed and results in energy cost savings.

Owners and operators of MRFs need to invest in new equipment that increases the efficiency of the recovery process and reduces contaminants in resulting paper mixes. This equipment would ideally allow processors to produce both a wider range of

paper grades and higher quality paper mixes. Doing so would increase available outlets for recovered paper, help stabilize the market for recovered paper, and increase the recovery rate for fiber in general.

Recycling Plastics

Summary

According to U.S. EPA, plastics comprised 12.1 percent of the MSW that was generated in 2007 and 6.8 percent was recovered.³³ In its waste characterization study ODNR, found that plastics comprised 16 percent by weight and 25 percent by volume of the waste delivered for disposal in loads that were sorted. These statistics demonstrate that there is significant potential to divert additional plastics from disposal into recycling programs. Of the plastics found in sorted loads, HDPE (#2) (commonly used to produce food containers such as milk and juice jugs, liquid detergent bottles, trash bags and cereal box liners,) accounted for approximately 38 percent of the plastics component weight and 40 percent of the total by volume.

Based on the most recent numbers as reported by the American Plastics Council, the total weight of plastic bottles recycled continued to increase through 2007. In 2007, the total weight of recovered plastic bottles reached an all-time high of a little more than 2.3 billion pounds (1.2 million tons), an increase of 115 million pounds (57,500 tons or 5.2 percent) over the quantity recycled in 2006.³⁴ [Note: Plastic bottles measured include: PET (#1), HDPE (#2), PVC (#3), LDPE (#4), and PP (#5).]

PET (#1) and HDPE (#2) bottles comprised over 96 percent of the plastic bottle market and over 99 percent of the plastic bottles recycled.³⁵ For this reason, the majority of recycling efforts are focused on bottles manufactured from those resins.

All plastic resins are, in theory, recyclable. However, recycling bottles manufactured from plastics #3 through #7 is hampered by the lower volume of those bottles entering the waste stream, the lack of processing infrastructure for those bottles and limited markets. The American Plastics Council

estimates that bottles made from resins #3 through #7 comprise less than four percent of the plastic bottle market.³⁶ Post-consumer flake and resins from those categories are primarily used in fiber, bottle, pipe and lumber composite products.

PET Summary

The American Plastics Council reports that approximately 1.4 billion pounds (698,000 tons) of PET bottles were recovered nationwide in 2007. This represents an increase over the weight recovered in 2006 of 124 million pounds (62,000 tons) and an increase in the percentage of PET bottles recycled from 23.5 percent to 24.6 percent.³⁷

More than half of the PET bottles that are recovered are recycled into fiber for carpet and clothing. Recovered PET bottles are also used to manufacture strapping and new containers for food.

HDPE Summary

According to the American Plastics Council, even though sales of HDPE resin increased from 2006 to 2007, the total weight of HDPE plastic bottles recovered nationwide in 2007 decreased to 920.6 million pounds (460,300 tons). This represents a decrease of 7.5 million pounds (3,750 tons) from the weight recycled in 2006. The corresponding drop of the recycling rate for HDPE bottles was from 26.4 percent in 2006 to 26.0 percent in 2007. The American Plastics Council attributes this decrease to lighter bottle weights and the shift to using concentrated laundry products.³⁸

How recovered HDPE is used to manufacture new products depends upon whether the plastic is natural or pigmented. Natural HDPE is used primarily to manufacture bottles for non-food products. Examples include bottles for laundry detergent, motor oil, and household cleaners. Pigmented HDPE is used to manufacture pipe and lawn/garden products.³⁹

Future Direction

Available capacity for collecting, processing and using recovered plastics continues to outpace the quantity of plastics being recovered. Growth beyond the current business slowdown is anticipated as new recycled-content product applications are developed and the recycled-content of new bottles is increased.

Increasing the recovery of PET and HDPE bottles remains the primary concern to support the growth in the use of recovered plastics. The American Plastics Council identified the following barriers to increasing plastic bottle recycling:

- Consumers and community leaders are not aware of the value of and demand for recovered plastic bottles. Local, targeted, sustained education campaigns help to increase the recovery of plastic bottles.

Did You Know?

- 54 percent of recovered PET is used to make fiber (carpet and clothing).
- 15 percent of recovered PET is used to make plastic strapping.
- 43 percent of recovered HDPE bottles go into making new bottles.
- 22 percent of recovered HDPE is used by the plastic pipe industry.

Source: American Chemistry Council, *Plastic Recycling Facts*, <http://www.americanchemistry.com/plastics/doc.asp?CID=1581&DID=6012> (May 28, 2009).

- Recovering single-serve containers that are consumed away from the home continues to hinder making strides in plastic recycling. Many of these plastic bottles are not recovered through curbside collection programs or community drop-off bins. State and local waste professionals can assist event coordinators with providing recycling programs at venues such as sports arenas and stadiums, conference centers, fair grounds, etc. where single serve containers are generated. Consumer education and recycling promotions must also be provided to increase public interest in recycling and the availability of recycling options at public venues, offices, recreational sites, schools, and retail establishments.
- Deviations in the composition of new bottles, such as barrier layers and color issues, impact the quality and recyclability of plastic bottles. The recycling industry must continue to work with the packaging industry to limit the development of non-recyclable plastic bottles.

Recycling Scrap Tires

Summary

According to recent statistics, Ohio EPA estimates that up to 90 percent of the scrap tires that are received by scrap tire facilities are recycled. Scrap tires that are generated and processed in Ohio are recycled in three main ways:

- As a source of fuel;
- As fill material in construction projects and for civil engineering applications; and,
- As a raw material to manufacture new products.

Fuel source

Approximately 150 million tires annually are chipped and used as tire-derived fuel (TDF). TDF burns cleaner and hotter than traditional fossil fuels and is typically used as a supplement to coal or wood. In Ohio, TDF is used as a fuel source for operating cement kilns and paper mills and to generate electricity. Operators of power plants burn a mixture of tires and coal to produce cheaper electricity and reduce air emissions.

Fill material in construction projects and civil engineering applications

Millions of processed tires are used annually for a number of engineered uses. Construction companies use scrap tires that have been filled with dirt to construct subgrade, light-weight retaining walls. Waste management companies use chipped tires as drainage material over liner systems in landfill

facilities. Chipped tires are a substitute for traditional aggregate materials (sand and gravel) because tire chips allow leachate to drain efficiently to collection points. Schools use tire chunks that have been processed to remove the steel as mulch for playgrounds. Tire chunks last longer than wood, are cleaner than wood, and reduce injuries. Tire chips are mixed with concrete to manufacture sound barriers used on busy highways. Sound barriers that are made of tire chips and concrete absorb sound more efficiently than barriers made of harder materials.

Raw Material

Crumb rubber that is produced by grinding scrap tires is a raw material that is used by manufacturing companies to produce new products. Crumb rubber is incorporated into material used for specialized sporting surfaces, such as tracks and tennis courts. Surfaces paved with rubberized material are more flexible than surfaces paved with traditional, harder materials. This makes rubberized surfaces easier on athletes' ankles, shins, and knees.

Crumb rubber is mixed with asphalt to make pavement that can reduce road noise. In the past, using rubberized asphalt to pave roads was met with mixed results and, as a result, did not emerge as a sustainable market for scrap tires. However, due to improvements in how rubberized asphalt is made, there is a renewed interest in using rubber from scrap tires in rubberized asphalt road projects. This renewed interest is being driven by new technology that produces liquefied Ground Tire Rubber (GTR) which is then injected into the asphalt mix to produce a durable paving material. See the text box on the next page for a more in depth look at this new technology.

Future Direction

For a number of years, ODNR focused Scrap Tire Grant program funding on projects that create new or upgrade existing facilities for using crumb rubber to manufacture value-added products, that result in the purchase of equipment to process scrap tires into GTR, or that resulted in the use of GTR in civil engineering applications. ODNR anticipates that it will phase out its focus on GTR for the 2010 grant round. Once that happens, SWMD and local government funding will become important to expand the use of GTR in paving projects locally. Doing so would expand the demand for and hence the market for GTR.

As was mentioned earlier, ODNR is working with ODOT to incorporate GTR into ODOT's paving projects. If ODNR awards ODOT with grant funding during the 2009 round of the Scrap Tire Grant program, then that grant may provide ODOT with the impetus necessary to incorporate GTR as a standard ingredient in paving and significantly improve the market for GTR statewide.

Ground Tire Rubber (GTR) Initiative

Using its Scrap Tire Grant program, ODNR supports a relatively new technology that converts processed scrap tires into a product that is suitable as an ingredient for manufacturing asphalt. Through its Ground Tire Rubber (GTR) Initiative, ODNR hopes to develop a sustainable market for large numbers of recovered scrap tires by facilitating the use of GTR to manufacture paving material. The new technology liquefies GTR so that it can effectively be incorporated into asphalt that can then be used for paving roads.

In the past, scrap tires chunks were incorporated into asphalt as a substitute for traditional aggregate. Including the tire chunks in the asphalt mix resulted in asphalt that was weaker than asphalt made with traditional aggregate. This was partly because the tire chunks did not bind to the asphalt. When the asphalt was used to pave roads, over time the tire chunks separated from the asphalt destroying the integrity of the pavement. This problem hindered widespread use of scrap tires in road paving projects. The liquefied GTR, when incorporated into the paving material as a modified asphalt binder, results in asphalt that withstands long-term use.

Until 2009, ODNR had received grant applications from and awarded grants to only local and county governments to use GTR as paving material. During the 2006, 2007, and 2008 Scrap Tire Grant rounds, ODNR awarded a combined total of more than \$1.2 million to 13 local governments. Those projects resulted in 243,609 scrap tires (17,717 liquid tons of GTR) being used for paving roads. However, in order for the GTR Initiative to result in a sustainable market for scrap tires, ODNR believes that it is necessary for the State to use GTR for projects funded by the State.

Although no state level projects involving GTR have been performed in Ohio to date, the Ohio Department of Transportation (ODOT) did develop specifications to be used by local and county governments for their GTR paving projects. Furthermore, during the 2009 grant round, ODOT submitted a grant application to use GTR in paving projects. At the time this document was prepared, the 2009 grant awards had not yet been announced.

Projects Implemented by SWMDs to Promote Markets for Recyclables

Goal 7 of the state plan is an optional goal. This gives Ohio's SWMDs the flexibility to decide whether or not to include market development programs in their solid waste management plans. SWMDs can influence markets primarily at the local level. However, markets for many recovered materials are national, even global in nature and are not appreciably affected at the local level. Given the financial constraints faced by SWMDs, Ohio and SWAC felt it best to give SWMDs the ability to stimulate local markets when doing so makes sense and is appropriate rather than requiring such programs.

In many cases, SWMDs do implement programs to help develop markets for recyclable materials. In fact, a number of SWMDs have been successful in working with local businesses to expand processing capabilities or utilize certain materials.

Recycling Revolving Loan Fund Program (Lorain County Solid Waste Management District)

The Lorain County Solid Waste Management District (Lorain SWMD) created the Recycling Revolving Loan Fund as an economic development tool to improve markets for recovered materials within Lorain County. The program is intended to increase the use of post consumer recyclable materials by businesses and organizations (including non profits) as feedstocks to their manufacturing processes. Fundable projects under the grant program include purchasing machinery or equipment to allow or enhance the use of recovered materials. Loan funds cannot be used for working capital, to purchase land, or to refinance existing debt.

The objectives of the Recycling Revolving Loan Fund are:

- To promote recycling business opportunities;
- To provide additional markets for recovered materials;
- To retain or create recycling related jobs;
- To increase manufacturing capacity for recyclable materials in Lorain County by working with existing businesses and attracting new businesses to the region to utilize the recyclable materials collected locally.

Oversight of the Recycling Revolving Loan Fund is provided by a committee comprised of the following members:

- County Administrator;
- County Solid Waste Director;
- County Community Development Director;
- Three Solid Waste Policy Committee Members; and
- One member of the public.

The committee is charged with developing the application for requesting funds and guidelines for using the funds. The committee is also responsible for reviewing received applications and for recommending to the Lorain County commissioners which projects should receive funding. The county commissioners have the final authority to decide which applicants are awarded loans.

To initiate the loan program, the Lorain SWMD placed \$500,000 in a trust that is administered by a third-party financial institution. In any year, the Lorain SWMD can award grants totaling up to the amount remaining in the trust fund. In the past, the Lorain SWMD limited the maximum loan amount to \$50,000 per applicant. In accordance with the Lorain SWMD's most recent solid waste management plan update, an applicant can now receive up to \$200,000. Applicants must repay loans within ten years, although the length of the loan can vary. The interest rate borne by the grantee is dependent upon the term length of the loan (i.e. the longer the term of the loan, the higher the interest rate).

The Columbus Transformation Center (Solid Waste Authority of Central Ohio (SWACO– Franklin County))⁴⁰

The Columbus Transformation Center is a project that is the result of a partnership between a public agency (SWACO) and a private company (Shelly Company). The project will result in what SWACO refers to as a “green” industrial park. The Columbus Transformation Center will be located on the property formerly occupied by the Columbus Waste To Energy Facility.

The Shelly Company produces asphalt and uses recovered oil and asphalt in its paving product. The company currently operates a limestone mine on property adjacent to the site for the Center. In exchange for mineral rights to mine limestone on SWACO's property, Shelly Company will fill 10 acres of currently unusable land for development of the Center. In addition, the Shelly Company will pay SWACO approximately \$1.5 million for the mineral rights.

Two companies – Rastra, Inc. and Kurtz Brothers – are expected to build facilities at the Columbus Transformation Center. Rastra, Inc. has plans to construct a new manufacturing facility at the Center. The facility will be used to manufacture polystyrene/ concrete building materials. Polystyrene that is diverted from disposal in SWACO's sanitary landfill near Grove City will be used as a feedstock for Rastra's product. In this way, Rastra will provide a market for a difficult to recycle material.

Kurtz Brothers plans to construct and operate an anaerobic digester at the Center. The operation will divert organic wastes, such as yard waste and food waste, from disposal in landfill facilities and use the waste to produce energy and other products.

In all, the two projects are expected to create a combined total of 45 to 60 jobs. Additionally, the Shelly Company will protect its estimated 300 existing jobs.

The Glass reFactory

(Brown County Solid Waste Authority and Adams-Clermont Joint Solid Waste Management District)

The Glass reFactory is operated by the Adams-Brown Recycling Station (ABR) which is located in Georgetown, Ohio. ABR is a division of Adams Brown Counties Economic Opportunities, Inc. (a not-for-profit organization). Adams Brown Counties Economic Opportunities, Inc. serves Adams and Brown Counties, two primarily rural counties in southwestern Ohio. ABR began operating in 1979 as a summer youth program, and the operation has grown over time to become one of Ohio's largest non-profit recycling facilities. The facility processes around four million pounds of recyclable materials annually.

The overall purpose of the Glass reFactory is to provide an end-use for recovered glass. To this end, ABR uses glass bottles and jars that are processed at its recycling station to manufacture decorative glass items at the Glass reFactory. Suncatchers are the primary product manufactured at the Glass reFactory, as well as the item the facility is best known for.

Creating the Glass reFactory was a cooperative effort involving ABR, ODNR-DRLP, the Brown County Solid Waste Authority, the Adams-Clermont Joint Solid Waste Management District, and Fifth-Third Bank. Development of the facility began in 1996 and production began in 1998. Initial funding for the Glass reFactory was provided by ODNR, DRLP, through a Market Research grant, and the Brown County Solid Waste Authority. Today, the Glass reFactory is a self-sustaining operation due to sales of recycled glass merchandise.

As was mentioned, the Glass reFactory was created to provide a use for recovered glass. As an unintended and unforeseen benefit, the facility has helped to promote recycling awareness both locally and regionally.

State Market Development Strategies

As with the state strategies that were established in Chapter 3, the market development strategies established in Chapter 9 are focused on actions that Ohio's state government agencies can take to help further the development of markets for recovered materials.

Status of State Market Development Strategies from the 2001 State Plan

Appendix K contains descriptions of the progress Ohio made toward implementing the state market development strategies from the 2001 State Plan.

State Market Development Strategies to be Implemented with this State Plan Update

As was discussed at the beginning of this chapter, the prices for recovered materials plunged in 2008 due to the declining global economy. Efforts of the U.S. and state governments to stimulate the economy and create jobs could rapidly turn this situation around. Financial turmoil adds risk to all types of projects, ranging from relatively simple projects, such as purchasing a new recycling vehicle, to complex and capital intensive projects, such as a new MRF or a waste to energy facility. The aversion to risk by entrepreneurs, established private waste and recycling companies, and local governments could translate into the complete stalling, or even backsliding, of waste reduction activities unless decisive action is taken.

This state plan can help provide a roadmap to economic recovery by using the recovery and conversion of waste materials into resources, useable products, and energy. These types of projects can further translate into creating new jobs. However, to do so and do it effectively will require new thinking and new tools. It will require partnerships, innovation, research and development, piloting, and demonstration. Along the way there will be some failures. The possibility of failure must be recognized from the start. The State, the SWMDs, and all partners must work together to ensure that progress is made.

It is well documented that recycling, waste reduction, and waste-to-energy projects are economic development tools and environmental tools. The reuse, recycling, waste conversion and waste reduction activities offer direct development opportunities to communities. These opportunities can be used in part to turn around the current state of financial affairs facing the state of Ohio and its citizens.

In addition to the material-specific actions that were proposed earlier in this chapter, Ohio EPA and SWAC believe that the following strategies should be implemented to improve the availability of markets for recovered materials in Ohio. These strategies are generally designed to assist in identifying and expanding end uses for materials that historically have had few available markets due to limited supply, quality, processing capacity, or transportation issues. However, the strategies below go far beyond the traditional in that they identify the interrelationships that exist in the marketplace (the biggest and most

obvious example being the conflict between relatively “cheap” landfills and all other means of waste reduction) that sometime are a hindrance to getting the job done as well.

1. Reinstitute the use of the Interagency Recycling Market Development Workgroup (IAWG) to develop and implement a statewide, comprehensive, market development plan.

As is discussed later in this chapter, IAWG was created to develop the “*Ohio Recycling Market Development Plan*” to guide Ohio’s investment in developing markets for specific recyclable materials. IAWG was terminated in 2004.

In accordance with this state plan, a reinstated IAWG would consist of representatives from the following agencies:\

- Ohio Department of Natural Resources;
- Ohio Department of Development;
- Ohio Department of Transportation;
- Ohio Department of Administrative Services;
- Ohio Environmental Protection Agency; and,
- Ohio Department of Agriculture (not a member as originally established by the Ohio General Assembly).

The new IAWG would be charged with the following responsibilities:

- Develop and implement a plan to increase state of Ohio procurement of recycled-content products. This activity would be done in cooperation with the Office of Budget and Management and fiscal officers within Ohio’s governmental system;
- Create a material taskforce study group to survey private and public sector organizations to determine how Ohio’s agencies can assist the present material markets, including regulatory, collection, transportation, processing, manufacturing, and financial systems;
- Work to institute a method to coordinate activities among Ohio agencies to accomplish positive environmental investment in Ohio. This would be accomplished by developing common sense regulatory systems and by facilitating coordination among agencies that provide financial assistance; and
- Develop and implement a plan to assist entrepreneurs with finding and leveraging sources of funding for eligible projects. This plan could include a wide range of assistance, from providing assistance with writing grant requests to providing limited matching funds on specific, worthy projects.

2. To the extent possible, Ohio governmental agencies should facilitate the implementation of technologies that use waste to produce energy.

Through State Strategy 9 in Chapter 3, Ohio EPA and ODNR have committed to facilitating waste-to-energy technology being implemented in Ohio. While Ohio EPA's role is to streamline the permitting process for waste-to-energy facilities, ODNR's focus is on providing funding for those facilities.

Waste-to-energy and distributed energy resource projects can be partially funded through the Market Development Grant program. ODNR has funded and will continue to solicit applications for projects to convert methane gas from landfill facilities to natural gas operations. Other energy-related projects that are eligible for funding under the Market Development Grant program include projects for industrial heat recovery and for energy efficiency (with recycled content materials).

Regarding projects for energy efficiency, grant funding can be used to construct a new building designed for energy conservation and for converting existing buildings to install energy efficient equipment (such as converting an existing lighting system to an energy efficient system). Grant funding can be used to compensate the applicant for the difference in cost between the traditional equipment and the state-of-the-art equipment.

3. Broaden the concept of recycling market development to include markets for not just traditional products but also fuels, energy, and heat.

4. Change the rhetoric and strengthen the discussion on the need for systems thinking and integrated solutions. Understand and communicate the connectivity of decisions; that there are sometimes unpredictable and unintended consequences downstream.

5. Strengthen relations with Ohio's universities and research institutions to utilize new modeling tools being developed to analyze and assist in complex business decision making, taking into account such aspects as "the triple bottom line".

6. Develop and Implement the use of industrial ecology tools, one example being By-Product Synergy to further advance the state's ability to convert waste into resources; facilitate the establishment of one or more by-product synergy networks working with ODNR, academia, and through solid waste districts, NGO's and the private sector.

By-product synergy is the practice of matching under-valued by-product streams with potential users and helping to create new revenues or savings for the organizations involved while simultaneously addressing social and environmental impacts. Participating company engineers and operations staff are exposed to each other's production processes, input needs, and waste streams and through facilitated collaboration identify innovative ways of integrating their operations to cut pollution, save energy, reduce material costs and improve the bottom line.

Footnotes

²⁷ "Commodity Reports: Paper," *Recycling Today* (January, 2009), 47:1, 26-28.

²⁸ "Commodity Reports: Plastic," *Recycling Today* (January, 2009) 41:1, 30-31.

²⁹ U.S.Green Building Council, *LEED Rating Systems*, <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222> (April 1, 2009).

³⁰ ODNR, DRLP, *Glass Recycling*, <http://www.dnr.state.oh.us/tabid/17878/Default.aspx> (April 2, 2009).

³¹ U.S. EPA, *Basic Information about Food Scraps*, <http://www.epa.gov/osw/conserves/materials/organics/food/fd-basics.htm> (April 6, 2009).

³² *Municipal Solid Waste*, 7.

³³ *Municipal Solid Waste*, 7.

³⁴ American Chemistry Council and Association of Postconsumer Plastic Recyclers, *2007 United States National Post-Consumer Plastics Bottle Recycling Report*, (Arlington, Virginia, 2009), 1.

³⁵ American Chemistry Council, 2.

³⁶ American Chemistry Council, 3.

³⁷ American Chemistry Council, 1.

³⁸ American Chemistry Council, 1.

³⁹ American Chemistry Council, 7.

⁴⁰ John Remy, *SWACO and Shelly Create/Save Jobs*, <http://www.co.franklin.oh.us/fc/content/press/swaco08-20-07.cfm> (August 9, 2007).

Chapter 10

Waste-to-Energy

In the late 1980s, when House Bill 592 was drafted, Ohio's solid waste professionals predicted that incinerating mixed municipal solid waste (MSW) would provide a means of reducing the volume of waste that needed to be disposed of in landfills. Those professionals also believed that recovering energy from incinerating solid waste would become a means of obtaining value from solid waste.

As is explained in Chapter 6 ("Management of Ash Resulting from the Burning of Mixed Municipal Solid Waste"), all of Ohio's large incinerators and energy recovery facilities that burned mixed MSW ceased operating by the mid 1990s. Consequently, incineration, with or without energy recovery, never emerged as a management technique for significant quantities of solid waste in Ohio. Furthermore, at the time this revision of the state solid waste management plan (state plan) was prepared, there were no operating facilities for burning mixed municipal solid waste with or without energy recovery in Ohio.

Recently, there has been a resurgence of interest in technologies that use waste to produce energy and reduce the amount of waste being disposed of in landfill facilities. A number of factors have brought about this renewed interest. These factors include:

- socioeconomic benefits associated with diverting waste from disposal in landfills;
- media exposure of the environmental effects of pollution, such as global warming;
- interest in minimizing the production of greenhouse gases;
- rapidly increasing costs of traditional energy sources;
- the search for renewable and sustainable alternatives to fossil fuels; and,
- efforts to reduce the United States' reliance on foreign oil resources.

In response to this interest, the Ohio Department of Natural Resources (ODNR) working with a number of partners and sponsors, offered the First Annual Partnerships in Emerging Technology Conference in October 2008. This conference provided attendees with an overview of various emerging technologies and set the stage for future discussions among all interested parties. [Please see Chapter 2 for more information about this conference.]

Waste Management Hierarchy

As can be seen in Figure 10-1, U.S. EPA's preferred waste management hierarchy places the greatest emphasis on reducing the amount of waste generated and material that must be managed as waste. When waste is generated, U.S. EPA then favors management methods that divert waste away from disposal in landfill facilities. While recycling and composting are the most preferred means of managing waste that is generated, U.S. EPA recognizes that using combustion technologies that allow for the recovery of energy from waste are preferable to simply incinerating solid waste for volume reduction. [NOTE: Although it is not specifically called-out in the hierarchy, U.S. EPA places the use of waste to produce fuel on the same preference level as combustion with energy recovery.] This hierarchy also gives preference to burning solid waste for energy recovery over disposal in landfill facilities.

U.S. EPA's hierarchy corresponds very closely to the purpose of Ohio's state plan. Consequently, by utilizing waste-to-energy technologies, Ohio would adhere to U.S. EPA's hierarchy and further the state plan's goal of reducing Ohio's reliance on landfills to manage waste. For these reasons, Ohio EPA and SWAC support the use of waste-to-energy management options as viable components of a comprehensive waste management program.

Figure 10-1: U.S. EPA's Solid Waste Management Hierarchy⁴¹



Benefits of Waste-to-Energy Technologies

- Waste is considered to be a renewable resource. Even with our increased efforts to reduce and recycle waste, it is inevitable that Ohioans will generate solid waste that must be disposed of.
- Some waste-to-energy technologies have the potential to generate less pollution than energy-producing technologies that consume fossil fuels.
- Waste-to-energy technologies increase our sources of energy thereby lowering our dependence on foreign oil.
- A broader assortment of potential energy sources enhances our energy security.
- Waste-to-energy technologies that use biomass are considered to be carbon-neutral (e.g. no net increase of carbon dioxide in the atmosphere) resulting in reduced emissions of greenhouse gas when compared to traditional sources of energy.⁴²
- Using waste to create energy reduces methane emissions from landfills.
- Using waste to generate energy reduces Ohio's reliance on landfill facilities to manage waste.
- Using waste in place of other biomass sources, such as crops, to produce energy does not negatively affect prices for other commodities, such as food.⁴³
- The reduction in the volume of waste that is achieved through the waste-to-energy technology can be credited to Ohio's and SWMDs' waste reduction and recycling rates.

Drawbacks of Waste-to-Energy Technologies

- Environmental professionals disagree about the affects of producing energy with wastes on community recycling efforts. Some assert that combusting waste increases recycling efforts (such as recycling of ferrous metals). Others maintain that combusting waste reduces incentives for recycling and waste minimization.
- Burning/combusting organics produce different pollutants than fossil fuels. Examples include dioxins, furans, potentially toxic ash, fine particulates, and heavy metals. As a result, facilities that burn/combust waste must be constructed with proper, potentially costly, pollution control equipment.
- Not all waste-to-energy technologies result in net production of usable energy.
- Some organics can be composted which is a lower resource and energy-intensive method of managing the organics.
- Most waste-to-energy technologies require high initial capital investments.
- There can be a long pay-back period involved in operating waste-to-energy facilities.
- There is limited existing infrastructure for using some alternative fuels (e.g. using converted landfill gas to fuel vehicles).
- Economics of some technologies require significant throughput to guarantee success. Issues such as flow control can make securing that throughput a challenge.
- Communities typically are strongly opposed to siting new waste management facilities due to negative perceptions of waste facilities, particularly those that combust waste.

Technologies

Waste-to-energy technologies include those processes that treat waste in produce energy. In some cases, the processes involve using waste as a fuel source to generate heat which then can be converted into electricity. In other cases, the processes involve converting waste into a fuel which can then be used to produce energy. All waste-to-energy technologies result in the diversion of waste from disposal facilities thereby reducing not just the consumption of land for waste disposal but also the potential for landfill-generated greenhouse gases to be emitted to the atmosphere.

There are a number of technologies that use or have the potential to use waste to produce energy. These technologies include:

- Bioreactors:
 - Anaerobic digestion, and
 - Converting biomass to energy
- Production of Syngas:
 - Pyrolysis (such as plasma arc converters)
 - Starved-oxygen gasifiers, and
 - Conversion of syngas to biofuel such as ethanol
- Collection and utilization of landfill gas
- Co-firing of municipal solid waste and coal
- Incineration with energy recovery

Each of the technologies listed above is discussed in this chapter.

Bioreactors

Anaerobic Digestion

Anaerobic digestion relies on the natural decomposition of organic material to both reduce the volume of waste that must be disposed of as well as to recover usable gasses that can then be converted into energy. Anaerobic digestion uses micro-organisms to break down biodegradable material in the absence of oxygen. During this process, the micro-organisms produce methane. Although anaerobic digestion is most commonly used to manage wet waste material, such as sewage treatment residuals and other sludges, it is suitable for managing almost any organic material other than common polymers. Thus, recyclable wastes such as waste paper and other fiber wastes, and non-recyclable wastes such as yard waste, food scraps, animal wastes, agricultural wastes, and certain leachates, can be managed through anaerobic digestion. There are many potential sources and means of obtaining feedstocks for anaerobic digestion. Source separated yard waste can be collected from community yard waste collection programs and commercial generators, such as landscape contractors. Agricultural waste from both crops and livestock can serve as feedstock. Food waste can be collected from grocery stores, restaurants, and other food service establishments. Residuals from mixed solid waste materials recovery facilities can be used as feedstock.

When combined with other reduction and diversion programs such as recycling, composting, and incineration, anaerobic digestion can be a component of a comprehensive waste management program that minimizes the amount of waste that must be disposed of in landfills.

In addition to disposal-related benefits, anaerobic digestors also have the potential to provide a low-cost, renewable source of fuel for energy production. Anaerobic digestors allow for the controlled production of methane which can then be collected and used as a substitute for fossil fuels in energy production. It reduces uncontrolled releases of methane to the atmosphere resulting from the biodegradation of waste in landfills. It also minimizes the risks posed by methane gas migrating through underground pathways to nearby structures, underground pipelines, other underground utility corridors, and other outlets.

Converting Biomass to Energy

This technology involves treating biomass in such a way as to release its stored energy. Biomass refers to living or recently dead biodegradable, organic material, usually plant material, that can be used as fuel. It is material that is still part of or was recently removed from the carbon cycle. In contrast, natural gas, coal, and petroleum are fossil fuels and were produced from organic matter that was removed from the carbon cycle many years ago.

Treating biomass can involve direct combustion or transforming the material into fuel that can then be used to produce energy. Thus, biomass can be burned to provide heat or to generate steam for making electricity. Biomass can also be converted into biofuels that can then be used to produce energy. Biofuels can be a solid, a liquid, or a gas. Examples include cellulose, methane gas, ethanol, and biodiesel.⁴⁴

Biomass can also be burned in conjunction with coal at power plants through a process that is known as co-firing. Co-firing is normally used to reduce air emissions and other environmental impacts from burning straight coal. Generally, in co-firing, biomass comprises a small percentage of all of the fuel burned. A number of different sources indicate that the biomass to coal ratio for fuel feeding the boiler should not exceed 15:85 percent. Biomass at higher percentages negatively affects the boiler's efficiency.

Ethanol is produced by fermenting organic material that is high in sugar or starch content. Although ethanol has traditionally been created from agricultural crops such as grains, sugar beets, and sugar cane, companies are developing technologies that can create ethanol from household garbage.

Biodiesel is produced from organic material that is high in oil. In terms of waste, used vegetable oils and fats can be used. Biodiesel is made through a chemical process called transesterification. This process separates glycerin from the fat or vegetable oil. The process leaves behind two products — methyl esters (the chemical name for biodiesel) and glycerin.⁴⁵ Glycerin is used to manufacture soaps and other products. Oils and fats can also be chemically processed to produce biofuel.

Production of Synthesis Gas/Syngas

Syngas is produced through the chemical decomposition of organic material into gases and can be produced from almost any organic material, including solid waste. Syngas is comprised of several different gases, but primarily consists of hydrogen and carbon monoxide. Syngas can be refined and used as a substitute for traditional fossil fuels in a number of applications, including fuel for turbines and internal combustion engines which can be coupled with electric generators. Syngas can also be converted into synthetic fuel. Burning syngas is potentially more efficient than direct combustion of the feedstock. Furthermore, syngas burns cleaner than fossil fuels and is also cleaner than the bulk incineration of solid waste. Burning syngas produces primarily water vapor and carbon dioxide.

In addition to gases, the processes that produce syngas generate solid material and heat. The heat that is produced can be converted into steam and used to generate electricity. The solid material can be ash or slag, depending upon the process used to produce the syngas. Much of the solid material can be used beneficially rather than disposed of in landfill facilities.

There are two basic types of technologies that can be used to produce syngas from solid waste. These two technologies are pyrolysis and gasifiers. The amount of syngas produced by through pyrolysis or a gasifier depends on the amount of organic material in the feedstock. The greater the amount of organic material, the more gas will be produced. Combining plasma arc converters and gasifiers with other types of waste management programs, such as recycling programs and materials recovery facilities, can maximize the organic content of the waste stream as well as the quantities of recyclable materials recovered from the waste stream. Both technologies are described below as is the conversion of syngas into ethanol.

Pyrolysis

There are a number of waste treatment technologies that rely on pyrolysis to produce fuel. The process of pyrolysis occurs in the absence of oxygen. Thus, pyrolysis causes the decomposition of waste while avoiding combustion. Plasma arc converters are one example of pyrolysis. Plasma arc converters use a strong electrical current to generate extreme temperatures which in turn convert organic material into gas. The high temperature in combination with the lack of oxygen causes the chemical decomposition of the organic material through pyrolysis rather than combustion. This results in the volatilization and complete chemical breakdown of the material into gases. Under the conditions that exist in a plasma arc converter, feedstocks are converted primarily into syngas and slag.

Slag is the by-product that is generated when inorganic wastes melt and become vitrified. It is the solid portion of the waste stream that remains after pyrolysis has taken place. Although the slag is a waste, the amount of slag produced is approximately 20 percent of the weight and five percent of the volume of the original feedstock.⁴⁶ Thus, plasma arc converters result in a substantial reduction in the amount of waste that must be managed.

As another benefit, there are a number of potential uses for the slag. The manner in which molten slag is cooled determines the type of solid the slag becomes. Different forms of slag can be recycled in different ways. Rock-like, air cooled slag can be incorporated into cement, asphalt, and road surfacing material. Fiber-like, forced-air cooled slag can be used as insulation. Molten slag can be poured into molds to make bricks and paving products.⁴⁷

Starved-Oxygen Gasifiers

Like pyrolysis, gasification is a process that can be used to convert carbon-based materials into usable gases. Unlike plasma arc converters, however, gasifiers cause organic materials to react and chemically break down to gases using high temperatures and a controlled amount of oxygen. The oxygen is required to induce partial combustion of the waste to produce the needed high temperatures. A relatively small portion of the fuel burns completely. Rather than burning, most of the carbon-containing feedstock is chemically broken apart by the gasifier's heat and pressure.⁴⁸

Gasifiers convert feedstocks into four main by-products:

- Syngas;
- Hydrocarbon liquids (oils);
- Char (carbon black and ash); and
- Water.

Char is the solid waste material produced by a gasifier. The amount of ash produced ranges from eight percent to 15 percent of the original volume of the feedstock.⁴⁹

Conversion of Syngas (to biofuel, such as ethanol)

Producing biofuel from biomass-generated syngas is a technology that is receiving attention due to its potential to produce liquid fuel from waste. As was already discussed, syngas can be produced from a number of different technologies. Once the syngas has been produced, converting it to biofuel involves using either a metal catalyst or a microbial catalyst to convert the syngas into ethanol, butanol, and propanol.^{50 51}

Of the two types of conversion methods, using microbial catalysts to produce biofuel from syngas is the lower-cost option. This is because initiating the conversion using metal catalysts requires extremely high pressure and temperature. Creating these conditions requires costly energy inputs. Additionally, the reaction produces substantial amounts of heat which must be removed from the system in order for the reactions to proceed once initiated.⁵²

Using a microbial catalyst, such as bacteria, to cause the conversion reaction does not require the addition of significant energy. As a result, using microbial catalysts to produce ethanol from syngas is lower in cost than using metal catalysts. Further, the ethanol produced is lower in cost than ethanol produced using corn. This may make the ethanol economical enough to compete with traditional fuels.

The process for producing syngas and subsequent conversion to ethanol using a microbial catalyst is as follows:

- Production of syngas;
- Heat recovery;
- Removal of contaminants from syngas;
- Adjustment of the ratio between hydrogen and carbon monoxide in the syngas;
- Passing of syngas through a microbial reactor at the appropriate temperature; and,
- Collecting and purifying/separating the products as they exit the reactor.⁵³

Converting syngas into biofuel produces the following products and wastes:

- Steam;
- Ash;
- Carbon Dioxide;
- Ethanol;
- Butanol; and,
- Propanol.⁵⁴

Collection and Utilization of Landfill Gas

MSW landfills generate significant quantities of methane gas, along with carbon dioxide and volatile organic compounds (VOCs). Methane makes up about 50 percent of landfill gas. Landfill gas poses a safety threat when it migrates laterally through underground pathways. Landfill gas also represents an environmental threat when it is released to the atmosphere. In fact, methane gas is approximately 20 times more detrimental as a greenhouse gas than carbon dioxide. Thus, passive releases of methane gas contribute significantly to the concentration of greenhouse gases in the atmosphere. In addition to safety and environmental threats, landfill gas represents a valuable source of usable fuel.

Landfill gas can be recovered, refined, and used as an alternative to natural gas for producing electricity. Using landfill gas to produce electricity is one of the lowest impact resources. This is one of the greatest benefits to using landfill gas to generate electricity. Refined landfill gas can also be used as an alternative to petroleum-based gasoline in motor vehicles.

Owners and operators of all MSW landfill facilities are required to provide for landfill gas monitoring and management. In accordance with current air regulations, owners and operators of large solid waste landfills are required to collect landfill gas either through passive or active gas extraction systems. Many facility owners and operators flare the collected gas to destroy VOCs.

Co-firing of Municipal Solid Waste and Coal

This technology could provide an alternative to dedicated units for incinerating solid waste. Co-firing MSW with coal provides a means of reducing the amount of solid waste that must be disposed of in landfills, uses a renewable resource to reduce

dependence on coal, and provides a means of moderating emissions from the strict burning of coal. Additionally, burning MSW, particularly biomass, in conjunction with coal is potentially the lowest cost means of obtaining energy from biomass.

The concept behind co-firing MSW and coal is to use the existing coal-burning infrastructure to help manage solid waste. In this manner, the costs involved would potentially be lower than constructing and operating dedicated MSW combustion facilities. The costs involved in upgrading existing coal-burning power plants to accept MSW would include retrofitting existing plants with required emission control technology, making modifications for fuel handling, storage, and ash removal, and, depending upon the proximity of the plant to sources of MSW, transportation costs.⁵⁵

Another benefit is the affect of MSW, particularly biomass, on the quality of the emissions from the coal-burning operation. Adding MSW as a feedstock to coal-burning operations does not sacrifice the efficiency of the coal plant provided the amount of MSW is controlled at maximal levels.⁵⁶ At the same time, including the MSW as a feedstock can reduce the emissions of sulfur dioxide, nitrogen oxide and greenhouse gases from the plant. Improvements to emissions resulting from co-firing MSW and coal is most notable when the MSW contains a high percentage of biomass.

Incineration with Energy Recovery

Incineration is a waste management technology that is typically used to reduce the volume of waste that must be disposed of. Incineration involves burning waste in a furnace that is specifically designed for combusting waste. When combined with energy recovery, however, incineration can be used to produce steam or electricity. Unlike gasification, incineration occurs in the presence of an excess of oxygen to enable complete combustion. During incineration, waste materials are combusted and converted into:

- Bottom Ash;
- Flue Gases, including carbon dioxide, sulfur dioxide, hydrochloric acid, heavy metals, and dioxins;
- Particulates (i.e. fly ash); and
- Heat.

The heat from the combustion process can be captured and used to produce steam which in turn can be used directly for heating or to generate electricity.

As was mentioned earlier, at the time this document was prepared, Ohio did not host any operating facilities for burning mixed MSW, either for energy recovery or for volume reduction in Ohio. That may change in the future. Recently, Ohio's solid waste industry had begun investigating the feasibility of incinerating solid waste to recover energy.

Environmental Regulatory Barriers

The majority of Ohio's environmental rules and regulations are well-established as are the administrative programs that implement the rules and regulations. These laws and regulations are focused primarily on controlling releases of pollutants and contaminants to the environment through known technologies and management practices. The regulations were not designed with the recent advancements in waste management technologies in mind. In particular, Ohio's solid waste regulations are designed to direct solid waste to disposal facilities rather than divert it to non-traditional waste-to-energy facilities. As most of the wastes that would be used to produce energy are regulated as solid wastes, the regulations pose a dilemma in terms of how to permit and license facilities that use the technologies. The regulations that govern solid waste incinerators are an example. Those regulations require the same permits and licenses for both traditional incinerators and energy recovery facilities. As a result Ohio's regulatory system does not contemplate how to regulate waste-to-energy technologies separately from standard incineration practices.

In some cases, trying to draw distinctions between traditional incineration and waste-to-energy technologies is difficult due to the similarities in the processes used and the pollutants produced. In particular, those facilities that rely on combustion all have similar environmental concerns.

Ohio's existing environmental regulations pose the following obstacles to implementing waste-to-energy technologies.

- Ohio's regulations currently lack the flexibility to accommodate many potential waste-to-energy technologies. This is particularly true regarding the permitting requirements for waste management facilities.
- Due to the number of permits needed, the process of applying for and receiving all of the necessary approvals is very time consuming and resource intensive.

These obstacles represent issues that Ohio EPA will need to address in order to facilitate the use of technologies that produce energy using waste.

Solid Waste Regulations

Solid Waste Incinerator and Waste-to-Energy Regulations:

Ohio's existing regulations governing solid waste incinerators are found in Ohio Administrative Code (OAC) Rules 3745-27-50 through 3745-27-53. These rules apply equally to incinerators used for volume

reduction and solid waste incinerators with energy recovery. Owners/operators of both types of facilities are required to obtain the same permits from Ohio EPA. Furthermore, the regulations apply the same operational standards to both types of facilities. Thus, other than offering separate definitions, the regulations currently treat both types of facilities the same.

Under Ohio's solid waste regulations, incinerator is defined as:

"...any equipment, machine, device, article, contrivance, structure, or part of a structure used to burn solid or infectious wastes to ash." A solid waste energy recovery facility is defined as "...any site location, tract of land, installation, or building where mixed solid waste or select solid waste streams, including scrap tires, is used as or intends to be used as fuel to produce energy, heat, or steam."

Ohio's regulations governing solid waste incinerators do allow Ohio EPA to permit other waste-to-energy technologies that do not involve combusting solid waste. However, the regulations do not clearly identify those technologies. As a result, Ohio EPA has begun evaluating how to revise the rules to accommodate newer and emergent technologies that use waste to produce energy.

Ohio EPA is exploring ways that the Agency can streamline permitting anaerobic digestors. The Agency's efforts are focused on anaerobic digestors that are used to manage solid waste and from which energy is recovered. Currently, these anaerobic digestors are potentially regulated under three chapters of the Ohio Revised Code (ORC)

- ORC Chapter 3734 (Solid Waste), administered by Ohio EPA's Division of Solid and Infectious Waste Management;
- ORC Chapter 6111 (Water Pollution Control), administered by Ohio EPA's Division of Surface Water; and
- ORC Chapter 903 (Concentrated Animal Feeding Facilities), administered by the Ohio Department of Agriculture.

To streamline the permitting process, Ohio EPA is investigating ways to avoid regulatory duplication. The concept being considered would require the owner or operator of a qualifying anaerobic digester to obtain a permit under ORC Chapter 6111 or 903. Under those circumstances, the owner or operator would be released from ORC Chapter 3734 provided the owner or operator follows best management practices for managing solid waste storage and handling areas. These practices are intended to avoid nuisance conditions.

Ohio EPA's long-term plan is to develop a comprehensive regulatory package to govern all types of waste-to-energy technologies. This package would incorporate the existing solid waste incinerator and waste-to-energy rules, the proposed anaerobic digestion facility rules, and new rules to expand the types of technologies that can be permitted.

In the interim, the director of Ohio EPA does have the authority, under ORC Section 3734.02, to exempt a permit applicant from having to follow particular requirements in the solid waste regulations. That same section of the ORC allows the director of Ohio EPA to approve variances to particular requirements. These authorities give Ohio EPA some flexibility to facilitate permitting waste to energy technologies on a case-by-case basis. While these authorities do offer a short-term solution, they do not recognize waste-to-energy technologies as preferential management techniques nor do they streamline the permitting process for those technologies.

Air Pollution Control Regulations

While the solid waste regulations pose barriers to effective permitting of waste-to-energy technologies, the permitting requirements under ORC Chapter 3704, Air Pollution Control (administered by Ohio EPA's Division of Air Pollution Control) may pose the greater obstacle. Unlike the water pollution control and hazardous waste regulations that are discussed later, the air pollution control requirements discussed below are specific to solid waste combustors.

New Source Performance Standards(NSPS) and Emission Guidelines

In 1990, Congress amended the Clean Air Act to address emissions from solid waste combustion (i.e. burning non-hazardous municipal solid waste). The new provisions required U.S. EPA to establish new source performance standards (NSPS) to address emissions from new combustors and to establish emission guidelines for existing combustors. Both the NSPS and emission guidelines require compliance with emission limitations.

The NSPS are direct federal regulations that apply to new sources of emissions. The NSPS apply to solid waste incinerators that are built after and to those that start operations following the effective date of the NSPS. Qualifying combustion units are required to be constructed and operated in accordance with the NSPS. The emission guidelines are developed and administered by individual states and apply to existing sources of emissions. Existing sources are those that were built before the NSPS applicability date. Existing sources had to be retrofitted with pollution control technology so that those facilities could be operated in compliance with the emission guidelines.

The federal government does not directly regulate solid waste combustion units through the emission guidelines. Instead, individual states are directed to develop plans as the vehicles by which the states implement the emission guidelines. These state plans must be approved by U.S. EPA. Once a state's plan is approved, the plan becomes federally enforceable. The Clean Air Act contains the general requirements and procedures for states to follow for developing and submitting plans.

On December 19, 1995, the federal government adopted regulations for the NSPS and emission guidelines for MSW combustors with combustion capacities larger than 39 tons per day. As a result of litigation, U.S. EPA subsequently promulgated regulations for large and small MSW combustors through separate legislative efforts. The NSPS for new and emission guidelines for existing large MSW combustors were re-adopted on August 25, 1997 and fully implemented by December 2000. A large MSW combustor is defined as a combustor with a capacity greater than 250 tons per day. The standards and guidelines require owners and operators of large combustors to achieve the maximum achievable reduction in emissions of air pollutants. The standards and guidelines establish emission levels for:

- Organics (dioxins and furans);
- Metals (cadmium, lead, mercury, particulate matter, and opacity);
- Acid gases (hydrogen chloride, sulfur dioxide);
- Nitrogen oxides; and
- Fugitive ash.

The standards and guidelines also establish the following required operating practices:

- Carbon monoxide;
- Load;
- Flue gas temperature;
- Operator training/certification;
- Siting analysis, and
- Materials separation plan.

The NSPS for small MSW combustors were adopted on June 6, 2001 and apply to MSW combustors with capacities of between 35 and 250 tons per day. The format of the emission limits is the same as those for large MSW combustors (i.e. emission limits based on pollutant concentration). However, alternative percentage reduction requirements are provided for mercury, sulfur dioxide, and hydrogen chloride.

The emission guidelines for small MSW combustors were adopted by the federal government on February 5, 2001. These guidelines contain the same required operating practices as those promulgated for large MSW combustors.

The Clean Air Act requires U.S. EPA to review and, if appropriate, amend the NSPS and emission guidelines every five years. In December 2005, U.S. EPA proposed revised emission limits to reflect the levels of performance actually achieved by the emission controls installed to meet the emission guidelines established in the original regulations. The proposed amendments were adopted by the federal government and became effective on May 10, 2006. The amendments revised the emission limits and compliance testing provisions. Relative to the NSPS, the most significant changes were to the emission limits for dioxin, cadmium, lead, mercury, and particulate matter. For the emission guidelines, the most significant changes were to the emission limits for cadmium, lead, mercury, and particulate matter. For both the NSPS and the emission guidelines, the revisions require increased data availability from continuous emissions monitoring systems.

Water Pollution Control Regulations

The water pollution control requirements that are discussed below may or may not apply to waste-to-energy facilities. Unlike the air pollution control requirements that were explained earlier, the water pollution control requirements are not specific to waste-to-energy facilities. Instead, these requirements apply to any qualifying facility or activity.

National Pollutant Discharge Elimination System (NPDES)

Any municipality, industry, or other business that wishes to discharge wastewater to a surface water of the State must first obtain a NPDES permit from the Ohio EPA. Through the NPDES permit, Ohio EPA regulates wastewater discharges by limiting the quantities of pollutants in the discharge. The limits and other conditions in the permit help ensure compliance with Ohio's water quality standards and federal regulations, all of which were written to protect public health and the aquatic environment.

There are three main subprograms of the overall NPDES program that have the potential to affect waste-to-energy facilities. These components are each explained below.

Point-Source Discharge - Whether or not a facility owner or operator is required to obtain a discharge permit under the NPDES program depends upon where the facility discharges effluent. The owner/operator would be required to obtain an NPDES permit if the facility discharges directly to waters of the United States. In addition to dictating limits on the types and levels of contaminants that can be discharged and the temperature of any cooling water discharged, the NPDES permit also establishes monitoring and reporting requirements. If the facility discharges to a municipal sanitary sewer system, then

the facility owner or operator will need to meet requirements under the National Pretreatment Program which is administered by either the local government or Ohio EPA.

Water Intake Structures - A facility that withdraws water for cooling purposes from a lake, river, estuary, or ocean is required to meet best technology available (BTA) requirements in accordance with Section 316(B) of the Clean Water Act. The BTA requirements are intended to minimize the environmental impacts on organisms that reside in the waters. The BTA requirements govern the location, design, construction, and capacity of cooling water structures.

Stormwater Discharge - A facility owner/operator may be required to obtain an NPDES stormwater permit. In addition to obtaining the necessary permit, the owner or operator would also be required to implement stormwater pollution prevention plans (SWPPPs) or stormwater management programs (both using best management practices (BMPs)) that effectively reduce or prevent the discharge of pollutants into receiving waters. The requirements governing stormwater discharges apply to the construction and operation of the facility.

National Pretreatment Program

The National Pretreatment Program is mandated under the federal Clean Water Act. The program is implemented through a cooperative effort of federal, state, and local regulatory environmental agencies established to protect water quality. The program is designed to reduce the level of pollutants discharged by industry and other non-domestic wastewater sources into municipal sewer systems, and thereby, reduce the amount of pollutants released into the environment through wastewater. The objectives of the program are to protect the Publicly Owned Treatment Works (POTW) from pollutants that may interfere with plant operation, to prevent pollutants that may pass through untreated from being introduced into the POTW, and to improve opportunities for the POTW to reuse wastewater and sludges that are generated.

401 Water Quality Certification

401 Water Quality Certification refers to requirements imposed under the Clean Water Act to protect waters of the United States. The federal 401 Water Quality Certification program is administered by Ohio EPA and is required for projects that would physically impact waters of the state, including streams, lakes and wetlands. Anyone who wishes to discharge dredged or fill material into the waters of the Ohio, regardless of whether the project will occur on private or public property, must obtain a Section

401 Water Quality Certification from Ohio EPA. In addition, the U. S. Army Corps of Engineers must issue a Section 404 permit before the project can occur. The purpose of the 401 Water Quality Certification is to ensure that the project will not violate Ohio's water quality standards.

Hazardous Waste Regulations

All generators of waste are required to evaluate whether or not the waste is hazardous in order to determine how to properly manage the waste. This is true for the waste products resulting from waste-to-energy processes. In general, the major concern for wastes generated from waste-to-energy facilities is the potential for the waste to exhibit the toxicity characteristic.

For those technologies that generate glass-like slag material, the potential for the slag to fail the toxicity characteristic is relatively low. This is because the slag material essentially encapsulates whatever contaminants are present, preventing the contaminants from leaching hazardous constituents. Of more concern are the ashes that are generated by technologies that use combustion to decompose waste. These ashes have greater potential to leach toxic substances.

The potential for waste products of waste-to-energy technologies to contain toxic substances is partially dependent upon the types of materials in the waste used as feedstock. The potential for the waste products to be toxic can be reduced by using homogeneous, primarily organic feedstocks or by sorting heterogeneous feedstocks, such as mixed municipal solid waste, to remove undesirable materials.

Summary

The waste industry has seen a renewed interest in using waste to produce energy. The main driving forces behind this renewed interest are increased fuel costs and the desire to reduce the United States' reliance on foreign sources of fossil fuels. Many of the waste-to-energy technologies fit into the preferred waste management hierarchy and can potentially be components of a comprehensive waste management structure. Further, because the technologies use waste, they have the potential to help Ohio achieve its reduction and recycling goals.

Many of the technologies that are being discussed are not new. What is new is the interest in applying these existing technologies to manage specific waste streams. In order to do so, however, the waste industry will have to overcome some significant obstacles, some of which are based in environmental regulations. From a regulatory standpoint, while solid waste regulations will need to be amended to accommodate new technologies, the solid waste regulations are a small piece of the overall process. Other regulations, such as the air pollution control regulations, pose a much bigger complication.

Ohio EPA is working to streamline its permitting requirements to remove duplicative regulation. The goal is to allow the Agency to be as coordinated as possible when responding to applicants wanting to implement waste-to-energy operations. For this reason, this state plan includes, in Chapter 3, a strategy that obligates Ohio EPA to investigate developing rules to govern permitting and operating waste-to-energy facilities (see State Strategy 9 in Chapter 3).

Footnotes

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Appendix A

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- | |
|--|
| * SWAC Member - Appointed - Term exp. 6/23/2010 |
| ** SWAC Member - Appointed - Term exp. 6/23/2011 |
| *** SWAC Member - Ex Officio |
| 1 Chairperson |
| 2 Vice-chairperson |
| 3 Secretary |

Appendix B

Waste Reduction and Recycling Rates

Waste Reduction and Recycling Rates by Solid Waste Management District for Calendar Years 2001 and 2007

SWMD	Residential/Commercial Sector WRRR in 2001 (percent)	Residential/Commercial Sector WRRR in 2007 (percent)	Industrial Sector WRRR in 2001 (percent)	Industrial Sector WRRR in 2007 (percent)
Adams-Clermont	1.5	11.07	63.61	47.43
Allen, Champaign, Hardin, Madison, Shelby Union (Northcentral Ohio)	14.34	21.55	89.07	78.27
Ashland	20.55	15.06	58.4	92.57
Ashtabula	19.21	33.38	8.48	12.02
Athens-Hocking	10.44	3.83	18.96	40.90
Auglaize	21.16	30.52	90.22	82.74
Belmont-Jefferson	0.62	7.85	92.45	92.88
Brown	14.14	11.91	80.14	96.12
Butler	6.73	33.07	75.64	80.90
Carroll, Columbiana, Harrison	10.15	12.56	72.51	69.51
Clark	34.96	34.46	97.7	96.64
Clinton	1.16	13.68	0	97.69
Coshocton, Fairfield, Licking, Perry	23.03	27.99	53.74	49.09
Crawford	20.52	29.18	82.86	96.57
Cuyahoga	23.37	29.42	69.26	70.54
Darke	19.79	26.72	95.96	79.08

SWMD	Residential/Commercial Sector WRRR in 2001 (percent)	Residential/Commercial Sector WRRR in 2007 (percent)	Industrial Sector WRRR in 2001 (percent)	Industrial Sector WRRR in 2007 (percent)
Defiance, Fulton, Paulding, Williams	27.71	30.82	71.45	70.32
Delaware, Knox, Marion, Morrow	17.72	36.22	86.78	75.16
Erie	12.36	11.99	90.93	91.03
Fayette, Highland, Pickaway, Ross	20.15	19.94	96.97	91.06
Franklin (Solid Waste Authority of Central Ohio)	28.6	29.95	66.68	64.64
Gallia, Jackson, Meigs, Vinton	29.46	3.69	2.05	1.77
Geauga-Trumbull	20.1	24.61	72.18	66.48
Greene	20.66	25.76	71.52	86.96
Guernsey, Monroe, Morgan, Muskingum, Noble, Washington (Southeastern Ohio)	32.08	29.05	76.88	62.48
Hamilton	32	43.23	88.16	56.15
Hancock	19.63	11.68	83.52	85.31
Henry	27.2	40.45	77.33	56.63
Holmes	11.79	26.11	94.71	84.18
Huron	23.59	37.06	97.01	84.96
Lake	31.56	28.43	85.06	81.29
Lawrence-Scioto	14.68	3.28	96.51	67.35
Logan	24.52	36.59	94.89	97.63
Lorain	9.86	15.68	93.15	57.31
Lucas	20.18	26.82	36.03	75.11
Mahoning	15.06	24.82	44.11	59.37
Medina	30.6	25.40	77.42	73.02
Mercer	26.01	21.97	96.49	98.98
Miami	25.45	34.74	93.38	68.70
Montgomery	7.37	15.59	41.56	64.67
Ottawa, Sandusky, Seneca	11.24	17.92	56.65	83.98
Pike	5.04	18.46	79.23	74.28
Portage	18.45	15.48	51.51	0
Preble	7.85	13.84	86.78	85.56
Putnam	26.25	21.67	97.44	98.60
Richland	28.61	17.06	89.4	91.24
Stark, Tuscarawas, Wayne	23.5	14.92	78.87	69.89
Summit-Akron	20.62	15.76	77.38	52.30
Van Wert	36.19	39.46	65.04	22.15
Warren	9.16	18.80	88.1	74.16
Wood	23.06	14.53	96.06	54.77
Wyandot	16.56	17.67	67.09	68.13

Appendix C

Community Development Grant Awards 2006, 2007, and 2008

2006 Community Development Grant Awards

Central Ohio

Clark County Solid Waste Management District and Paygro of South Charleston was awarded a \$250,000 Market Development Grant to create an in-vessel composting system that processes a wide range food-waste material, both post-consumer and post-commercial, converting such material into marketable compost. A total of 5,143 tons of additional food waste material will be processed annually. The company intends to create six new jobs and provide at least \$295,000 in matching funds.

Clark County Solid Waste Management District was awarded a \$22,166 Community Development Grant to purchase and install new equipment to help establish a full service recycling center.

Delaware County was awarded a \$10,000 Community Development Grant to support litter collection in state and local parks, as well as its Adopt-A-Roadway efforts.

Fairfield County was awarded a \$100,000 Community Development Grant to purchase two collection vehicles and containers to collect cardboard and other paper fiber.

Knox County was awarded a \$4,830 Community Development Grant to purchase recycling containers to be placed at local schools.

Licking County was awarded a \$2,110 Community Development Grant to purchase recycling containers to be utilized during 14 special events throughout the county for the collection of single served beverage containers.

Morrow County was awarded a \$9,160 Community Development Grant to support litter collection within 16 townships and Adopt-A-Roadway efforts.

Solid Waste Authority of Central Ohio and The Grossman Group of Columbus (Franklin County) was awarded a \$239,517 Market Development Grant to purchase equipment that processes corrugated cardboard. The company proposes recycling 42,000 additional tons per year and will provide at least \$239,517 in matching funds.

Northeastern Ohio

Ashtabula County was awarded a \$10,000 Community Development Grant to purchase supplies and reimbursement of disposal costs to cleanup public areas and illegal dumpsites.

City of Akron was awarded a \$10,000 Community Development Grant to purchase supplies for local litter collection projects, reimbursement of disposal costs and litter law enforcement awareness materials.

Columbiana County was awarded a \$3,118 Community Development Grant to purchase recycling containers to be placed at local schools for the collection of beverage containers and office paper.

Cuyahoga County Solid Waste District and the Broadview Group, LLC of Westlake was awarded a \$75,000 Market Development Grant to cover the cost of research and development of a waste carpet reclamation system that can be transferred into a processing facility environment. The company will provide at least \$75,000 in matching funds.

Cuyahoga County Solid Waste District (Kurtz Brothers, Inc.) was awarded a \$250,000 Market Development Grant for equipment to process construction & demolition debris including concrete, wood, and drywall.

Lorain County Solid Waste Management District was awarded a \$52,800 Community Development Grant to contract services for the collection of electronics at four separate events.

Mahoning County Solid Waste District (Associated Paper Stock Inc.) was awarded a \$250,000 Market Development Grant for the creation of a material recovery facility that will process recycled fiber products, plastics, glass and aluminum.

Mahoning County Solid Waste Management District was awarded a \$22,500 Community Development Grant to contract services for the collection of electronics at nine separate events.

Medina County was awarded a \$11,200 Community Development Grant for the purchase of a collection trailer providing a year-round opportunity for residents to recycle their electronics materials.

Portage County Solid Waste District was awarded a \$100,000 Community Development Grant to purchase and install a new glass trommel and conveying system, which will allow increased processing capacity.

Richland County Regional Solid Waste Management Authority was awarded a \$62,622 Community Development Grant to establish a permanent electronic collection facility.

Summit-Akron Solid Waste Management Authority was awarded a \$20,000 Community Development Grant to purchase recycling containers for a new initiative at the Blossom Music Center entitled “Recycling in Concert.” The project will be a model for plastic recycling programs at other entertainment venues. The authority will provide at least \$10,020 in matching funds.

Northwestern Ohio

Auglaize County Solid Waste District was awarded a \$56,000 Community Development Grant to purchase and install new equipment to process fiber-based material and a collection vehicle to service new accounts for the collection of recyclables.

Crawford County Solid Waste District (Innovative Recycling) was awarded a \$99,500 Market Development Grant for a sorting system and material baler to process multiple grades of fiber-based material.

Erie County was awarded a \$3,000 Community Development Grant to support litter collection efforts in partnership with the juvenile court system and the African-American Alternative Center.

Erie County Solid Waste Management District and Erie Materials, Inc. of Sandusky were awarded a \$250,000 Market Development Grant to purchase equipment that processes asphalt shingles. The recycled material will be used in the production of asphalt concrete. An estimated 1,300 tons of asphalt shingle waste will be recycled during the start-up phase of this project. Two new jobs will result from this project and the company will provide at least \$250,000 in matching funds.

Henry County Solid Waste District was awarded a \$4,175 Community Development Grant to support a 12-week litter collection program in partnership with the local court system and sponsor a community-wide cleanup project.

Huron County Solid Waste Management District (Monroeville Industrial Molding) was awarded a \$250,000 Market Development Grant for plastic extrusion equipment using recycled plastic material.

Lucas County Solid Waste Management District was awarded a \$113,000 Community Development Grant for the implementation of a call-in/appointment program for the collection of electronic materials.

Marion County was awarded a \$10,000 Community Development Grant to support a litter collection crew and Adopt-A-Roadway efforts.

Ottawa-Sandusky-Seneca Joint Solid Waste District was awarded a \$8,225 Community Development Grant to purchase portable ramps and make improvements to the facility’s dock area.

City of Toledo was awarded a \$10,000 Community Development Grant to purchase recycling containers to be utilized at special events.

Wood County Solid Waste District was awarded a \$100,000 Community Development Grant to purchase equipment to process construction and demolition debris material into a marketable material.

Van Wert County Solid Waste Management District was awarded a \$15,800 Community Development Grant for site upgrades that will improve the facility’s ability to accept electronic waste.

Southeastern Ohio

Harrison County was awarded a \$9,926 Community Development Grant to support litter collection in partnership with the county sheriff’s department and Adopt-A-Roadway efforts.

Meigs County was awarded a \$10,000 Community Development Grant to support litter collection on the county and township roadways in partnership with the county health department.

Vinton County was awarded a \$5,000 Community Development Grant to support litter collection on the county and township roadways in partnership with the county sheriff’s department.

Southeastern Ohio Joint Solid Waste Management District (Guernsey, Monroe, Morgan, Muskingum, Noble, Washington Counties) was awarded a \$24,000 Community Development Grant to cover the cost of contracting for electronic collection services in a six county region. This regional project will provide e-waste recycling in a predominately rural setting. The district will provide at least \$12,000 in matching funds.

Southwestern Ohio

Brown County Solid Waste Management Authority and Adams-Brown Recycling of Georgetown was awarded a \$206,000 Market Development Grant to create a sorting system and purchase equipment that will increase its capacity to process new and multiple grades of fiber-based material, including cardboard. The company proposes processing 2,306 tons of recycled material annually. Two new jobs will be created through this project and the organization will provide at least \$206,000 in matching funds.

Clermont County was awarded a \$10,000 Community Development Grant to support litter collection and Ohio River Sweep efforts in partnership with the municipal court system and Clermont 20/20.

Clinton County Solid Waste Management District was awarded a \$2,254 Community Development Grant to purchase recycling containers to be utilized at local schools, public facilities and at special events.

Greene County was awarded a \$32,000 Community Development Grant to purchase and install new equipment that will allow the county to improve the marketing of processed material.

Hamilton County Solid Waste Management District (Cincinnati Paperboard) was awarded a \$225,000 Market Development Grant to purchase equipment to clean and recycle post-consumer wastepaper fiber that is currently too contaminated for use.

Montgomery County Solid Waste District was awarded a \$18,525 Community Development Grant to provide electronics collection services to the district's small business community.

Ross-Pickaway-Highland-Fayette Solid Waste Management District was awarded a \$7,066 Community Development Grant to contract for the collection and recycling of electronic items on a regional basis.

Warren County Solid Waste Management District was awarded a \$10,000 Community Development Grant to purchase a collection vehicle, which will be utilized to conduct a year-round litter collection effort.

2007 Community Development Grant Awards

Central Ohio

Clark County Waste Management District was awarded \$24,476 for the purchase of ten (17cy) roll-off recycling containers, directional signage, and 450 (24 gallon) recycling bins. The project is expected to collect 224 tons of mixed recyclables per year. The containers will service the Springfield and South Charleston areas.

Delaware County was awarded \$8,000 for a service contract providing for the collection and proper recycling of electronics and appliances. The program is targeted at the elderly portion of the county's population and should realize the collection of 14 tons annually.

DKMM Solid Waste District (Delaware, Knox, Marion, Morrow counties) was awarded \$26,000 for the purchase of a box truck which will be utilized by the Delaware County Habitat for Humanity for the collection of deconstruction material. The non-profit organization proposes recycling 200 additional tons of material per year and will provide at least \$13,000 in matching funds.

Knox County was awarded \$10,000 to cover the expense of a litter crew supervision contract and miscellaneous expenses. The project is anticipated to collect 100 tons of litter per year.

Licking County was awarded \$45,118 for the costs associated with the purchase of five (12cy) roll-off containers and a truck allowing for the collection and recycling of 364 tons of corrugated cardboard material.

Marion County was awarded \$10,000 for a personal services contract, collection equipment, and awareness costs associated with the implementation of a recycling collection program for the Marion Popcorn Festival, the Marion County Fair, and the Marion Mayhem, a professional indoor football team. It is projected that 9.5 tons of corrugated cardboard and plastic containers will be collected as a result of the program.

North Central Ohio Solid Waste District (Allen, Champaign, Hardin, Madison, Shelby, Union counties) was awarded \$17,500 for the purchase of recycling containers, directional signage and sandwich board signs promoting a recycling effort at the Farm Science Review, which will be held on September 18-20, 2007 at the Molly Caren Agricultural Center (London, Ohio). It is projected that 8 tons of aluminum and plastic containers will be collected as a result of the program.

Northeastern Ohio

Carroll County was awarded \$5,956 for the purchase and placement of 50 PET (polyethylene terephthalate) recycling centers. These centers will be placed at the Carroll County Fairgrounds and used during various events at this location. It is anticipated that 18 tons of corrugated cardboard and plastic containers will be collected as a result of the project.

Columbiana County was awarded \$6,197 for the purchase and placement of 50 PET recycling centers. These centers will be placed at the Columbiana County Fairgrounds and used during various events at this location. It is anticipated that 14 tons of corrugated cardboard and plastic containers will be collected as a result of the project.

Harrison County was awarded \$17,661 for the purchase of two (30cy) roll-off recycling containers. The project is expected to collect 21 tons of mixed recyclables per year. The containers will service the Jewett and Bowerston areas.

Lorain County Solid Waste Management District was awarded \$10,000 for the purchase of a litter collection crew pick-up truck. The project is expected to collect 50 ton of litter annually.

Mahoning County Solid Waste District was awarded \$50,000 for the purchase of twelve (30cy) roll-off recycling containers. The project is expected to collect 1,500 tons of mixed recyclables per year. The containers will service Boardman Township, Milton Township, Beaver Township, Goshen Township, Canfield Township, Springfield Township, Struthers City, and Campbell City.

Portage County Solid Waste District was awarded \$100,000 for the purchase and installation of a new horizontal, auto-tie baler, to process 4,000 tons annually of fibrous material at the district's material recovery facility.

Northwestern Ohio

Auglaize County Solid Waste District was awarded \$13,500 for the purchase and installation of two glass crushers. Approximately 1,662 tons of glass is collected per year as a result of the county's drop-off collection program.

Erie County Solid Waste Management District was awarded \$49,920 for the purchase of eight roll-off recycling containers (20cy and 40cy) and directional signage. The project is expected to collect 1,884 tons of mixed recyclables per year. The containers will service the county's 14 drop-off locations.

Hancock County Solid Waste Management District was awarded \$45,000 for the purchase and installation of a new horizontal, auto-tie baler to process 2,000 tons annually of corrugated cardboard, newsprint and various plastic resins at the district's material recovery facility.

Lucas County Solid Waste Management District was awarded \$50,000 for the purchase of one front load truck with a 41cy full ejection and pack-on-the-go recycling packers. The project is expected to collect 11,300 tons of mixed recyclables annually. The containers will service sites located throughout the county at Kroger stores, village and township halls, the Lucas County Recreation Center, several Lucas County Metroparks and 26-targeted schools.

Mercer County Solid Waste Management District was awarded \$22,000 for the purchase of two (23 ft.) recycling trailers with compartmentalized bins. The project is expected to collect 21 tons of mixed recyclables per year. The containers will service sites at Parkway High School located in Rockford, Ohio and in the Village of Burkettsville.

City of Toledo was awarded \$100,000 for the purchase of recycling containers with radio frequency identification tags for a pilot curbside recycling project, also involving the implementation of a recycling bank service. The pilot project is anticipated to collect 3,600 tons of mixed recyclables annually.

Van Wert County Solid Waste Management District was awarded \$18,404 for the purchase and installation of two vertical balers in order to process 301 tons annually of mixed recyclable material at the district's material recovery facility.

Wood County Solid Waste District was awarded \$100,000 for the purchase of 5,600 wheeled curbside recycling carts, which will be used to service the households within the City of Bowling Green. The project is forecasted to address 900 – 1,200 tons of mixed recyclables annually. The materials will be directed to the Bowling Green Recycling Center for processing.

Southeastern Ohio

GJMV Solid Waste Management (Gallia, Jackson, Meigs, Vinton counties) was awarded \$50,000 for the purchase of a truck, specialized crane and eight – ten recycling containers. The project is expected to collect 285 tons of mixed recycled material per year. The equipment will service 12 sites in Gallia County and three sites in Jackson County.

Meigs County was awarded \$26,000 for the purchase of ¾ ton pick-up truck. The project is expected to collect 285 tons of mixed recyclables per year. The containers will service sites located in Chester, Olive, Rutland, Salem, Salisbury and Sutton Townships.

Muskingum County was awarded \$33,333 for the purchase a forklift, which will be utilized at the county’s material recovery facility, and a recycling trailer dedicated to the collection of recyclable materials collected and sorted at *The Wilds* conservation center. The projected tonnage of mixed recyclables per year is 3,250.

SouthEastern Ohio Joint Solid Waste Management District (Guernsey, Monroe, Morgan, Muskingum, Noble, Washington counties) was awarded \$50,000 for the purchase of three trucks to service the drop-off recycling sites. The project is expected to collect 1,800 tons of mixed recyclables per year. The containers will service Guernsey, Monroe, and Noble Counties at 17 locations; Morgan and Washington Counties at 14 locations along with commercial, governmental, industrial, and institutional generators; and Muskingum County at 17 locations along with commercial, governmental, industrial, and institutional generators.

Southwestern Ohio

Adams County was awarded \$16,667 for the purchase a steerloader that will process 2,550 tons annually of mixed recyclable materials.

Clinton County Solid Waste Management District was awarded \$21,364 to cover the expense of a service contract for the county’s drop-off recycling program. The project is expected to collect 360 tons of mixed recyclables per year. The containers (6cy) will service the following communities: Wilmington (three sites), Blanchester (two sites), Sabina, New Vienna, Martinsville, Midland, Clarksville, Port William, Sligo, Kingman, and Lees Creek.

Greene County was awarded \$8,149 for the purchase of two recycling drop-off collection containers and a service agreement for electronics recycling. The project is expected to annually collect 44 tons of mixed recyclables and electronic items. The containers will service the Villages of Jamestown and Cedarville, while the electronics collection will be countywide.

Montgomery County Solid Waste District was awarded \$10,000 to purchase a tool lending center/trailer. The project is to collect 242 tons of litter per year.

RPHF Joint Solid Waste Management District (Ross, Pickaway, Highland, Fayette counties) was awarded \$50,000 to cover the cost of a recycling service contract. The project is expected to collect 2,000 – 3,000 tons of mixed recyclables annually. The containers will service 86 containers at 37 locations within the four counties.

Warren County Solid Waste Management District was awarded \$100,000 for the purchase of 3,000 (65-gallon) curbside recycling carts, which will be used in a targeted rural area. The pilot project is expected to realize an additional 326 tons of mixed recyclables annually. This effort is in conjunction with CSI, the current contracted hauler in the area.

2008 Community Development Grant Awards

Project Type: Commercial & Institutional Recycling

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
City of Cleveland Heights	\$ 9,632.00	Multiple	200.2
Cuyahoga County	\$ 24,434.78	Multiple	411
Erie County SWMD	\$ 11,450.00	Multiple	2,033.9
Subtotal	\$ 45,516.78		2,645.10

Project Type: Deconstruction

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Cuyahoga County SWD	\$ 50,000.00	CDD	1,500
Lake County	\$ 25,000.00	CDD	75
SWACO	\$ 39,387.00	CDD	900
Subtotal	\$114,387.00		2,475

Project Type: Litter Collection

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
City of Canton	\$ 3,648.00	Litter	20
Huron County SWMD	\$10,000.00	Litter	10
Subtotal	\$13,648.00		30

Project Type: Material Recovery Facility Recycling

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Greene County	\$ 35,646.00	Multiple	454
SouthEastern Ohio JSWMD	\$100,000.00	Multiple	3,250
Wood County SWD	\$100,000.00	Multiple	720
Subtotal	\$ 235,646.00		4,424

Project Type: Recycling Curbside

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Carroll-Columbiana-Harrison SWD	\$ 100,000.00	Multiple	275.6
Hamilton County SWD	\$ 100,000.00	Multiple	1,680
Subtotal	\$ 200,000.00		1,955.6

Project Type: Recycling Drop-Off

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Adams County	\$ 7,900.00	Aluminum	54
City of Cleveland	\$50,000.00	Multiple	2,825
DKMM SWD	\$25,333.00	Multiple	233
Mercer County SWD	\$ 2,333.00	Multiple	285
Putnam County SWD	\$50,000.00	Multiple	110
Van Wert County SWMD	\$37,680.00	Multiple	209.85
Subtotal	\$ 173,246.00		3,716.85

Project Type: Special Venue Recycling

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Auglaize County SWD	\$ 6,333.33	Multiple	7
Hamilton County SWD	\$11,028.00	Multiple	62.3
Van Wert County SWMD	\$ 3,333.00	Multiple	33.75
Subtotal	\$20,694.33		103.05

Project Type: Targeted Material Collections

Grant Applicant	Amount Awarded	Targeted Materials	Tons of Materials
Highland County	\$ 47,122.00	Fiber	500
Knox County	\$ 15,000.00	OCC	16
Lucas County SWMD	\$ 50,000.00	Electronics	228
Subtotal	\$112,122.00		744
Total 2008 Awards	\$915,260.11		16,093.60

Appendix D

2008 Material Recovery Facility (MRF) Recycling Survey

Purpose: Ohio EPA has designed this survey to collect information on recycling activities in Ohio. This survey is voluntary and has been created to simplify reporting by MRF operators, some of who have been completing annual surveys issued by multiple Solid Waste Management Districts (SWMDs) in Ohio. This form is intended to allow MRF operators to report one time instead of filling out multiple surveys.

The information gathered through this survey will be consolidated with all other survey responses collected by Ohio EPA and distributed to SWMDs throughout Ohio. Data collected through this survey and other methods will be used to measure statewide and SWMD progress in reaching state recycling goals. Your participation in this effort is GREATLY appreciated!

Directions: Please provide the information regarding your facility requested in Sections 1 through 5 below. Section 6 provides tables in which to provide information on the amount of material processed by your facility in 2008. Section 6 also includes instructions for filling out those tables.

If you have any questions concerning the survey, or would like to receive it in electronic format, please contact Channon Cohen at (614) 728-5357 or channon.cohen@epa.state.oh.us

1. FACILITY NAME & LOCATION

Facility Name:		
Owner or operator:		
Facility location (physical location, not necessarily mailing address):		
County:	City/township:	Zip:
Mailing Address (not necessarily physical location):		
County:	City/township:	Zip:

2. PERSON COMPLETING THIS REPORT

Name:	Job Title:	
Address:		
City:	State:	Zip:
Phone: ()	Fax Phone: ()	
E-Mail Address:		

3. FACILITY OPERATIONAL STATUS

Please indicate the status of operation during 2008. Check all that apply.

- In operation during the year and continuing to operate.
- In operation during part of the year but ceased operating on _____.
- Closed throughout the year, did not receive any material.

4. FACILITY TYPE (check all that apply)

- A. Are the recyclables received at the facility source-separated, multi-stream? (clean MRF)
YES NO
- B. Are the recyclables received at the facility source-separated, single-stream? (clean MRF)
YES NO
- C. Are "blue-bag" recyclables received at the facility?
YES NO
- D. Are recyclables recovered from mixed solid waste at this solid waste facility (dirty MRF)?
YES NO
- E. Is the facility primarily a transfer facility, with recyclables processed as a secondary activity?
YES NO

5. MEASURING WASTE RECEIPTS

Indicate the method of measuring incoming waste at the gate. Check all that apply.

<input type="checkbox"/>	visually (in cubic yards)
<input type="checkbox"/>	Scales (in tons)
<input type="checkbox"/>	by capacity of the hauling vehicle

6. Recycling Quantities/Recycling Data Table Instructions

A “recycling data table” is provided on the following page. A separate table of information should be completed for each county or community of origin for the materials received by your facility (if this is an electronic version of this form, several copies of the table are provided. If necessary, photocopy the table as necessary.) If it is possible to identify a “community” name, such as a City or Village name, rather than providing County-wide information, this is preferable.

The table contains areas to report separate information for the residential, commercial, and industrial sectors. The commercial sector includes all retail businesses, such as grocery stores, malls, restaurants, banks, etc. and all institutions such as schools and hospitals. The industrial sector includes all businesses that are considered manufacturing facilities, energy power plants, etc. It may not be possible to distinguish between commercial accounts and small industrial corrugated cardboard accounts. If this is the case, it is acceptable to report all paper/corrugated cardboard received from industrial and commercial customers in the commercial sector portion of the table. If this is done, please indicate so in the appropriate space on the table.

Information can be provided in this table in any type of breakdown that is practical, as long as it can be tied back to the County of origin. For example, a processor that received material from the City of Columbus, other municipal contracts in Franklin County, and commercial customers in Franklin County could provide information in two separate tables, one for the City of Columbus, and one for the other municipal and commercial accounts.

While the table requests that the quantities of certain materials be broken down into subcategories, such as clear, brown, and green glass, if it is not possible or practical to provide this information please provide the total amount for the material category (i.e. the total amount of all types of glass that was received).

If it is not possible or practical to provide any tonnage data, it is acceptable report information in the form of a commodity percentage based on the total aggregate recycled waste stream reported. For example, if your facility processed 200 tons total from the residential sector from all counties serviced by your facility, and you know that this can be broken down as 20 percent mixed glass; 12 percent ferrous; 8 percent non-ferrous; 6 percent plastics; 54 percent fiber, and you also know that you received 50 tons of residential material from Franklin County, you could report the 50 tons total residential waste from Franklin County and the 20 percent, 12 percent etc. material percentage breakdown for the individual materials, based on the aggregated material processed from the residential sector as a whole (all counties).

The purpose of the survey is to gather information on the amount of material actually processed at the facility. If you also broker materials that are not processed at the facility, those tonnages should not be reported on this form.

These instructions are summarized on the top of the table. If you have any questions or would like to provide the information in an alternate format, please contact **Channon Cohen at (614) 728-5357 or channon.cohen@epa.state.oh.us**

County of Origin of Recyclables: _____ Community Name (if available): _____

- 1) If possible, provide the number of tons of each commodity recycled from the County or Community, broken down by residential, commercial, and the industrial sectors, in the table below. If you are unable to break down the tons by each subcategory below (i.e. clear glass, brown glass, green glass, all other glass), please provide information for the general category (i.e. "total mixed glass").
- 2) If you are not able to identify the amount of each commodity from this specific County or community, please provide the total tons recycled from the County or community, for each sector of origin, and the percent of each material processed by your facility as a whole for each sector.
- 3) It may not be possible to distinguish between commercial accounts and small industrial corrugated cardboard accounts. If this is the case, report all of the corrugated cardboard in the commercial sector and indicate this by putting an 'X' in the following space:

_____ The commercial cardboard category below includes both commercial and industrial accounts

Categories	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	
	Tons Recycled	OR Percent Recycled	Tons Recycled	OR Percent Recycled	Tons Recycled	OR Percent Recycled
Glass						
Clear Glass	tons	%	tons	%	tons	%
Brown Glass	tons	%	tons	%	tons	%
Green Glass	tons	%	tons	%	tons	%
All Other Glass or Total Mixed Glass	tons	%	tons	%	tons	%
Plastic						
PETE	tons	%	tons	%	tons	%
HDPE	tons	%	tons	%	tons	%
Film Plastic	tons	%	tons	%	tons	%
All Other Plastic or Total Mixed Plastics	tons	%	tons	%	tons	%
Paper						
Newspaper	tons	%	tons	%	tons	%
Cardboard	tons	%	tons	%	tons	%
All Other Paper or Total Mixed Paper	tons	%	tons	%	tons	%
Non-ferrous Metals						
Aluminum Cans	tons	%	tons	%	tons	%
All Other Non-ferrous or Total Mixed Non-ferrous	tons	%	tons	%	tons	%
Ferrous Metals						
Steel Cans	tons	%	tons	%	tons	%
All Other Ferrous or Total Mixed Ferrous	tons	%	tons	%	tons	%
Wood						
Pallets						
Other Wood	tons	%	tons	%	tons	%
Other (specify) _____	tons	%	tons	%	tons	%
Other (specify) _____	tons	%	tons	%	tons	%
GRAND TOTAL	tons	(provide total tons)	tons	(provide total tons)	tons	(provide total tons)

Appendix E

Final Report to U.S. EPA Region V

Regarding the Drop-off Study



Drop-off Recycling in Ohio:

Measuring and Understanding Participation & Program Effectiveness



U.S. EPA Region 5

November 1, 2004

Submitted by the
Ohio Environmental Protection Agency
in partnership with the
Ohio Department of Natural Resources

Ohio Environmental Protection Agency
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Introduction

While a fair amount of research has been conducted on the effectiveness of curbside recycling programs, not much research or documentation has been published on the effectiveness of drop-off recycling programs¹. In order to learn more about these types of programs, Ohio EPA conducted a study to determine such things as diversion amounts, participation rates, usage patterns, etc. at drop-off recycling sites in Ohio. This study involved three major components: analysis of tonnage data from more than 250 sites throughout the state; face-to-face surveys of drop-off users at 17 sites throughout the state; and a telephone survey of 600 people living in one county in Ohio.

Study Sponsors and Contributors

This study was funded by a solid waste management assistant grant from the U.S. EPA Region 5, with significant financial contribution from the Ohio Department of Natural Resources. Ohio EPA was the lead agency developing and conducting the study. Input and assistance from Ohio's solid waste management districts² was received throughout the study.

The overall study design was developed with input from an Advisory Committee comprised of the following individuals:

Andrew Booker, Supervisor, Planning Unit, Division of Solid and Infectious Waste Management, Ohio Environmental Protection Agency

Patricia Raynak, Administrator, Research, Industry and Markets Section, Division of Recycling and Litter Prevention, Ohio Department of Natural Resources

Anand Desai, Ph.D., Associate Professor, School of Public Policy and Management, The Ohio State University

David Foltz, Ph.D., Associate Professor and MPA Coordinator, Department of Political Science, University of Tennessee

Elizabeth Biggins-Ramer, Principal Planner, Solid Waste Management, Cuyahoga County Planning Commission

Dan Wickerham, Coordinator, Brown County Solid Waste Authority; Program Director, Adams-Brown Recycling

Much of the survey work and data analysis and all of the GIS mapping was conducted by The Strategy Team, Ltd., located in Columbus, Ohio, with input from Michael Greenburg, GT Environmental, Westerville, Ohio.

The project leads at Ohio EPA were Michelle Kenton and Matthew Hittle.

Kevin Shoemaker, Ernie Stall, Nick D'Amato, and Channon Cohen, of the Planning Unit, Division of Solid and Infectious Waste Management, Ohio EPA also contributed to the study.

Approach

There were three primary components to the study:

1. Detailed analysis of the amount of material collected at drop-off sites throughout Ohio (tonnage data). This analysis included compiling 4 years (2000 – 2003) of tonnage data from hundreds of drop-off sites throughout Ohio. In 2002, the primary data year for this portion of the study, tonnage data was collected for 374 sites. Of this, data for 275 sites was considered to be high quality. Based on these sites, statistics were compiled regarding the amount of materials collected. The results of this analysis can be found in Section IV.B. Summary information on all of the data years can also be found in that section.

2. A face-to-face survey of users of drop-off sites was conducted at 17 sites throughout the state. The geographic distribution of these sites can be seen in Figure 1. In addition, the amount of material brought to the site by each user was weighed. This survey data was used to determine user characteristics, usage frequency, distance traveled, participation rates, etc. This data was also used to determine “functional usage areas” for the types of drop-off sites studied. Some of the most interesting results of this portion of the study are summarized in Sections IV.C. through IV. E. Detailed information on the methodology and detailed results can be found in The Strategy Team, Ltd. “Report to the Ohio Environmental Protection Agency: Determining an Empirically Based Access Credit Model” (TST Report), located in Appendix A.

3. A phone survey of 600 residents of Summit County was conducted regarding recycling issues. A number of questions related to drop-off recycling specifically. The results from the phone survey were one of several approaches used to establish estimate participation rates at drop-off sites. Information regarding this survey can be found in Section IV.E. and the TST Report, located in Appendix A.

Footnotes

¹ By drop-off recycling programs, we are referring to trailers, roll-off containers, or other types of containers that are used as collection points for residential and sometimes commercial recyclables. Residents or businesses store their recyclables and then periodically drive to the drop-off site to deposit their recyclables into the container.

² In accordance with Ohio law, Ohio counties are organized into solid waste management districts (SWMDs). These SWMDs are required to implement programs to reach state recycling goals established by Ohio EPA with the input of the State Solid Waste Management Advisory Council.

Figure 1: Drop-off Recycling Survey Locations



3. A phone survey of 600 residents of Summit County was conducted regarding recycling issues. A number of questions related to drop-off recycling specifically. The results from the phone survey were one of several approaches used to establish estimate participation rates at drop-off sites. Information regarding this survey can be found in Section IV.E. and the TST Report, located in Appendix A.

IV. Study Results

This document presents selected results from the face-to-face and phone surveys as well as results from the analysis of the tonnage data. A detailed description of the methodology and more detailed results of the face-to-face and phone surveys are presented in the TST Report, located in Appendix A.

Readers who are interested in generalizing the results of the study or are conducting a similar study are encouraged to read Section VI, "Limitations and Further Research Needs." We believe the results of this study represent a good first attempt to quantify the effectiveness of drop-off programs in Ohio. Although a myriad of factors distinguish the different drop-off sites throughout the state, great effort was made to collect data at drop-off sites that were representative of the sites found throughout the state. While the issuance of this report represents the conclusion of a significant portion of the study, over time Ohio EPA will continue to analyze the data collected, gather additional data as resources allow, and continue to strive to better understand the effectiveness of drop-off recycling programs in the state.

A. Definition of Terms

Throughout this document, drop-offs will frequently be defined as either full-time or part-time, and rural or urban. Those terms are defined below.

Full-time or FT: The drop-off site was available to residents at least 40 hours each week.

Part-time or PT: The drop-off site was available to residents less than 40 hours each week, and sometimes as little as one day per month.

Urban: The drop-off is located in a community (i.e. city, village, or township) of 5,000 people or more.

Rural: The drop-off is located in a community (i.e. city, village, or township) of less than 5,000 people.

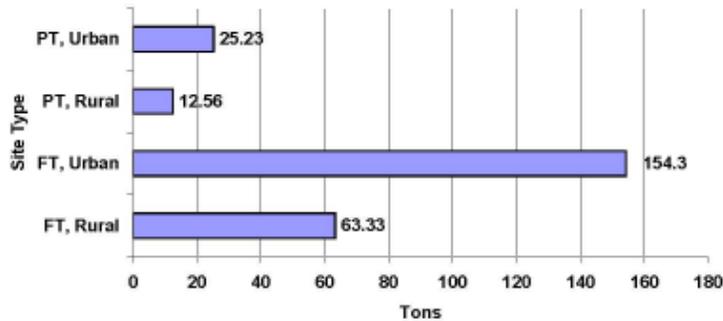
B. Diversion Amounts

In the first phase of this study, Ohio EPA compiled the amount of material collected annually at numerous drop-off sites throughout the state (beginning with data year 2000 and continuing through 2003). This data was evaluated for its accuracy. For example, some sites were originally measured by volume (cubic yards) of material, and then converted to tons using a conversion factor. Sites that were indirectly measured in this way or calculated in some other manner were not included in the statistical analysis. Only sites where materials were directly measured by weighing were included in the calculations.

While four years of tonnage data were compiled for the study, 2002 was identified as the primary data year for the tonnage information, since it was the most recent complete data set at the time. Of 811 sites originally identified, 374 had some data for the 2002 data year. Of these sites, 275 sites were identified as having high quality data.

Basic statistics were run on the data from the 275 sites. The average amount of material collected per site is presented in Figure 2. This information may be useful as a benchmarking tool for program managers or for planning purposes.

Figure 2: 2002 Average Tons per Year by Site Type



All four years of data are summarized in Table 1.

Table 1: Tonnage Data Summarization

Drop-off Type	Year	Average Tons Collected	Standard Deviation	Number	Minimum	Maximum
FT RUR	2000	74.58	66.59	31	9	284
FT RUR	2001	66.82	75.29	104	0.98	498
FT RUR	2002	63.33	50.53	103	1.54	275.75
FT RUR	2003	85.46	50.25	77	1.93	252.58
FT URB	2000	137.37	121.94	18	9	459
FT URB	2001	185.27	207.36	94	2	941
FT URB	2002	154.3	168.91	69	0.14	868.69
FT URB	2003	217.82	247.06	55	22.67	1264.99
PT RUR	2000	16.66	12.64	36	2	66
PT RUR	2001	15.25	14.48	65	0.481	63
PT RUR	2002	12.56	11.28	67	1.25	52.9
PT RUR	2003	12.55	13.62	69	0.51	63.45
PT URB	2000	35	19.35	6	9	54
PT URB	2001	57.42	64.91	15	7	259
PT URB	2002	25.23	65.89	36	0.96	391
PT URB	2003	52.84	51.84	13	9.29	199

Some may find it useful to examine the data in more detail than the simple averages presented above. Therefore, more detailed histograms of the tonnage data can be found in Appendix B.

C. User Characteristics

The second phase of the study involved the face-to-face surveying of drop-off users at 17 sites throughout the state. Users were asked a series of questions, and the material they brought to the site was weighed. A detailed description of the methods used in this phase of the study, as well as the survey instrument, can be found in the TST Report, located in Appendix A.

This section of the report summarizes some of the demographic information, or user characteristics, compiled from the surveys. We would encourage readers to read the entire TST Report contained in Appendix A for further details.

A word of explanation about the demographic results is warranted. Surveys were administered to the users of the drop-off sites as they arrived to drop off their materials. Frequently, the person delivering material to the drop-off was bringing material from a household of two or more people. Therefore, while the materials delivered to the site may have originated

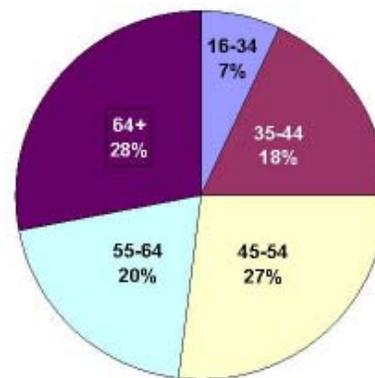
from a household of several people, the survey was answered by the person delivering the materials. So the demographic data represents the people delivering the material to the site, but does not necessarily represent the person(s) in the household who made the decision to recycle, or the person(s) responsible for generating the material being delivered. This distinction is important to keep in mind when considering the demographic results, such as age, sex, etc., although it is not important when considering other results of the study, such as distance traveled, etc.

Figure 3 depicts the age distribution of the users of the drop-offs, compared to the age distribution in Ohio overall.

Figure 3: Respondent Age vs. Ohio Age Demographics

The results show that the survey respondents tended to be older than the population of the state as whole, which is consistent with other research on recycling behavior. However, the fact that these results represent the people delivering the materials to the site may also explain why younger age groups are not represented as strongly.

Respondent Demographics: Age



Ohio Demographics: Age

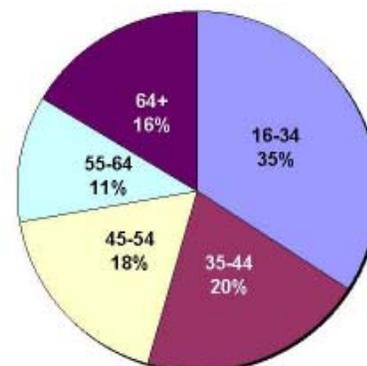


Figure 4 depicts the education levels of survey respondents compared to the overall population in Ohio.

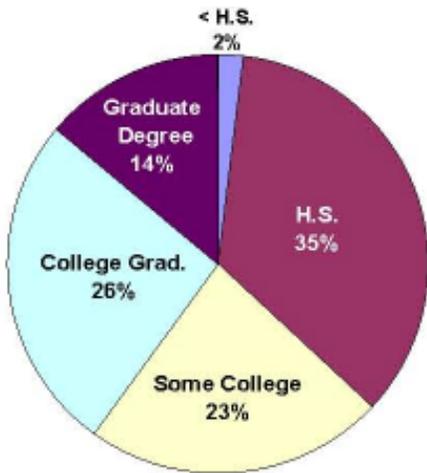
Figure 4: Respondent Education Levels vs. Ohio Education Levels

The results indicated that respondents were more likely to have some level of college education (63%) than the population of the State as a whole (47%).

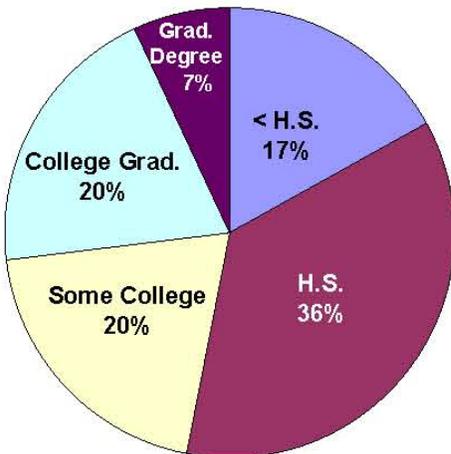
Figure 5 indicates the gender of the survey respondents versus the overall population in Ohio.

Figure 5: Respondent Gender vs. Ohio Gender Demographics

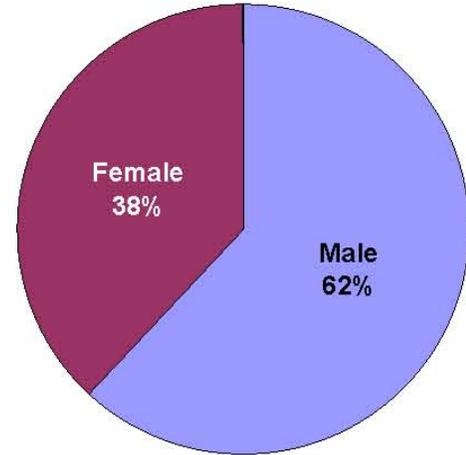
Respondent Demographics: Education



Ohio Demographics: Education

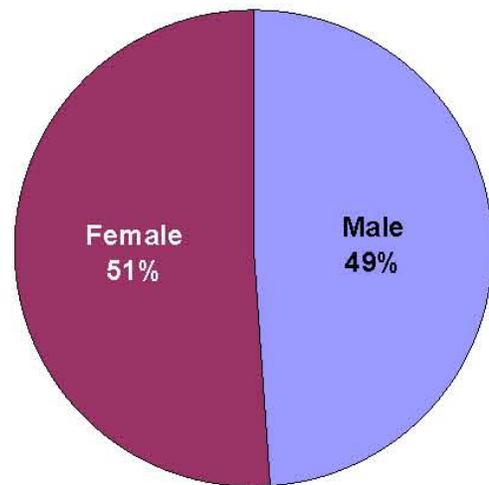


Respondent Demographics: Gender



The results indicate that survey respondents were more likely to be male than the population in the state as a whole. Again, this does not necessarily indicate that men are more avid recyclers, but that they were more likely to be delivering the materials to the site and/or more likely to answer the survey (if more than one person was in the car delivering the materials).

Ohio Demographics: Gender



D. Usage Patterns

Most of the face-to-face survey effort focused on usage patterns, such as frequency of use, amount of material brought per visit, distance traveled, etc. Again, a detailed description of the methods, as well as the survey instrument, can be found in the TST Report, located in Appendix A.

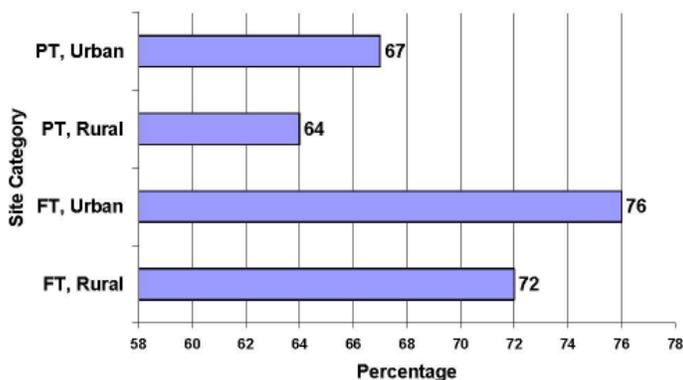
We will summarize some of the most interesting findings in this section, but would encourage readers to read that entire report for further details.

Users were asked:

“Are you out today just to recycle materials, or are you running other errands today?”

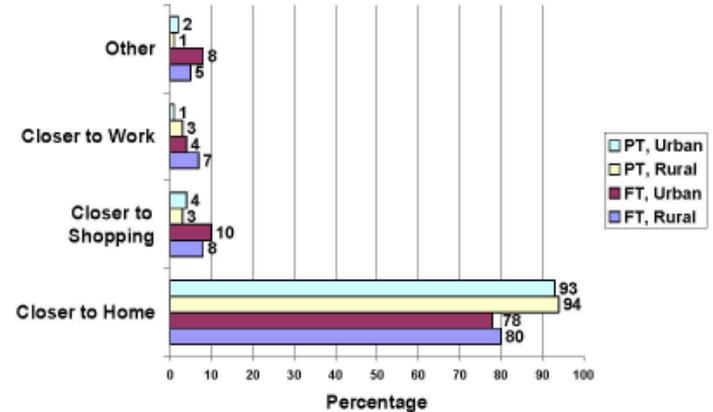
For all categories of drop-off sites, the majority of respondents were running other errands in addition to dropping-off their recyclables. This trend was particularly true for the full-time sites. Results are presented in Figure 6:

Figure 6: Purpose of Trip to Drop-off Site: Percentage of Respondents Running Other Errands Also



Respondents were also asked whether the drop-off site was closer to home, closer to work, closer to where they shop, or closer to something else. Respondents overwhelmingly indicated that the drop-off site was closer to home. Results are presented in Figure 7:

Figure 7: Location of Drop-off by Site Type

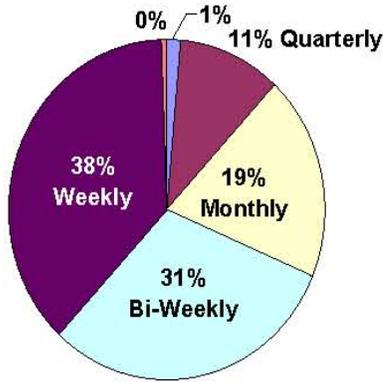


The results of these last two questions are interesting when considered together. Common sense might suggest that most people will drop off their recyclables while running other errands, and the survey responses confirm this idea. In fact, drop-off sites are frequently located with this in mind. For example, drop-off sites are often located adjacent to a business or building that receives a naturally high traffic flow, such as a grocery store, in an attempt to take advantage of the traffic and increase the convenience of using the site. Survey respondents, however, also overwhelmingly indicated that the drop-off site that they were using was closer to home than any other location identified, including where they shopped. These survey responses seem to indicate that while using drop-off recycling sites is combined with other daily errands, proximity to home plays a much more important role than its proximity to any other destination.

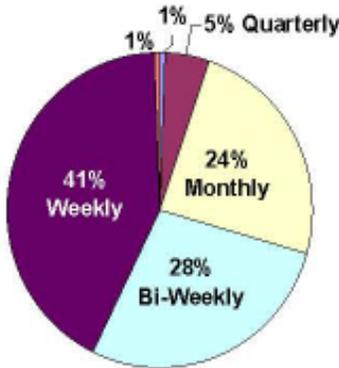
Respondents were also asked how often they utilized the drop-off sites. Figure 8 shows the frequency distribution of their responses for both urban and rural full-time sites. Part-time drop-off sites are not shown because visits to part-time sites greatly corresponded to the hours of operation for the site (i.e. if the site was only open one weekend a month, then the majority of interviewees visited the sites once a month). It can be seen that the vast majority of the users of the full-time sites bring their recyclable material weekly or bi-weekly and almost all come at least monthly. The results are very similar for both rural and urban sites and are presented in Figure 8:

Figure 8: Number of Site Visits per Year: Urban Full-Time vs. Rural Full-Time

Frequency Distribution of Site Visits Per Year to Urban Full-Time Drop-Off Sites

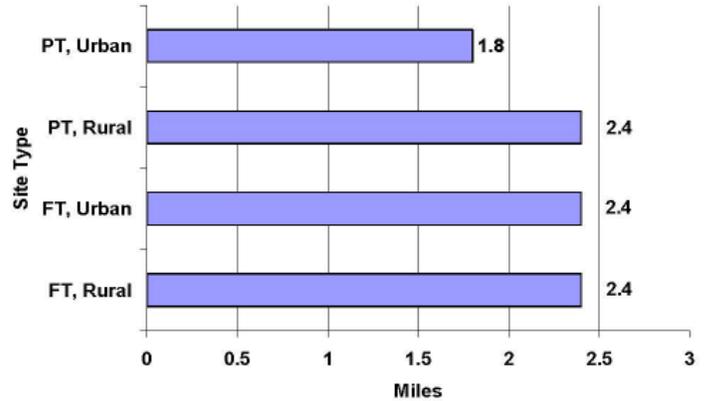


Frequency Distribution of Site Visits Per Year to Rural Full-Time Drop-Off Sites



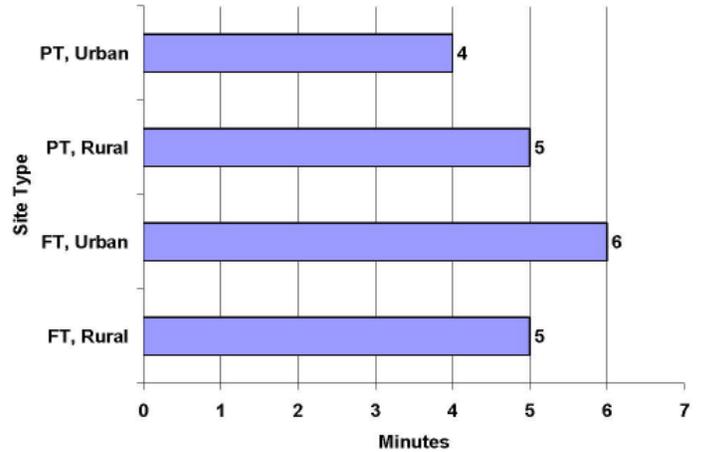
One of the primary goals of the study was to quantify the distances traveled to use the drop-off sites. Therefore, each survey respondent was asked to provide their address or nearest cross-street. Based on this information, software was used to calculate distances traveled. Figure 9 shows the median distance which people drove to drop their recyclables off at the recycling sites. The median distance was 2.4 miles for three of the four categories. The exception was part-time urban sites, which had a smaller median distance traveled. (Only two of the 17 sites surveyed fell into this category. This category of site also represents a very small portion of the overall drop-off sites across Ohio).

Figure 9: Median Distance Traveled to Site, by Site Type



We find it striking that the median distance traveled was exactly 2.4 miles for three out of the four categories. Figure 10 shows the median driving times for each of the site categories:

Figure 10: Median Driving Times to Site, by Site Type



Ignoring the part-time urban category, the results would indicate a typical user of a drop-off site in Ohio travels about 2½ miles, taking between five and six minutes to get to a drop-off site.

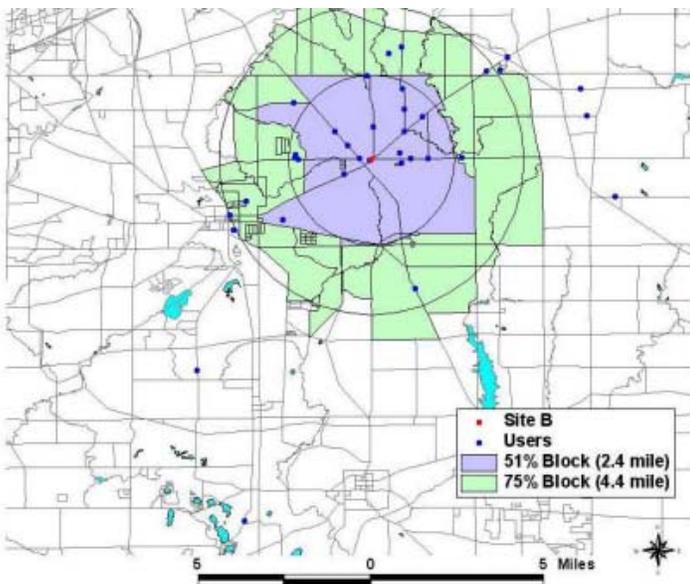
The median, as opposed to the mean, was chosen as a measure of central tendency for distance traveled due to the existence of large outliers in the data. For example, while the majority of drop-off users may have traveled less than three miles to use a site, a single user who traveled 25 miles could significantly influence the mean value. The median value is not influenced by large outlying values in this way.

For a more complete understanding of this information, histograms of the distance traveled to each type of drop-off site, with the median and mean indicated, are presented in Appendix C.

Addresses (or nearest cross-streets) of users were also used to produce maps depicting usage patterns. An example of one of the maps is shown below as Figure 11. Maps were created by plotting the interviewees' home addresses (or closest intersections) using ArcView GIS for each of the 17 sites surveyed.

Figure 11: Example Usage Pattern Map

**Site B, Hamden Township, Geauga County
(Rural, Full-time)**



Using this information, circles were drawn to capture two sets of drop-off site users and by extension two areas on the map. The outer circle around the drop-off location, shown in the example map, contains 75 percent of the interviewees and the inner circle contains 51 percent of the interviewees' addresses. The radii of these circles are shown in the legend of the map in parentheses. The population within the outer circle is represented by all of the census blocks colored green or purple. The outer circle, while capturing a greater majority of drop-off site users, likely avoids including outliers that would be observed with a circle that captures 90-100 percent of those using the drop-off site.

This 75 percent circle could be considered the "functional usage area" around the drop-off site, meaning an area around the drop-off site where the significant majority of the users (75%) reside. Beyond this circle, it becomes much less likely that a resident will use the drop-off site.

In addition to calculating these distances for each individual site, this type of analysis was also conducted for the four categories of drop off sites. The results are illustrated in histograms contained in Appendix C, and also in Table 2:

Table 2: Median and 3rd Quartile Distances Traveled by Site Type

Site Type	Median (50%) Distance Traveled in Miles	3 rd Quartile (75%) Distance Traveled in Miles
PT, Urban (n=2)	1.8	4.8
PT, Rural (n=5)	2.4	4.2
FT, Urban (n=5)	2.4	3.4
FT, Rural (n=5)	2.4	4.7

As can be seen, while the PT Rural, FT Rural, and FT Urban all share a median distance traveled of 2.4 miles, the 3rd Quartile (75 percent of users coming from this distance) shows some variability. In particular, the distance for FT Urban sites is notably smaller than the other categories and over a mile smaller than the distance for FT Rural sites.

If we again ignore the PT Urban category (because the sample size was small, among other reasons), the results might be generalized in the following way:

- A typical user of drop-off site travels around 2½ miles
- The "functional usage area" of an urban site is about 3½ miles
- The "functional usage area" of a rural site probably extends to about 4½ miles (slightly less for PT sites, slightly more for FT sites)

E. Participation Rates

A participation rate is a measure of the number of people using a recycling service versus the number of all potential users. This is a relatively easy calculation for a curbside program, which would be measured by the number of households participating in the program versus the number of household receiving curbside service. It is a much more difficult calculation for a drop-off site, since there is typically no definitive measure of the potential number of users. For example, if a few users of a drop-off site travel a very great distance to use a site, should every household within that distance to the site be counted as a potential user? This approach would very likely result in a very large number of potential user, which in turn would result in a very low calculated participation rate.

Therefore, in order to calculate a meaningful participation rate for a drop-off, it is necessary to define a reasonable boundary around the site and consider all of those living within the boundary to be “potential users.” For this study, we have utilized the 75 percent radii as the “functional usage area” around a drop-off site.

Using the 75 percent radii as the “functional usage area,” the number of users and participation rates within the functional usage areas were calculated for each category of drop-off site. This calculation used the following variables: 75 percent of the total tons of material collected annually at each type of drop-off site; the average amount of material brought per user; the average number of visits per user per year; and the average number of people per household. Then, based on the population living within the functional usage area, participation rates were calculated. The results of these calculations are shown below in Table 3.

Table 3: Average Population, Average Number of Users, and Percent Population Using, by Site Type

Site Type	Average Population (within 75% buffer area)	Average # of Users (from tonnage data)	Average % of Population estimated to use site (within 75% buffer)
FT, Rural (n=5)	11,156	1,910	21%
FT, Urban (n=5)	33,956	4,007	13%
PT, Rural (n=5)	5,777	753	17%
PT, Urban (n=2)	9,208	401	13%

Additional explanation of this methodology can be found in the TST Report contained in Appendix A.

Finally, a phone survey was conducted in Summit County Ohio, located in the northeast part of Ohio. This county contains both rural and urban areas, and includes the City of Akron, with a population of 212,215. The phone survey asked a number of questions about recycling programs, including questions about drop-off recycling sites within the County. Results of this phone survey indicate that about 30 percent of residents are aware of the location of drop-off recycling sites within their communities, and about half of them use the drop-off sites. In other words, about 15 percent of the residents indicate that they use a drop-off site within their community. This result is consistent with the range of participation rates calculated above (13-21 percent), and would seem to support the validity of those calculations.

V. Other Study Outputs

In addition to the results published in this report, which will be disseminated in a variety of ways, the drop-off research project will result in several other outputs as described below.

A. Survey Toolkit

Ohio EPA is developing a “Drop-off Study Toolkit,” for parties interested in replicating Ohio EPA’s drop-off study, principally Ohio’s Solid Waste Management Districts (SWMDs). The packet will include an in-depth description of the methodology, including the process of selecting sites, clarifying research objectives, a sample survey instrument, a protocol for conducting field surveys and directions on mapping/analyzing results. It will also contain sample documents that will show the user exactly how to move forward conducting a study of their own. The contractor used by Ohio EPA for this study, The Strategy Team, Ltd., has agreed to contract with SWMDs at a reduced cost, since the up-front work of designing the study has already been completed. An approximate per site cost estimate will be included in the tool-kit. In addition, the tool-kit will outline specific ways that the study can be modified and expanded to collect additional information about the use of drop-off sites in addition to the type of data collected in the Ohio EPA study.

B. Factors for Success

One of the initial objectives of the study was not only to quantify usage patterns and participation rates at drop-off recycling sites, but to use more qualitative methods to determine what factors lead to the most successful sites in the State. This task has proved more difficult than expected do to the wide variability of sites that exist throughout the State (it’s difficult to compare “apples to apples”) and the myriad of variables that may influence success. The results of this study do, however, give us a more accurate measuring stick from which to begin to make these comparisons. Using some of the results of this study as a starting point, Ohio EPA will continue to explore this issue in the future.

C. Access Credit Models

The Ohio Environmental Protection Agency requires each of Ohio’s 52 SWMDs to meet one of two state recycling goals: a “Percentage Goal,” in which a SWMD shows that 25 percent of the residential/commercial waste generated by households and businesses in its jurisdiction is diverted from landfills; or an “Access Goal,” in which a SWMD shows that 90 percent of the population within its jurisdiction has access to a recycling opportunity. Most of

Ohio's SWMDs choose to comply with the Access Goal. The two recycling opportunities that are most often used to meet this goal are curbside recycling and drop-off recycling. Each SWMD receives a population access credit (or "access credit") for each drop-off site and curbside recycling option in its jurisdiction. When these credits sum to 90 percent of the jurisdiction's population, the access goal has been met. A drop-off site located in a rural area (i.e., a municipality with less than 2,500 people) receives an access credit of 2,500. A drop-off site located in an urban area (i.e., a municipality with more than 5,000 people) receives an access credit of 5,000. Unfortunately, these access credits are not rooted in well-documented empirical data.

One objective of study's research project was to help the Ohio EPA better understand participation and effectiveness of drop-off recycling sites to be able to design an empirically based, more accurate access credit. Four possible different access credit models were included in the report submitted to OEPA, found in Appendix A. These models will be evaluated by OEPA when redefining the access credits associated with drop-off recycling sites around Ohio. No one model will necessarily be implemented as defined in the attached report. It is more likely that a combination of one or more models will be used, and it is possible that the models will be modified as the data is further analyzed.

VI. Limitations and Further Research Needs

As with any study, time and financial constraints influence the study approach and design. In this final section of the report, items are identified that may have the highest potential to impact the study results so that anyone considering conducting a similar study can learn from our experience.

The first possible limitation relates to sample size. The sample size for the face-to-face surveying was limited due to financial constraints. While we believe the sample size is significant enough to have a degree of confidence in the results, in an ideal world we would have expanded the number of sites for which we conducted face-to-face surveys. This is also true for the phone survey portion of the study. While the phone survey was utilized as a supplement to compare to our participation calculations, and not the primary method of calculating participation, ideally the phone survey would have encompassed more than just a single county in Ohio. Duplicating the phone survey portion of the study in additional regions of the state is currently under consideration by Ohio EPA.

A second possible limitation relates to the geographic distribution of the tonnage data. In order to calculate usage numbers and participation rates, we limited the face-to-face survey portion of the study to those drop-off sites that had tonnage data. As

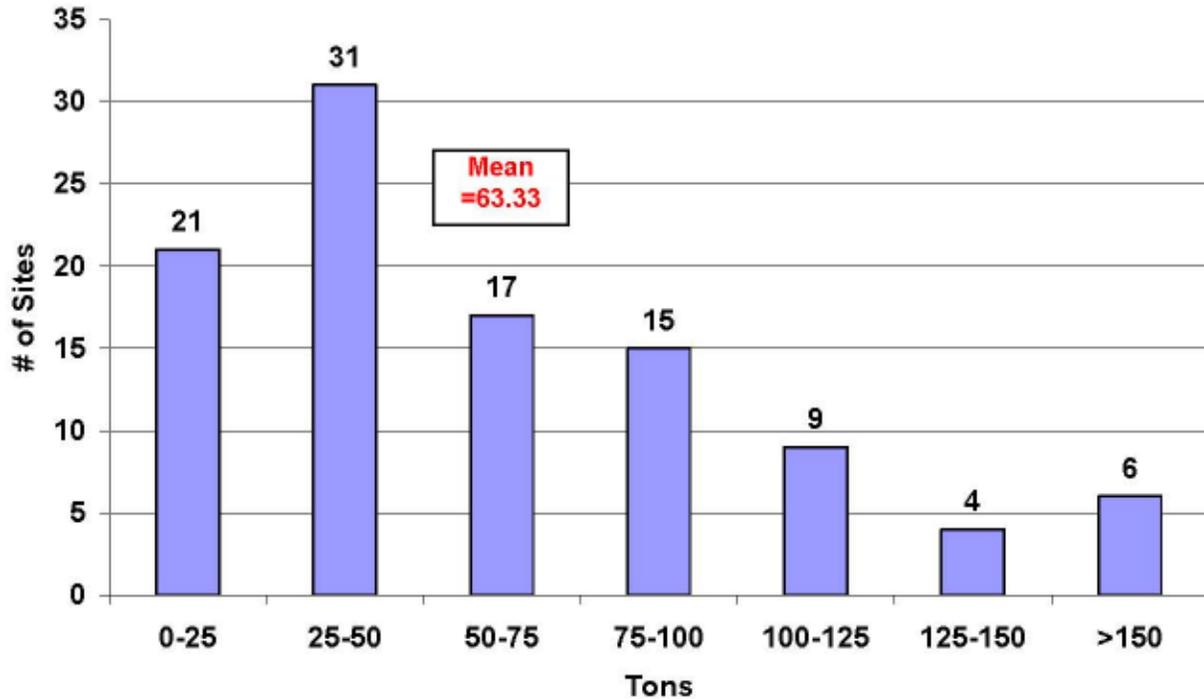
indicated earlier, of the 800 or so drop-off sites originally identified in the study, 275 had high quality tonnage data. While we consider this to be a fairly high percentage of the overall sites, virtually none of the known drop-off sites in southeast Ohio gathered tonnage data. Therefore none of them were eligible for inclusion into the face-to-face survey portion of the study. Of the sites that were eligible, 17 sites were purposefully selected to get an adequate representation of urban, rural, part-time, and full-time sites. Effort was also made to get as widespread a geographic distribution as possible. Therefore, while we would have preferred to include some sites from the south-east portion of the state, we do not believe that this limitation negatively influenced the results in a significant way.

A third possible limitation relates to the sites that were selected. In order to increase our odds of being able to gather at least 40 surveys at these sites in a reasonable amount of time, most sites that were selected collected an above-average amount of material in a year (in many cases significantly above average). In other words, most sites selected for the face-to-face surveying were very high performing sites as measured by the amount of tonnage that they collected annually. The implication could be that the study results are skewed to the most effective sites in the state. As a result, the number of users per year, the average amount of material brought per visit, average distance traveled, etc. could be overstated. However, the amount of material collected at a site is only one measure of performance. Our calculations indicate that high tonnage amounts do not necessarily translate into high participation levels. In other words, while a site may collect a large amount of material in a year, if the population density surrounding the site is very high there still may be a relatively small percentage of people participating. As a result, high tonnage data alone may not be a valid measure of performance. Therefore, whether this issue unduly influenced the results remains an open question.

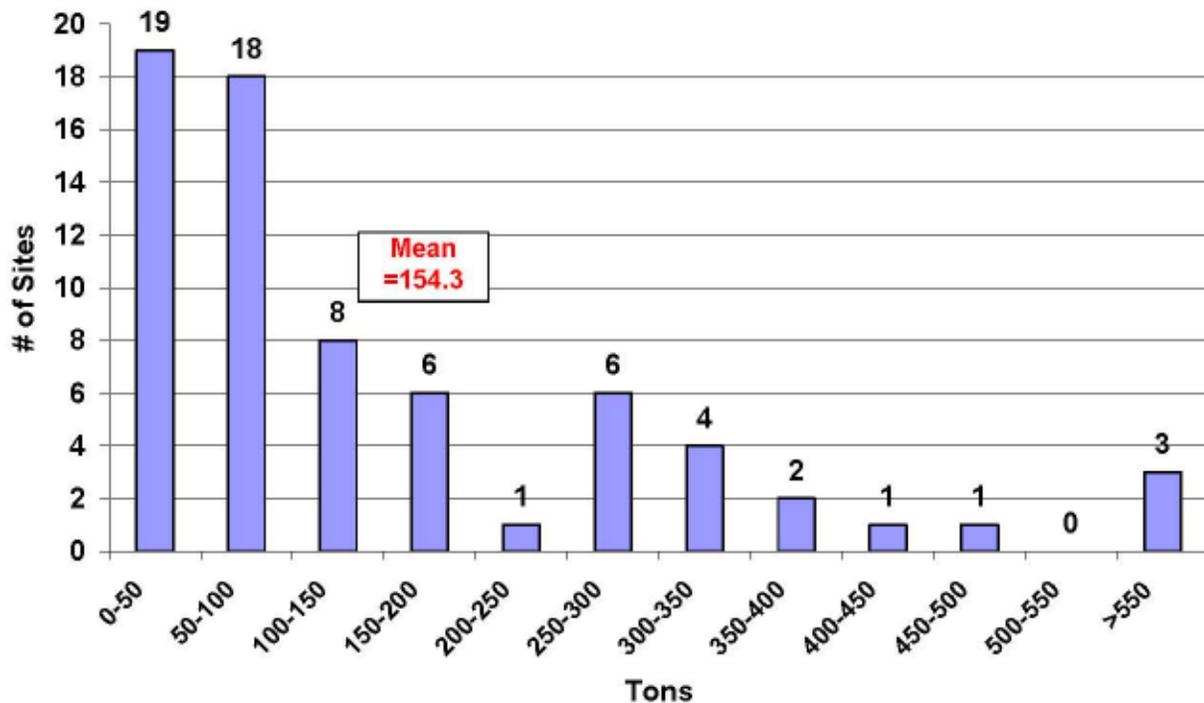
A final possible limitation relates to the timing of the face-to-face surveying. In order to gather at least 40 surveys at each site as efficiently as possible, surveys were usually gathered over one or more weekends (under the assumption that the sites would be used more often during the weekend hours). However, because most sites were only surveyed on the weekends, it could be that some bias was introduced in some of the survey responses (i.e. "Is this site closer to home, closer to where you work, closer to where you shop?"). While this issue was seriously considered during the development of the methodology, the need to efficiently gather a sufficient number of surveys outweighed any perceived downside to the approach. Therefore, while it would have been interesting to collect a greater portion of the surveys during a weekday in order to determine if there were any significant differences in their responses, we do not feel that this limitation is critical to the overall usefulness of the study.

Appendix B: Tonnage Histograms

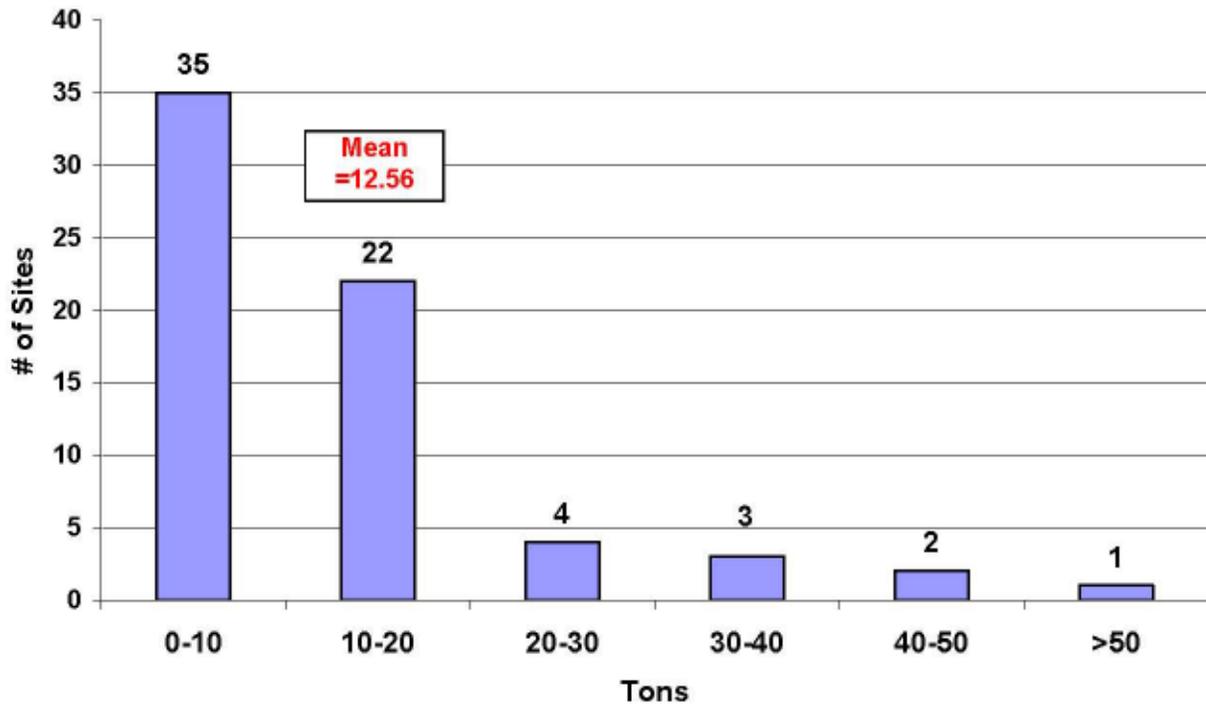
Tons Collected at Full-Time/Rural Drop-off Recycling Sites - 2002



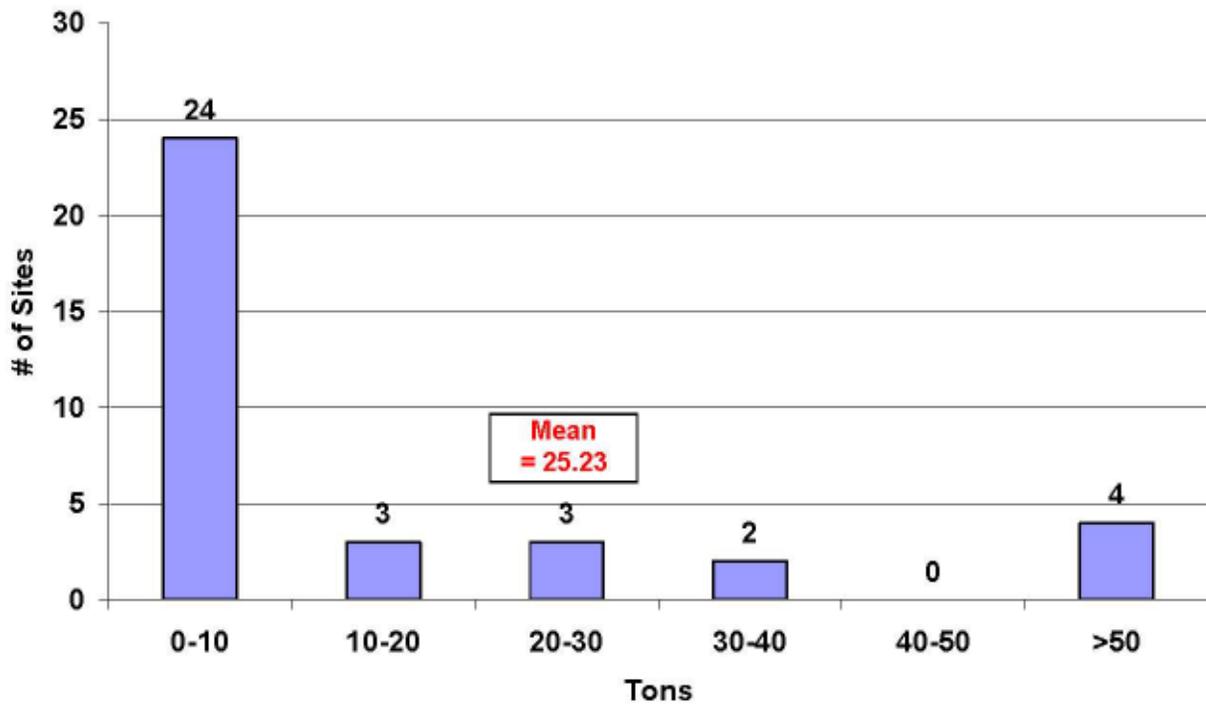
Tons Collected at Full-Time/Urban Drop-off Recycling Sites - 2002



Tons Collected at Part-Time/Rural Drop-off Recycling Sites - 2002

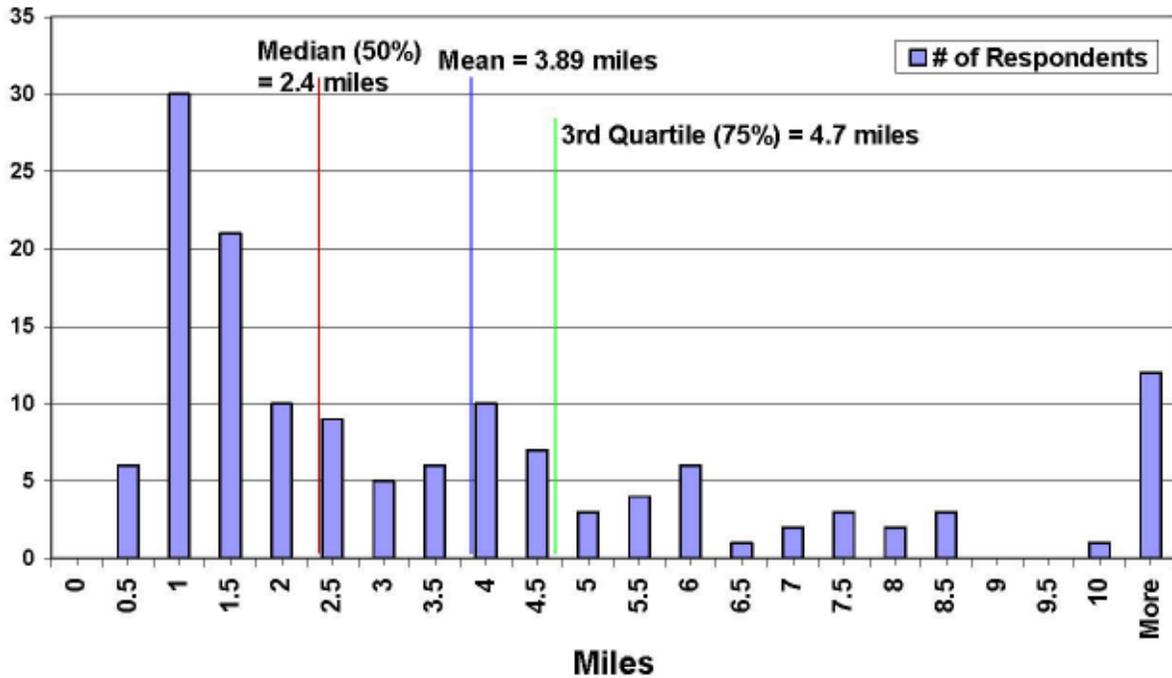


Tons Collected at Part-Time/Urban Drop-off Recycling Sites - 2002

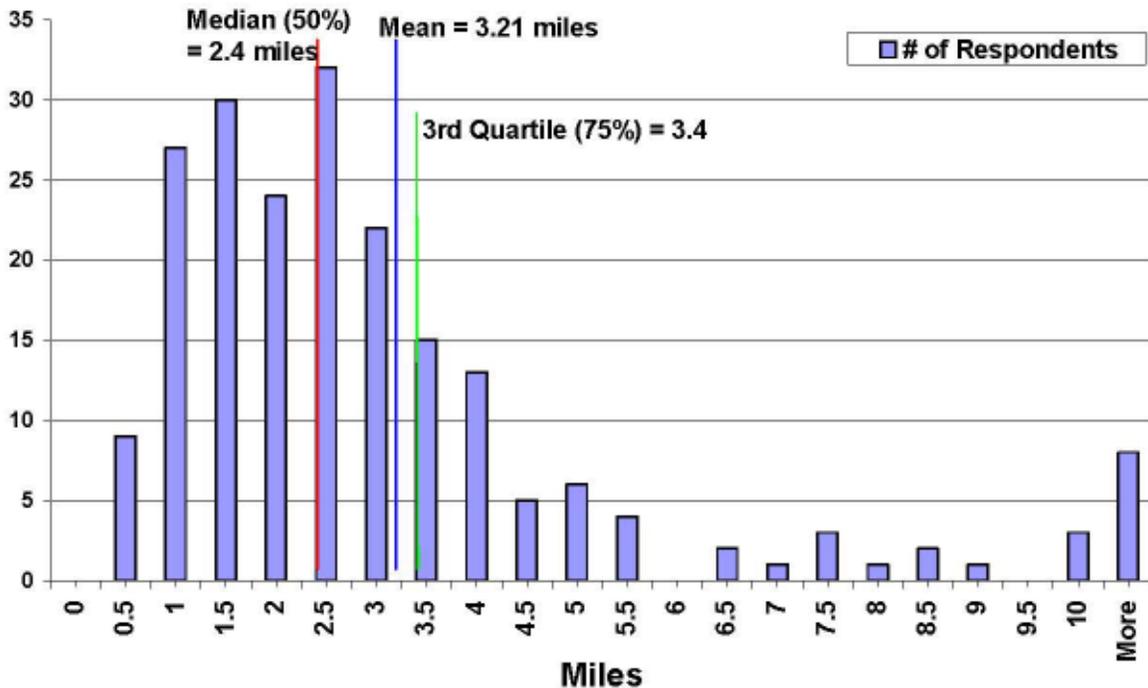


Appendix C: Distance Traveled Histograms

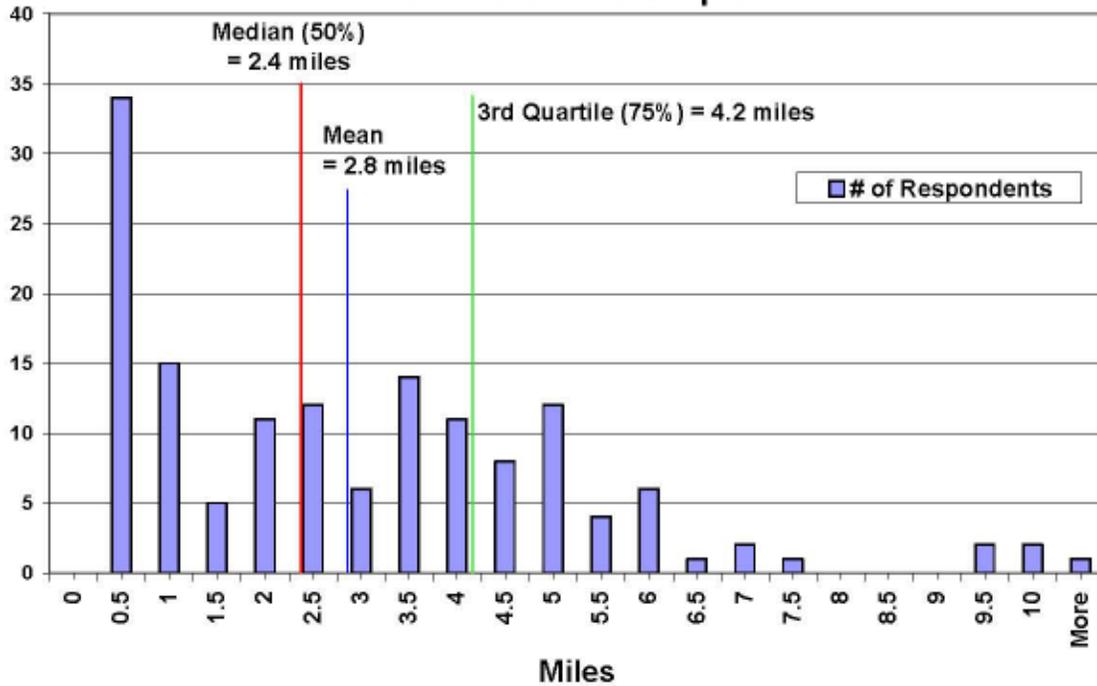
Frequency Distribution of Mileage Driven to Recycle at a Rural Full-Time Drop-off Site



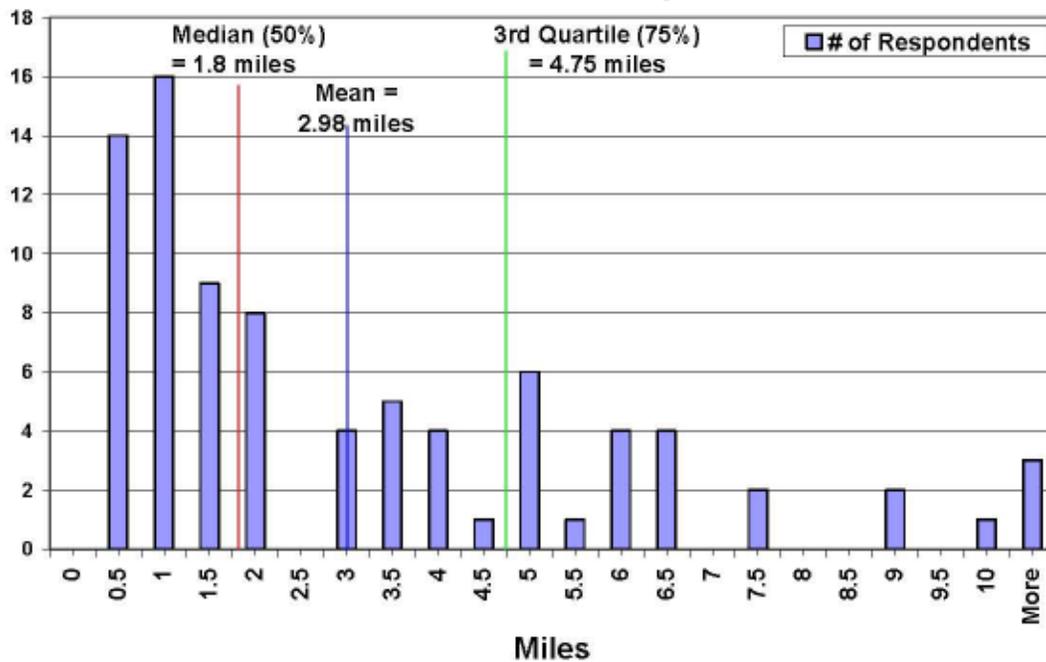
Frequency Distribution of Distance Driven to Recycle at an Urban Full-Time Drop-off Site



Frequency Distribution of Distance Driven to Recycle at a Rural Part-Time Drop-off



Frequency Distribution of Distance Driven to Recycle at an Urban Part-Time Drop-off Site



Appendix F

Yard Waste Restriction

In accordance with Rule 3745-27-01(Y)(1), yard waste is defined as:

“...solid waste that includes only leaves, grass clippings, brush, garden waste, tree trunks, tree stumps, holiday trees, and prunings from trees or shrubs. Yard waste does not include industrial or agricultural processing wastes.

[Comment: The intent of this definition is to identify a general type of vegetative waste resulting from the care and maintenance of landscaped areas, lawns, and gardens that has been collected for the purpose of disposal or composting. Vegetative waste resulting from the use of commercial products, such as discarded flowers, potted flowers, or grave blankets that do not include plastic, metal, styrofoam, or other nonbiodegradable material would be considered a yard waste. Vegetative waste from industrial processing such as food processing waste is not a yard waste.]”

Ohio EPA promulgated rules governing yard waste, animal waste, and mixed municipal solid waste composting facilities on June 1, 1992. In response to comments from local officials that the new regulations for leaf and grass composting were unnecessary and burdensome, on November 9, 1992, Ohio EPA Director Donald Schregardus announced a moratorium on the enforcement of rules at composting facilities that exclusively compost yard waste. Director Schregardus noted that the rules were not intended to discourage composting or to close existing yard waste composting operations.

The regulations that were adopted now prohibit owners and operators of landfill, transfer, and incinerator facilities from accepting source-separated yard waste. The only exceptions are tree trunks and stumps. Owners and operators of landfill, transfer, and incinerator facilities are permitted to accept and dispose of source-separated yard waste under the following circumstances

- Upon obtaining the written acknowledgement of the solid waste management district of the need for the temporary disposal of yard waste, the owner or operator may temporarily accept source-separated yard waste resulting from storm damage or some other natural catastrophe. The

solid waste management district is the appropriate entity to make the determination that locally available yard waste management capacity is not sufficient to handle yard waste resulting from storm damage or some other natural catastrophe.

- The owner or operator may dispose of yard waste resulting from the incidental acceptance of source-separated or commingled yard waste provided that the owner or operator has the required yard waste restriction program in place.
- Upon obtaining the appropriate documentation, owners and operators may accept a vehicle load of source-separated yard waste if that vehicle load has been refused by the owner or operator of a yard waste composting facility.
- The owner or operator may accept tree trunks and stumps.

Judging whether or not the owner or operator of a solid waste facility is complying with the yard waste restriction also presents problems. Once waste is placed at the working face of a landfill facility, or on the tipping floor of an incinerator or a transfer facility, it is difficult to determine whether a particular bag of yard waste was originally source-separated, transported in a vehicle dedicated to transporting yard waste, and subsequently mixed at the receiving facility (the situation the restriction was designed to avoid) or the bag came to the facility already mixed with general trash in a garbage truck (i.e. a mixed yard waste situation). Because it is not practical to have facility operators inspect each garbage truck for yard waste nor is it practical to sort through trash to remove bags of yard waste, Ohio EPA addressed the situation by allowing facility owners and operators the option of establishing a yard waste restriction program.

By establishing the yard waste restriction program, Ohio EPA sought to place an emphasis on encouraging alternative yard waste management options and deterring the disposal and incineration of source-separated yard waste. Ohio EPA believes this approach is appropriate given that the design, operation, and environmental monitoring provides more than adequate environmental protection should incidental loads of yard waste be accepted at a solid waste landfill or incinerator facility. The yard waste restriction program requires the owner or operator to



implement procedures to identify and refuse to accept source-separated loads of yard waste transported in dedicated vehicles. The program further requires owners and operators to promote alternative management of yard waste by distributing information. By having a yard waste restriction program, the owner or operator of the facility is not violating the yard waste restriction for accepting mixed yard waste or incidental source-separated yard waste. However, the owner or operator is required to review the program and implement improvements when needed. Failure by the owner or operator to implement the program, review the program, and incorporate needed improvements would all be violations.

Another implementation issue pertains to the applicability of the bans to resource recovery facilities which burn mixed municipal solid waste and recover energy. These facilities are currently exempted from Ohio's solid waste regulations and are subject to only air and water pollution regulations. Owners and operators of these facilities cannot be cited for violating the solid waste rules by Ohio EPA or local health departments. However, in October 1992 SWAC affirmed that the disposal restrictions in the state solid waste management plan are intended to apply to these facilities.

Appendix G

Siting Criteria for Solid Waste Facilities

Tables G-1 through G- 5, below, present, for each of five types of solid waste facilities - landfills, transfer facilities, incinerators, composting facilities, and scrap tire facilities – the siting criteria that apply to the facilities. Thus, the tables provide the following information: the criterion; the specific setback or restriction associated with the criterion for that

facility; and the specific reference from the Ohio Administrative Code where the criterion can be found. Those tables that address facilities with multiple regulatory classes or types also provide that information. The citation number given for each rule in these tables reflects the currently effective version of the rule.

Table G-1: Municipal Solid Waste Landfill Facility Siting Criteria¹

Criterion	Specifics	Ohio Administrative Code
National and state parks or recreation areas: - national park or recreation area, - candidate area for potential inclusion in the national park system, - state park or state park purchase area, or - any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior	Limits of waste placement not located within 1000 feet	3745-27-07(H)(1)(a) to (d)
Sand or gravel pit	Facility not located in	3745-27-07(H)(2)(a)
Limestone or sandstone quarry	Facility not located in	3745-27-07(H)(2)(b)
Sole Source Aquifer	Facility not located above a federally declared sole-source aquifer	3745-27-07(H)(2)(c)
100 gallon per minute aquifer system	Facility not located above unconsolidated aquifer yielding 100 gallon/minute to a well located within 1000 feet of limits of waste placement	3745-27-07(H)(2)(d)
Isolation distance	Maintain 15 feet of distance between bottom of recompacted liner and uppermost aquifer	3745-27-07(H)(2)(e)
Five year time of travel: - Area surrounding a public water supply well and through which contaminants may move and reach the well within five years - Wellhead protection area or a drinking water source protection area for a public water system using ground water	Limits of waste placement and temporary or permanent leachate ponds or lagoons are not located within the surface or subsurface areas	3745-27-07(H)(3)(a)(i) &(ii)

Criterion	Specifics	Ohio Administrative Code
Underground Mine	Facility not located in an area of potential subsidence due to or within the angle of draw of an underground mine	3745-27-07(H)(3)(b)
Water supply well and developed spring	Limits of waste placement not located within 1000 feet	3745-27-07(H)(3)(c)
Natural Areas <ul style="list-style-type: none"> - ODNR designated state nature preserve, state wildlife area, or a state wild, scenic, or recreational river - Ohio historical society nature preserves - U. S. Dept. of Interior designated natural wildlife refuge or a national wild, scenic, or recreational river - U. S forest service designated special interest area or research natural area in the Wayne national forest - stream segments designated by Ohio EPA as state resource water, coldwater habitat, or exceptional warmwater habitat 	Limits of waste placement not located with 1000 feet	3745-27-07(H)(4)(a)(i) to (v)
Property Line	Limits of waste placement not located with 300 feet	3745-27-07(H)(4)(b)
Domicile	Limits of waste placement not located within 1000 feet	3745-27-07(H)(4)(c)
Surface Waters (stream, lake, wetland)	Limits of waste placement not located within 200 feet	3745-27-07(H)(4)(d)
Regulatory Floodplain	Limits of waste placement not located in the regulatory (100 year) floodplain	3745-27-20(C)(2) - Location Restriction

Table G-2: Transfer Facility Siting Criteria

Criterion	Specifics	Ohio Administrative Code
Regulatory floodplain	Waste handling area not located in	3745-27-22(C)
Surface Waters	Waste handling areas not located within 200 feet	3745-27-22(D)
National and state parks and recreation areas - national park or recreation area - candidate area for potential inclusion in the national park system - state park or state park purchase area - any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior	Facility not located in	3745-27-22(I)(1) to (4)
Natural Areas - ODNR designated state nature preserve, state wildlife area or a state scenic river - Ohio historical society nature preserves - U. S. Dept. of Interior designated natural wildlife refuge or a national scenic river - U. S forest service designated special interest area or research natural area in the Wayne national forest - stream segments designated by Ohio EPA as state resource water, coldwater habitat, or exceptional warmwater habitat	Waste handling areas not located within 500 feet	3745-27-22(J)(1) to (5)
Domicile	Waste handling areas not located within 250 feet	3745-27-22(K)

Table G-3: Incinerator Siting Criteria		
Criterion	Specifics	Ohio Administrative Code
Floodway	Facility is not located in	3745-27-51(C)
Surface waters	Facility is not located within 200 feet	3745-27-51(D)
National and state parks and recreation areas - national park or recreation area - candidate area for potential inclusion in the national park system - state park or state park purchase area - any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior	Facility is not located in	3745-27-51(I)(1) to (4)
Natural areas - ODNR designated state nature preserve, state wildlife area or a state scenic river - Ohio historical society nature preserves - U. S. Dept. of Interior designated natural wildlife refuge or a national scenic river - U. S forest service designated special interest area or research natural area in the Wayne national forest - stream segments designated by Ohio EPA as state resource water, coldwater habitat, or exceptional warmwater habitat	Facility is not located within 250 feet	3745-27-51(J)(1) to (5)
Domicile	All waste handling areas are not located within 250 feet of a domicile	3745-27-51(K)

Table G-4: Composting Facility Siting Criteria			
Criterion	Specifics	Facility Type	Ohio Administrative Code
Regulatory floodplain	Limits of materials placement and leachate management system structures not located in	Class I Class II Class II	3745-27-43(C)(1)(a) 3745-27-45(M)(3) 3745-27-45(M)(3)
Surface waters	Limits of materials placement and leachate management system structures not located within 200 feet	Class I Class II Class III Class IV	3745-27-43(C)(1)(b) 3745-27-45(M)(4) 3745-27-45(M)(4) 3745-27-45(M)(4)
Public water supply well, developed spring, and private potable water supply well	Limits of material placement and leachate management system structures not located within 200 feet	Class I Class II Class III	3745-27-43(C)(1)(c) 3745-27-45(M)(1)(b) 3745-27-45(M)(1)(b)

Criterion	Specifics	Facility Type	Ohio Administrative Code
Domicile	Limits of material placement and leachate management system structures not located within 500 feet	Class I	3745-27-43(C)(1)(d)
Surface Waters	Limits of material placement and leachate management system structures not located within 250 feet	Class II Class III	3745-27-45(M)(1)(c) 3745-27-45(M)(1)(c)
Natural Areas - ODNR designated state nature preserve, state wildlife area or a state scenic river - Ohio historical society nature preserves - U.S. Dept. of Interior designated natural wildlife refuge or a national scenic river - U.S. forest service designated special interest area or research natural area in the Wayne national forest - stream segments designated by Ohio EPA as state resource water, coldwater habitat, or exceptional warmwater habitat.	Limits of materials placement and leachate management system structures at least 1000 feet from Limits of materials placement and leachate management system structures at least 500 feet from	Class I Class II Class III	3745-27-43(C)(1)(e)(i)-(v) 3745-27-45(M)(1)(d)(i) - (v)
National and state parks and recreation areas - national park or recreation area - candidate area for potential inclusion in the national park system - state park or state park purchase area - any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior	Limits of material placement and leachate management system structures not located within Facility not located within	Class II Class III Class IV Class I	3745-27-45(M)(1)(a)(i) – (iv) 3745-27-45(M)(1)(a)(i) – (iv) 3745-27-45(M)(2)(a) – (d) 3745-27-43(M)(2)(a) – (d)



Table G-5: Scrap Tire Facility² Siting Criteria			
Criterion	Facility	Specifics	OAC
National and state parks and recreation areas	Storage Recovery area not located within 1000 feet	Scrap tire handling	3745-27-62(B)(1)(a)-(d) a. national park or recreation area b. state park or state park purchase area c. candidate area for potential inclusion in the national park system d. any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior
	Monofill	Limits of waste placement and temporary storage area not located within 1000 feet	3745-27-71(H)(1)(a)-(d) a. national park or recreation area b. candidate area for potential inclusion in the national park system c. state park or state park purchase area d. any property within boundaries of national park or recreation area not acquired by U.S. Department of Interior
Natural Areas - ODNR designated state nature preserve, state wildlife area or a state wild, scenic, or recreational river area - Ohio historical society nature preserves - U. S. Dept. of Interior designated natural wildlife refuge or a national wild, scenic, or recreational river - U. S forest service designated special interest area or research natural area in the Wayne national forest - stream segments designated by Ohio EPA as state resource water, coldwater habitat, or exceptional warmwater habitat and may include wetlands.	Storage Recovery	Scrap tire handling area not located within 1000 feet	3745-27-62(B)(2)(d)(i) - (v)
	Monofill	Limits of waste placement and temporary storage area not located within 1000 feet	3745-27-71(H)(4)(a)(i) - (v)
Property Line	Storage Recovery	Scrap tire storage area not located within 100 feet	3745-27-62(C)(1)
	Monofill	Limits of waste placement and temporary scrap tire storage area not located within 300'	3745-27-71(H)(4)(b)

Criterion	Facility	Specifics	OAC
Domicile	Storage Recovery	Scrap tire storage area not located within 500 feet of a domicile not owned/leased by facility owner or 200 feet if owned or leased by facility owner	3745-27-62(C)(2)
	Monofill	Limits of waste placement and temporary storage area not located within 1000 feet	3745-27-71(H)(4)(c)
Surface waters	Storage Recovery	Scrap tire storage area at least 200 feet from surface waters (including streams, lakes, wetlands)	3745-27-62(C)(3)
	Monofill	Limits of waste placement and temporary storage areas not located within 200 feet of stream, lake, or wetland	3745-27-71(H)(4)(d)
Seismic impact zone	Monofill	Limits of waste placement and leachate management system not located in	3745-27-71(H)(4)(e)
Floodway and/or regulatory flood plain	Storage Recovery	Facility not located in a regulatory floodplain	3745-27-62(B)(3)
	Monofill	Limits of waste placement and temporary storage areas not located in floodway, and limits of waste placement and leachate management system not located in a regulatory floodplain	3745-27-71(H)(4)(f)
Sole Source Aquifer	Monofill	Facility not located above	3745-27-71(H)(2)(a)
100 gallon/minute aquifer system	Monofill	Facility not located above	3745-27-71(H)(2)(b)

Criterion	Facility	Specifics	OAC
Isolation distance	Monofill	Maintain not less than 5 feet of isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner	3745-27-71(H)(2)(c)
Wellhead protection area or drinking water source protection area for a public water system using ground water	Monofill	Limits of waste placement and temporary or permanent leachate ponds or lagoons no located within surface and subsurface areas	3745-27-71(H)(3)(a)
Underground mine	Monofill	Facility not located within an area of potential subsidence from or within the angle of draw	3745-27-71(H)(3)(b)
Water supply well and developed spring	Monofill	Limits of waste placement not located within 1000 feet	3745-27-71(H)(3)(c)

Footnotes

¹ The entries in this table provide information for the siting criteria as they apply to only municipal solid waste landfill facilities. Many of these same criteria can be found in the industrial solid waste landfill facility rules (OAC Rule 3745-29-07) and the residual solid waste landfill facility rules (OAC Rule 3745-30-06).

² Scrap tire facility is a generic term that includes, but is not limited to, the following: scrap tire collection facility, scrap tire storage facility, scrap tire recovery facility, scrap tire monofill facility, scrap tire monocell facility, and scrap tire submergence facility as those terms are defined in OAC Rule 3745-27-01.

Appendix H

Scrap Tire Abatement Program

Ohio EPA's Division of Solid and Infectious Waste Management (DSIWM) manages Ohio's state-funded scrap tire abatement program. When Ohio EPA uses state funds to clean up a scrap tire site, it attempts to recover those costs from the property owner and/or the facility operator, as authorized by Ohio law in Ohio Revised Code (ORC) 3734.85. ORC paragraph 3734.85(E) establishes criteria for cleanups of no more than 2,000 tires if several conditions are met without cost recovery. Funding priorities also established in ORC 3734.85 did not allow Ohio EPA to begin these types of cleanups until October 2005. Since October 2005, over fifty-nine (59) of these sites have been cleaned up. An under 2,000 tire consensual agreement form, available on Ohio EPA's web site, must be completed and sent to Ohio EPA with supporting paperwork.

Many cleanups are done with local or private (property owner) funding. Local governments and solid waste management districts manage scrap tire cleanups with local funding as they do other solid waste open dump cleanups. In addition to more than 39 million tires removed from 90 scrap tire sites by state funding (see table below), local funding and enforcement efforts have resulted in the removal of more than 11 million scrap tires from more than 169 sites.

The process of cleaning up scrap tire dumps cannot start until someone identifies the site to authorities. Citizens can be a great help. If you know of a tire dump, please report its location to the local health department, an Ohio EPA district office, or Ohio EPA's solid waste division at 877-372-2621 (toll-free).

During the last decade, Ohio EPA has made significant progress dealing with previous decades of open dumping and failed scrap tire recycling ventures. By law, Ohio EPA must prioritize scrap tire sites and first clean up the ones that present the greatest threat to public health, safety and the environment. With most of Ohio's largest scrap tire sites cleaned up, smaller sites are becoming priorities for cleanup.

As Ohio's largest scrap tire site, Kirby Tire in Wyandot County consumed most of the funds available for cleanup. The site was estimated to contain 20 to 25 million scrap tires at the time of its court-ordered closure in 1998. A year later, Ohio's largest scrap tire fire occurred there, involving an estimated 5 to 7 million scrap tires. The fire was extinguished by burial on site. While burial of the fire is an effective means of extinguishing the fire, it is not a long term solution since the fire residuals need eventually to be moved to a proper disposal site.

On-site wastewater treatment was needed to clean water that comes in contact with the fire residuals. Five separate tire removal contracts have been awarded at the Kirby site to complete the removal of the 19 million scrap tires that were not involved in the August 1999 fire. The removal of the unburnt tires was completed in June 2006. A separate cleanup contract awarded in June 2006 completed the removal of the buried tires and tire fire residuals remaining in April 2008.

Ohio EPA periodically awards tire cleanup contracts to qualified bidders through a competitive bid process. This bid process is open to all of Ohio's licensed scrap tire storage, recovery, monocell and monofill operators and to equivalent scrap tire businesses in other states.

Starting in 2005, the Ohio Department of Administrative Services (DAS) has assisted Ohio EPA by providing contractual administrative services. For electronic notice of scrap tire procurement opportunities, you must register with DAS at www.ohio.gov/procure. Begin the registration process by clicking on the "Selling to the State" icon and then the "Vendor Registration" icon.

The contract for the cleanup of scrap tires was re-competed in 2008 with an award in July 2008 for a two-year period. A separate contract was awarded at the same time for those difficult scrap tire cleanups where the majority of the scrap tires are buried or submerged. Future scrap tire remediation cleanups will be based on priorities in the law, enforcement actions, identification of new sites, funding availability, etc.

Scrap tire abatement contracts awarded to date and the associated state-funded projects are presented in Table H-1.

Table H-1: State-Funded Scrap Tire Abatement Contracts

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
ReGenesis, Summit	Sep-97	Apr-99	Largest unlicensed site, in densely populated area (4,031,106 PTEs removed) failed pyrolysis project.	\$3,231,582
Seelig, Clark	Feb-98	Jul-98	Unlicensed site, in densely populated area, on bank of Mad River (860,350 PTEs removed)	\$1,008,251
Warsing, Coshocton	Oct-98	May-99	Closed by court order, unlicensed site(2,173,200 PTEs removed)	\$2,421,021
Willis, Lawrence	Sep-98	Oct-98	Densely populated area, near Ohio river(125,000 PTEs removed)	\$321,500
COGCO, Mahoning	Jan-99	May-99	Densely populated area, failed pyrolysis plant. (530,476 PTEs removed)	\$657,540
Kirby, Wyandot	May-99	Sep-01	Largest scrap tire site in Ohio. 2,681,215 PTEs removed and 7,006,551 gallons of contaminated water treated during first contract (USEPA fire response of \$2,500,000 not included)	\$2,435,845
Kirby, Wyandot	Aug-99	Jun-01	Fire response costs and subsequent water treatment as a result of the fire in August 1999	\$1,695,933
Kirby, Wyandot	Jul-01	Jun-03	First separate water treatment and security contract – 3,611,323 gallons of water treated	\$1,013,793
Kirby, Wyandot	Oct-01	Jul-02	Second contract for scrap tire removal at Ohio's largest unlicensed site (2,956,154 PTEs removed)	\$2,123,346
Timco, Harrison	Mar-02	Sep-02	Proximity to a sensitive population (elementary school) and unlicensed (484,309 PTEs removed)	\$307,443
Kays, Portage	May-02	Aug-02	Unlicensed site, estimated at over 1 million PTEs (559,376 PTEs removed)	\$382,776
Kirby, Wyandot	Oct-02	June-03	Third contract for scrap tire cleanup at Ohio's largest scrap tire site (3,001,872 PTEs removed)	\$1,849,417
JKV, Lorain	Nov-02	Mar-03	Densely populated area, unlicensed site(574,232 PTEs removed)	\$420,298
Kirby, Wyandot	Jul-03	May-04	Fourth contract for scrap tire cleanup at Ohio's largest scrap tire site (removed 3,001,275 PTEs)	\$2,647,965
Kirby, Wyandot	Jul-03	Jun-05	Second two-year water treatment and security contract, 4,996,502 gallons of water treated	\$1,248,457
McMasters Portage	Nov-03	Jul-05	Removal of 1,073,523 PTEs, near Berlin Reservoir, tires in a flooded strip pit	\$1,514,448
Kirby, Wyandot	May-04	Jun-06	Fifth contract for scrap tire services at Ohio's largest scrap tire site (removed 7,018,887 PTEs).	\$4,963,941

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
Adriatic, Mahoning	Aug-04	Sept-04	Removal of whole tires and tire shreds from former licensed recycling facility that failed to close properly. (176,410 PTE removed)	\$140,681
Benedict-Woosley, Morrow	Oct-04	Nov-04	Removal of 147,402 PTE from illegal site.	\$137,354
Harr, Scioto	Oct-04	Dec-04	Removal of 21,304 unburned PTEs and 12,980.33 tons of fire residuals and contaminated soils.	\$492,914
Rader, Morrow	Jan-05	Apr-05	Removal of 504,291 PTEs from illegal site.	\$452,365
Parker, Summit	May-05	Aug-05	Removal of 964,399 PTEs from an unlicensed site.	\$867,052
Kirby, Wyandot	Jul-05	Apr-08	Second two-year water treatment and security contract, 4,792,240 gallons of water treated.	\$1,023,333

Separate contracts were awarded for each site listed above. Multiple contracts were awarded at the Kirby site. Initiated multiple award contracts through DAS. Initial contracts awarded July 2005 to Rumpke of Ohio and Liberty Tire Services of Ohio. Contracts were effective through 30 June 2008. A total of 57 sites were cleaned up using these contracts.

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
West, Perry	Sep-05	Nov-05	Removal of 215,870 PTEs from an unlicensed site.	\$192,437
Spring Grove, Columbiana	Sep-05	Dec-05	Removal of 28,995 PTEs from an unlicensed site.	\$35,333
Keller, Auglaize	Oct-05	Nov-05	Removal of 99,333 PTEs from an unlicensed site.	\$94,830
Monroe FG, Monroe	Nov-05	Nov-05	Removal of 19,516 PTEs from an unlicensed site. First under 2,000 tires consensual agreement site. A large number of truck and agricultural tires filled with tire inflated number of PTEs.	\$26,918
Metzler, Guernsey	Nov-05	Nov-05	Removal of 9,446 PTEs from an unlicensed site.	\$18,696
C. Gray, Belmont	Dec-05	Dec-05	Removal of 4,337 PTEs from an unlicensed site.	\$7,632
J. Gray, Jackson	Dec-05	Dec-05	Removal of 2,824 PTEs from an unlicensed site. Second under 2,000 tires consensual agreement site.	\$6,495
Crestline, Richland	Apr-06	Jul-06	Removal of 227,608 PTEs from an unlicensed scrap tire site that had been operated as an auto salvage yard.	\$196,721
Bogie, Warren	May-06	May-06	Removal of 379 PTEs from an unlicensed site. Third under 2,000 tires consensual agreement site.	\$2,419
Cloke, Warren	May-06	May-06	Removal of 490 PTEs from an unlicensed site. Fourth under 2,000 tires consensual agreement site.	\$2,250.

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
V.Bressler, Henry	May-06	May-06	Removal of 1,993 PTEs from an unlicensed site. Fifth under 2,000 tires consensual agreement site.	\$7,790
B. Bressler, Henry	May-06	May-06	Removal of 1,134 PTEs from an unlicensed site. Sixth under 2,000 tires consensual agreement site.	\$6,587
A separate contract for removal of the buried Kirby scrap tire fire residuals was awarded through DAS to Environmental Quality Management.				
Kirby-EQM, Wyandot	Jun-06	Apr-08	Removal of buried tire fire residuals from the August 1999 fire involving 5 to 7 million tires. (PTEs shredded = 4,616,709, Tire pieces in solid waste = 6,500,000 PTEs {estimated})	\$11,197,066
Emig, Coshocton	Jun-06	Jun-06	Removal of 5,546 PTEs from an unlicensed site. Seventh under 2,000 tires consensual agreement site.	\$8,898
Bowers, Coshocton	Jun-06	Jun-06	Removal of 1,359 PTEs from an unlicensed site. Eighth under 2,000 tires consensual agreement site.	\$3,237
Red Sea, Coshocton	Jun-06	Jun-06	Removal of 231 PTEs from an unlicensed site. Ninth under 2,000 tires consensual agreement site.	\$1,712
Lejeune, Trumbull	Jul-06	Jul-06	Removal of 896 PTEs from an unlicensed site. Tenth under 2,000 tires consensual agreement site.	\$6,209
Rothmill, Guernsey	Jul-06	Aug-06	Removal of 2,734 PTEs from an unlicensed site. Eleventh under 2,000 tires consensual agreement site. A number of truck tires increased the PTEs.	\$8,964
Mercer, Jackson	Aug-06	On hold	Removal of 7,247 PTEs from an unlicensed site. Work was stopped when owner withdrew access permission.	\$11,159
Thacker, Jackson	Sep-06	Sep-06	Removal of 10,944 PTEs from an unlicensed site. 12 th under 2,000 tires consensual agreement site. A number of truck tires increased the PTEs.	\$17,052
Pillsbury, Perry	Nov-06	Nov-06	Removal of 605 PTEs from an unlicensed site. 13 th under 2,000 tires consensual agreement site.	\$900
Long, Warren	Dec-06	Dec-06	Removal of 1,361 PTEs from an unlicensed site. 14 th under 2,000 tires consensual agreement site	\$3,933
A separate contract to deal with tires dumped on very rugged terrain was awarded through DAS to Environmental Quality Management. Little Bear Wood Products was the subcontracted mobile scrap tire recovery facility.				
Vodrey, Columbiana	Apr-07	Apr-07	Removal of 1,895 PTEs from an unlicensed site. 15 th under 2,000 tires consensual agreement site. Rugged terrain contract.	\$15,474
Beaverkettle, Columbiana	Apr-07	Apr-07	Removal of 1,755 PTEs from an unlicensed site. 16 th under 2,000 tires consensual agreement site. Rugged terrain contract.	\$11,657

Moore, Columbiana	May-07	May-07	Removal of 71,506 PTEs from a business location of a former registered scrap tire transporter. Rugged terrain contract.	\$274,063
Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
Pitts, Greene	May-07	May-07	Removal of 503 PTEs from an unlicensed site. 17 th under 2,000 tires consensual agreement site.	\$1,095
Abbott, Adams	May-07	Jun-07	Removal of 23,798 PTEs from an unlicensed site.	\$38,148
ODNR Delaware	May-07	May-07	Removal of 732 PTEs from an unlicensed site. \$ 18 th under 2,000 tires consensual agreement site.	900
Jenkins, Jackson	Jun-07	Jun-07	Removal of 506 PTEs from an unlicensed site. 19 th under 2,000 tires consensual agreement site.	\$5,925
Goodnite, Morgan	Jun-07	Jun-07	Removal of 369 PTEs from an unlicensed site. 20 th under 2,000 tires consensual agreement site.	\$900
Klammer, Lake	Jun-07	Jun-07	Removal of 1,258 PTEs from an unlicensed site. 21 st under 2,000 tires consensual agreement site.	\$1,800
Ravenna, Portage	Jun-07	Jun-07	Removal of 19,416 PTEs from an unlicensed site. 22 nd under 2,000 tires consensual agreement site. Large number of buried truck tires filled with dirt.	\$21,341
Wiley, Harrison	Jun-07	Jun-07	Removal of 8,656 PTEs from an unlicensed site. 23 rd under 2,000 tires consensual agreement site. Truck tires and dirt filled tires increased PTEs.	\$12,357
Pealer, Jefferson	Nov-07	Nov-07	Removal of 2,828 PTEs from an unlicensed site. 24 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$9,101
Hnatiak-Akosi, Ottawa	Nov-07	Nov-07	Removal of 1,599 PTEs from an unlicensed site. 25 th under 2,000 tires consensual site.	\$7,239
ODNR Meilke, Lucas	Nov-07	Nov-07	Removal of 1,388 PTEs from an unlicensed site. 26 th under 2,000 tires consensual site.	\$3,610
Jenkins III, Lucas	Nov-07	Nov-07	Removal of 1,389 PTEs from an unlicensed site. 27 th under 2,000 tires consensual site.	\$3,611
Nix, Lucas	Nov-07	Nov-07	Removal of 1,389 PTEs from an unlicensed site. 28 th under 2,000 tires consensual site.	\$3,610
Tsemillies, Columbiana	Dec-07	Jan-08	Removal of 19,919 PTEs from an unlicensed site.	\$43,139
Garten, Warren	Dec-07	Dec-07	Removal of 6,234 PTEs from an unlicensed site. 29 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$10,506
Yoak, Warren	Dec-07	Dec-07	Removal of 3,600 PTEs from an unlicensed site. 30 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$4,623

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
Baer, Greene	Dec-07	Dec-07	Removal of 2,415 PTEs from an unlicensed site. 31 st under 2,000 tires consensual site. Truck tires upped PTEs.	\$4,907
Kings Mill Tech Cntr, Warren	Dec-07	Dec-07	Removal of 985 PTEs from an unlicensed site. 32 nd under 2,000 tires consensual site.	\$1,808
Golder, Hamilton	Dec-07	Dec-07	Removal of 477 PTEs from an unlicensed site. 33 rd under 2,000 tires consensual site.	\$2,107
Gabbard, Warren	Jan-08	Jan-08	Removal of 3,418 PTEs from an unlicensed site. 34 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$5,846
Brewer, Hamilton	Jan-08	Jan-08	Removal of 903 PTEs from an unlicensed site. 35 th under 2,000 tires consensual site.	\$2,648
Weaver, Ashtabula	Feb-08	Feb-08	Removal of 1,273 PTEs from an unlicensed site. 36 th under 2,000 tires consensual site.	\$1,800
Horner, Portage	Feb-08	Feb-08	Removal of 7,828 PTEs from an unlicensed site. 37 th under 2,000 tires consensual site. Truck & dirt filled tires upped PTEs.	\$11,494
Bussel, Hamilton	Feb-08	Feb-08	Removal of 2,197 PTEs from an unlicensed site. 38 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$4,294
ASTRI, Ashtabula	Feb-08	Mar-08	Removal of 88,870 PTEs from a previously licensed facility that failed to maintain compliance.	\$72,384
Andover, Ashtabula	Feb-08	Feb-08	Removal of 35,906 PTEs from an unlicensed site.	\$42,560
Warren County Engineer	Apr-08	Apr-08	Removal of 3,487 PTEs from an unlicensed site. 39 th under 2,000 tires consensual site. Truck tires upped PTEs.	\$5,949
City of Logan, Hocking	Apr-08	Apr-08	Removal of 640 PTEs from an unlicensed site. 40 th under 2,000 tires consensual site.	\$900
Pinnick, Marion	Apr-08	Apr-08	Removal of 278 PTEs from an unlicensed site. 41 st under 2,000 tires consensual site.	\$900
Union Twp, Scioto	May-08	May-08	Removal of 3,816 PTEs from an unlicensed site. 42 nd under 2,000 tires consensual site. Truck tires upped PTEs.	\$8,100
Alexander, Miami	May-08	May-08	Removal of 1,340 PTEs from an unlicensed site. 43 rd under 2,000 tires consensual site.	\$2,656

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
Morley, Warren	May-08	May-08	Removal of 1,102 PTEs from an unlicensed site. 4 th site under the rugged terrain contract and 44 th under 2,000 tires consensual site.	\$11,089
Painesville, Lake	May-08	May-08	Removal of 524 PTEs from an unlicensed site. 45 th under 2,000 tires consensual site.	\$1,200
Ginn, Brown	Jun-08	Jun-08	Removal of 2,197 PTEs from an unlicensed site. 46 th under 2,000 tires consensual site. Solid waste & mud filled tires.	\$25,161
Morristown, Belmont	Jun-08	Jun-08	Removal of 1,732 PTEs from an unlicensed site. 47 th under 2,000 tires consensual site.	\$7,511
Congo, Perry	Jun-08	Jun-08	Removal of 541 PTEs from an unlicensed site. 48 th under 2,000 tires consensual site.	\$900
Awarded a separate multiple award contract for sites where the primary removal is of buried and submerged tires. Contracts awarded July 2008 to Environmental Quality Management (EQM), Liberty Tire Services of Ohio, and Eagle Construction and Environmental Services.				
Naypaver, Trumbull	Aug-08	Aug-08	Removal of 77,750 tires buried in a man-made dam at an unlicensed site. An additional \$5,347.50 was spent on an engineering evaluation of the dam.	\$210,038
Goss, Muskingum	Nov-07	On-going	Liberty Tire Services removed 631,940 PTEs under the 2005 MAC Contract and EQM is continuing the work under the Buried and Submerged MAC.	\$2,700,000 as of Dec. 2008
Dials/Meadows/McAfee, Jefferson	Nov-08	Nov-08	Removal of 7,478 PTEs and buried fire residuals from an unlicensed site	\$77,468
Ron's Auto, Franklin	Nov-08	Nov-08	Removal of 15,106 PTEs from an unlicensed site. 49 th under 2,000 tires consensual site. Large off-the-road and truck tires.	\$48,139
Mercer, Jackson	On-hold 2006	Oct-08	Completion of projected interrupted by owner in 2006. A total of 36,234 PTEs removed from a flooded strip pit.	\$100,187
Brownie Airport, Butler	Oct-08	On-going	Test pits dug to verify continuing presence of buried tires at the site. Owner completing removal in 2009.	\$3,380
Re-competed multiple award contracts through DAS. Contracts awarded July 2008 to Rumpke of Ohio and Liberty Tire Services of Ohio. Contracts effective through 30 June 2010.				
Keysor, Auglaize	Sep-08	Sep-08	Removal of 3,117 PTEs from an unlicensed site. 50 th under 2,000 tires consensual site.	\$35,225
Wayne National Forest, Athens	Sep-08	Sep-08	Removal of 400 PTEs from an unlicensed site. 51 st under 2,000 tires consensual site.	\$616

Site, County	Work Started	Work Completed	Criteria at Time of Contract Award (Passenger Tire Equivalents [PTEs] Removed)	Dollar Value
Orozy, Ashtabula	Oct-08	Oct-08	Removal of 35,826 PTEs from an unlicensed site.	\$65,07
Wayne National Forest, Washington	Oct-08	Oct-08	Removal of 492 PTEs from an unlicensed site. 52 nd under 2,000 tires consensual site.	\$682
Carpenter, Brown	Oct-08	Oct-08	Removal of 1,462 PTEs from an unlicensed site. 53 rd under 2,000 tires consensual site.	\$4,952
Witta, Ashtabula	Oct-08	Oct-08	Removal of 580 PTEs from an unlicensed site. . 54 th under 2,000 tires consensual site	\$914
Milton Twp, Jackson	Nov-08	Nov-08	Removal of 335 PTEs from an unlicensed site. 55 th under 2,000 tires consensual site.	\$518
Garner, Hocking	Nov-08	Nov-08	Removal of 5,754 PTEs from an unlicensed site. 56 th under 2,000 tires consensual site. Large off-the-road and truck tires.	\$13,028
Weiler, Montgomery	Nov-08	Nov-08	Removal of 2,645 PTEs from an unlicensed site. 57 th under 2,000 tires consensual site. Mixture of truck and passenger tires.	\$7,128
Guilford, Defiance	Nov-08	Nov-08	Removal of 1612 PTEs from an unlicensed site. 58 th under 2,000 tires consensual site.	\$1,820
Peterson, Richland	Dec 08	Dec 08	Removal of 7,770 PTEs from an unlicensed site. 59 th under 2,000 tires consensual site.	\$9,186

TOTAL ACTUAL COSTS

\$47,178,173

Note: The Kirby water treatment and scrap tire removal contracts awarded since 2001 were made possible by the increase in the scrap tire fee from \$0.50 to \$1.00 per tire. This increase in revenue also allowed Ohio EPA to replenish nearly \$3.7 million it spent from its solid waste account for fire-related expenses at the Kirby tire site from September 1999 through June 2001. Cleanup of the Kirby site was accelerated and completed in nine years rather than the fifteen years originally estimated. The revenue increase also allowed the completion of over forty other sites during those eight years.

Appendix I

Changes to the Scrap Tire Rules (Adopted in 2007)

In 2007, Ohio EPA proposed draft scrap tire rules based on a review of the rules to satisfy the five-year review requirements in Ohio Revised Code 119. These proposed rules became effective in November 2007. The changes to the rules that became effective along with those rules are as follows:

Changes were made to help reduce small-scale open dumping in cities and rural areas:

- The rules now clarify that used tires are scrap tires when stored at a tire dealer or when being transported; and
- The rules now clarify that retreadable casings are scrap tires except when stored at a retreading facility.

Changes were made to reduce the storage of scrap tires, scrap tire products, and by-products

- The rules now require financial assistance on all scrap tire products and by-products while at a scrap tire recovery facility

Changes were made to alter the definition of “Used Tire” in OAC Rule 3745-27-01(U)(3)

- The definition now reads: “Used tire” means a whole scrap tire. A used tire remains a scrap tire until it has been reused by being installed on a vehicle or trailer.”
- The following sentence was deleted from the existing definition because it introduced confusion to the definition “‘Used Tire’ also means a whole tire that has been individually tagged as a used tire, and is still suitable for mounting and use on a wheel or rim.”

A new definition in OAC Rule 3745-27-01(S)(16) for “scrap tire storage pile” was created.

- The definition reads: “Scrap tire storage pile” means an area where scrap tires are stored either indoors or outdoors on the floor, on the ground, or in racks.”
- The definition further clarifies that
 - The dimensions of the storage pile are determined by the location of fire breaks
 - A storage pile may consist of a combination of racks and on the floor or on ground storage of scrap tires.

The rules now allow scrap tires that cannot be processed tires (based on type of tire and condition) to be sent to municipal solid waste landfills. This change was made because there are limited, dedicated disposal sites for scrap tires in Ohio. The rules, in OAC Rules 3745-27-19(E)(g) and 3745-27-65(D)(8)(i), now allow whole scrap tires that cannot be processed at a scrap tire recovery facility to be disposed of in a solid waste landfill. The rule already allowed scrap tire pieces that could not be processed to be disposed of in solid waste landfills. Whole tires that are covered by these provisions include, but are not limited to:

- Aircraft tires and forklift tires that cannot be processed due to their construction
- Scrap tires contaminated with mud or other materials that render them unsuitable for processing. Under these conditions, the scrap tire shipping paper must be signed by the owner or operator of a scrap tire recovery facility.

The definition of open dumping in OAC Rule 3745-01(O)(4)(c) was revised to include scrap tires deposited in buildings, trailers, or other vehicles at locations other than a scrap tire transporter’s registered business location or a scrap tire facility for longer than 14 days without prior written notice.

- Allows Ohio EPA to cite scrap tires left in trailers and buildings as open dumping.

As a result of the changes that were adopted in 2007, the rules now provide for improved enforcement options. Defining used tires as scrap tires provides a clearly enforceable statement for storage at used tire dealers and for unregistered transporters. The inclusion of tire racks as part of a scrap tire storage area at used tire dealers helps to reduce the risk of fires. Scrap tires that are stored in trailers and buildings can now be cited as open dumping.

Appendix J

Market Development Grant Awards 2007 and 2008

2007 Market Development Grant Awards

Central Ohio

Delaware-Knox-Marion-Morrow Solid Waste District was awarded \$250,000 on behalf of Sims Brothers, Inc. to purchase a baler to prepare and process 3,600 tons of fiber-based materials annually, including corrugated cardboard and newspaper. The project will create two new jobs in Marion County.

Solid Waste Authority of Central Ohio (Franklin County) was awarded \$250,000 on behalf of Kurtz Brothers, Inc. for a composting system to process 40,000 to 43,000 tons annually of food and cooking waste and convert the material into soil additives and other marketable compost material. The project will create two new jobs in Franklin County.

Northeastern Ohio

Cuyahoga County Solid Waste District was awarded \$250,000 on behalf of Kurtz Brothers, Inc. for equipment to process 37,128 additional tons annually of construction and demolition debris. The new production line will create seven new jobs in Cuyahoga County.

Jefferson/Belmont Regional Waste Authority was awarded \$188,000 on behalf of Valley Converting Company, Inc. for the purchase of equipment to process 11,000 additional tons annually of fiber materials. The company plans to hire 20 new employees to staff this new manufacturing line in Jefferson County.

Southeastern Ohio

Athens-Hocking Solid Waste District was awarded \$250,000 on behalf of Ohio University for a composting unit to process between 875 and 1,050 tons of food waste annually and convert it to marketable compost material. It will be the first full-scale composting project at an Ohio college or university and will create an additional job in Athens County.

Southwestern Ohio

Darke County Solid Waste District was awarded \$250,000 on behalf of Spartech Plastics, LLC for the purchase of equipment to process and recycle 17,000 tons annually of polyethylene (PE) plastic from the company's manufacturing process. Additional jobs will be created due to this project.

2008 Market Development Grant Awards

Central Ohio

Solid Waste Authority of Central Ohio (Franklin County) was awarded \$250,000 on behalf of MBD Ventures to establish a construction and demolition debris material recovery facility that will process 12,900 tons of material annually and create four new jobs.

Northeastern Ohio

Cuyahoga County Solid Waste Management District was awarded \$250,000 on behalf of Rosby Resources Recycling to establish a construction and demolition debris material recovery facility that will process 109,251 tons of material annually and create an estimated two new jobs.

Cuyahoga County Solid Waste Management District was awarded \$250,000 on behalf of Strategic Materials, Inc. to rebuild a glass processing facility that will process 45,000 tons of glass per year and create an estimated nine new jobs.

Mahoning County Solid Waste Management District was awarded \$250,000 on behalf of Recycle Management, Inc. to construct a new material recovery facility and purchase a baler/conveyer system, front-end loader, and star screen system to process 10,433 tons of recyclable material a year. The facility will create an estimated 12 new jobs.

Summit-Akron Solid Waste Management Authority

was awarded \$250,000 on behalf of B. E. T. – Sagamore Company to expand the capacity of an existing food waste composting facility by purchasing a grinding system that will process 4,000 tons of material annually. The facility will create two new jobs.

Southwestern Ohio

Clark County Solid Waste Management District was awarded \$245,000 on behalf of Paygro, a division of Garick Corporation, to expand the capacity of an existing food waste composting facility through the purchase of a mixing unit, plastic separator, and two collection trucks. The added equipment will allow Paygro to process 22,000 tons of material per year and create an estimated five new jobs.

Hamilton County Solid Waste Management District

was awarded \$250,000 on behalf of Technology Recycling Group to expand the processing ability of an existing electronics recycling facility through the purchase of an Andela Cathode Ray. The added equipment will allow Technology Recycling Group to process 22,000 tons of material annually and employ five new people.

Northwestern Ohio

Crawford County Solid Waste Management District

was awarded \$250,000 on behalf of Innovative Recycling to establish and construction and demolition debris material recovery facility that will process 60,000 tons of material annually and create an estimated 10 new jobs.

Wood County Solid Waste Management District

was awarded \$250,000 on behalf of NAT Transportation/Wood Water Services to expand the capacity of a food waste composting facility through the purchase of equipment that will process 10 tons of material annually. The expansion will create two new jobs.

Appendix K

Status of Recommended State Market Development Strategies from the 2001 State Plan

The 2001 State Plan included six recommendations for strategies that various state agencies could implement in order to strengthen Ohio's markets for recyclable materials. Each of these recommendations is shown in italicized text and is followed by an explanation of Ohio's accomplishments related to implementing the strategy.

1. Support the continued development and implementation of the “Ohio Recycling Market Development Plan”.

The overall purpose of the biennial *Ohio Recycling Market Development Plan* is to increase state support of recycling and recycling market development. To do this, the *Ohio Recycling Market Development Plan* identifies recyclable materials that would benefit from stronger markets. The *Ohio Recycling Market Development Plan* specifies the types of direct financial and other types of assistance the State can provide to stimulate recycling of the identified materials. The *Ohio Recycling Market Development Plan* further designates a specific Ohio agency to administer each component of the plan recommended, designates the funding level needed for each component, and establishes biennial budget estimates for the main operating biennial budget needed by the agency designated to administer the component.

Until December 2004, the *Ohio Recycling Market Development Plan* was prepared by a workgroup known as Interagency Recycling Market Development Workgroup (IAWG). This workgroup developed the plan in conjunction with the recycling and litter prevention council. The composition of IAWG and IAWG's responsibilities were defined in statute (ORC Sections 1502.10 and 1502.11). As required by statute, IAWG was comprised of representatives from:

- The Ohio Department of Natural Resources, Division of Recycling and Litter Prevention (ODNR, DRLP);
- The Ohio Department of Development (ODOD);
- The Ohio Environmental Protection Agency (Ohio EPA);
- The Ohio Department of Administrative Services (ODAS); and,
- The Ohio Department of Transportation (ODOT).

In 2004, as recommended by ODNR, DRLP, Ohio's General Assembly adopted Substitute House Bill 516 which eliminated IAWG. The most recent version of the *Ohio Recycling Market Development Plan* was published in 2000. The plan has not been updated since 2000 IAWG was eliminated.

2. Develop and implement a plan to increase state agency procurement of recycled-content products.

As is discussed in more depth in Chapter II, ODAS is required by law to maintain guidelines for purchasing equipment, materials, and supplies containing recycled materials. ODNR is required to prepare an annual report on the value and types of recycled-content products purchased by Ohio's government entities.

ODAS's definitions, guidelines for purchasing, and performance standards for recycled-content products are contained in OAC Sections 123:5-1-01 and 123:5-1-09. ODNR annually compiles and makes available the “State Agency Recycled-Content Procurement Programs Report”. This report documents the efforts of state government to purchase recycled-content products. The most recent version of this report was published by ODNR in 2007. The report shows that, in fiscal years 2000 through 2006, state agencies purchased a combined total of more than \$11 million of recycled-content products.

Deployment of the Ohio Administrative Knowledge System (OAKS) has complicated obtaining data regarding purchases of recycled-content products. For this reason, ODNR hasn't been able to publish a more recent version of the State Agency Recycled-Content Procurement Programs Report. Furthermore, Ohio's purchasing policies complicate purchasing recycled-content products.

3. Examine whether the current scrap tire rules impede the development of scrap tire markets in Ohio. In addition, identify the barriers, regulatory or otherwise, to expanded use of tire derived fuel in Ohio. Develop and implement a plan to revise the rules and/or reduce those barriers.

There are two components of Ohio's scrap tire program that contribute to the development of scrap tire markets. The first is the scrap tire grant program that was created in the solid waste statute. The second component is the beneficial use program that was established in the scrap tire regulations.

Scrap Tire Grant Program

As waste explained in Chapter 7, the scrap tire law created a grant program to encourage recycling and other uses of scrap tires. The grant program is funded through a portion of the revenues Ohio receives from the scrap tire fee and is administered by ODNR, DRLP. Grant funding is to be used by private businesses and non-profit organizations, and an agency of the state of Ohio must apply for the funding on behalf of the business or non-profit.

Priority is given to projects that provide a market for large quantities of scrap tires annually and that can be sustained without additional governmental subsidies. Financing provided through the grant program is intended to fund projects that:

- Convert manufacturing operations to accept scrap tire material as feedstock;
- Expand tire processing;
- Utilize scrap tire material in civil engineering projects; and,
- Develop recycling related technology for scrap tire material.

In 2008, ODNR awarded \$774,723 in grants to seven applicants. Awards included:

- \$75,000 to apply a crumb rubber surface to playing fields at the Spindler Road Park in Franklin County;
- \$74,723 to pave roadways at the Molly Caren Agricultural Center in Madison County;
- \$75,000 to establish a scrap tire shredding operation in Wood County;
- \$150,000 to pave a county road and two state routes in Muskingum County; and,
- \$150,000 to pave four roads in Logan County.

Beneficial Use Provisions

Ohio's scrap tire regulations contain provisions that allow for scrap tires to be used "beneficially" in projects. There are two ways that projects to beneficially use scrap tires are authorized. Thus a project may be approved by rule or through an action by Ohio EPA.

The scrap tire rules contain a number of "pre-approved" uses of whole scrap tires, cut scrap tires, and scrap tire pieces. These uses include several different civil engineering applications. Anyone can use tires for these pre-approved uses without obtaining approval for a project plan provided the requirements specified in the rules are followed. While approval for a plan is not required, the person using the tires is required to notify Ohio EPA prior to using the scrap tires. In addition, the person using the tires must submit a report to Ohio EPA within 60 days of completing the project.

Anyone wanting to beneficially use scrap tires in a way that is not pre-approved by rule must submit a project plan to and receive approval for the plan from Ohio EPA prior to performing the project. Furthermore, some uses may require approval from other local and state regulatory offices, such as local building code enforcement offices, zoning authorities, local health departments, etc. Scrap tires must be delivered to the project site by a registered scrap tire transporter, and the scrap tires must be stored properly prior to being used.

Regulatory barriers

The main regulatory barriers to wide-spread use of tire-derived fuel (TDF) are imposed by the air pollution control program. These regulatory barriers are essentially the same as those that apply to technologies that convert waste-to-energy and were discussed in Chapter X. Most of the applicable regulations govern greenhouse gas emissions, air quality standards, and the types of air pollution control equipment that must be installed at facilities that burn TDF.

4. Monitor the current efforts to recycle the Flue Gas Desulfurization (FGD) waste that is produced by Ohio’ coal burning power plants. If current plans to recycle FGD do not materialize, identify the barriers to utilize the material, and develop and implement a strategy to reduce those barriers.

As was explained in Chapters I and II, Ohio hosts three large coal fired power plants. These plants produce significant quantities of air pollution control waste the vast majority of which is FGD waste. FGD waste is generated through the process of “wet scrubbing” flue gases. Wet scrubbing involves injecting lime and water into the flue gas to remove the sulfur dioxide before the gas is emitted to the atmosphere. The resulting waste consists of calcium sulfite and water.

In 2007, Ohio’s three largest coal burning power plants produced a combined total of 5,172,688 tons of FGD waste. Of that waste, 4,394,065 tons, or 85 percent, were disposed of in solid waste landfill facilities. Two of the three SWMDs that host the power plants reported that FGD was recycled in 2007. In total, these two SWMDs reported that 696,476 tons of FGD waste were recycled in 2007. Table K-1 presents the quantities of FGD waste that have been generated, disposed of, and recycled over the last five years.

**Table K-1:
FGD Generated, Disposed, and Recycled:
2003 - 2007**

Year	Quantity Generated (tons)	Quantity Disposed (tons)	Quantity Recycled (tons)	Percent Recycled
2003	4,593,363	3,918,307	675,056	14.70
2004	4,931,341	3,977,148	954,193	19.35
2005	4,867,423	4,052,842	814,581	16.74
2006	4,479,272	3,681,760	797,512	17.80
2007	5,090,541	4,394,065	696,476	13.68

The majority of the FGD waste that was recycled was used as a substitute for gypsum to manufacture dry wall. FGD waste has also been used to:

- pave livestock feed lots and other pads;
- line manure lagoons; and,
- seal underground mines to prevent acid mine drainage.

Because FGD waste is a solid waste, more specifically a residual solid waste, it must be managed in accordance with Ohio’s solid waste law and regulations. This means that individuals who want

to use FGD waste in projects where the waste will be placed onto or into the ground (such as in paving projects) must currently get prior approval from Ohio EPA before performing the project. Furthermore, each site where FGD waste will be used must be approved by Ohio EPA separately. Consequently, Ohio’s solid waste regulations can pose a barrier to increased diversion of FGD waste from disposal in landfills to alternative uses. Projects that use FGD to manufacture new products (such as drywall) are not regulated under Ohio EPA’s solid waste program.

In order to facilitate beneficial uses of FGD waste, Ohio EPA, in 1997, issued a management directive, known as the “Integrated Alternative Waste Management Program (IAWMP).” The overall purpose of this directive is to eliminate duplicative reviews of individual project requests and the need for multiple approvals to satisfy environmental regulations. To do this, the IAWMP directive clarified which division, the Division of Surface Water (DSW) or the Division of Solid and Infectious Waste Management (DSIWM), is to review traditional and alternative waste management proposals, under what authority to review them, and what type of response is appropriate for the proposal under consideration. The directive did not change, in any major way, past practices of DSW and the policies it utilizes. The directive utilizes existing authority in the solid waste law to transfer some of the workload to DSIWM from DSW. Although IAWMP does not eliminate regulatory oversight of projects involving FGD waste, it streamlines the regulatory requirements that the individual wanting to perform the project must fulfill.

5. Research the factors influencing the supply, demand, and market price of glass and plastics in Ohio, and develop a strategy to improve the markets for these materials (these are two of the three materials identified in the 2000 Ohio Recycling Development Plan as most in need of assistance).

Glass

Efforts to increase the amount of glass that is recovered and creating a sustainable market for glass are reduced to money. As with all recyclable materials, the value of recovered glass must be higher than the costs of collecting, processing, and transporting the glass. The costs associated with recovering glass are high due to the weight of the material, the lack of available end-users, and difficulties with processing recovered glass (glass damages processing equipment and poses physical dangers to employees). Historically, the value of glass cullet as a commodity has been consistently low. Many collectors and processors must rely on profits from other recovered materials to subsidize recovering glass.

Glass is heavy and costly to transport. Thus, the further the processor is from an end user, the more expensive it is to transport the glass. There are few end users of recovered glass cullet in Ohio creating regional rather than statewide markets for recovered glass. These regional markets develop around local end users, and collectors and processors that are closer to the end-user are those that can economically recover glass.

The primary market for recovered glass cullet in Ohio is insulation manufacturing. Companies in that industry indicate that they need more glass cullet. Providers of recycling services indicate that they don't have access to markets for recovered glass. The high cost of transporting the cullet from those who have it to those who need it creates a disconnected relationship between the supply and demand of glass cullet.

Quality specifications for glass cullet are another barrier to increased recovery rates for glass. Some end users have very low tolerance levels for contaminants. Other end users are able to use only specific colors of glass. Processors typically produce cullet consisting of mixed colors. Furthermore, the trend toward single-stream collection and processing systems places additional limitations on the quality of glass cullet that can be produced. ODNR, through the Market Development Grant program, has awarded grants to companies to purchase equipment that separates contaminants from glass cullet (e.g. ceramics).

Plastic

Historically, the recovery rates for plastics have been very low. The low recovery rate is attributable to a number of factors, including:

- Low value of recovered plastics
- Contamination
- Low recovery rates
- Lack of markets for plastics 3-7
- Incompatible resin types/products made from multiple plastic types

Low Value - In order for recovered plastics to be marketable, the costs of collecting and processing them must be less than market price of recovered plastics. Furthermore, the prices of recovered commodities must be competitive with virgin resins. Historically, recovered plastics have carried relatively low prices as commodities for a number of reasons, including:

- Bottles made from PET and HDPE have traditionally been the only plastic types collected through community recycling programs.

- The high volume-to-weight ratio of plastics makes the cost of collecting plastic bottles high relative to other recovered materials.
- Until recently, plastic bottles collected through single-stream programs had to be manually sorted at processing facilities. This labor-intensive sorting system adds significant cost to the material.

The costs of collecting and processing plastic bottles combined with the low market price have resulted in the low value of recovered plastics

Contamination – Residents are often confused about which plastic containers can and can't be recycled through their community's collection program. Even among the commonly accepted plastics – i.e. PET and HDPE – not all containers made from those resins are recyclable. As a result, residents place non-recyclable plastics in their collection containers. These plastics represent contaminants, and the processor must pay to dispose of the contaminants. These disposal costs reduce the overall profitability of the plastics.

Low recovery rates – Residents discard a considerable number of acceptable plastic containers simply because they do not know which are recyclable and which are not. Furthermore, many products in single-serve beverage bottles are consumed away from the home at venues such as sports arenas and stadiums, concert halls, community events (such as festivals and fairs), and other public locations. Many of these venues lack recycling options. As a result, a large percentage of the discarded plastic bottles are not recovered.

Lack of Markets for Plastics Labeled 3-7 – As was mentioned, plastic bottles labeled 1 and 2 are the most commonly recovered plastics. Other plastics are typically not collected through most community programs. This is primarily due to limited markets for plastics 3-7. Consequently, high quantities of plastics continue to be disposed of in landfill facilities. Although a number of service providers have begun collecting all types of discarded plastics, those programs are the exception.

Incompatible resin types/products made from multiple plastic types - Many plastic products are made from more than one resin type. This complicates recycling those products because it is difficult to isolate each plastic resin. An example is the plastic bottle. In order to extend the shelf life of many products, bottlers have begun using bottles that are manufactured with multiple layers of plastic. In most cases, the layers consist of a barrier layer sandwiched between two layers of PET or HDPE. This complicates efforts to recover these bottles because the barrier layer represents a contaminant to end-users of either PET or HDPE.

6. Monitor and support the development of markets and infrastructure for the collection and recycling of electronic material from residential sources.

As was explained in Chapter VIII, in Ohio, SWMDs and local governments have borne the burden of providing collection programs for end-of-life electronics. The number of SWMDs offering some type of collection program for residentially-generated electronics continues to increase. However, these collection programs are not sustainable, particularly given current budgetary pressures and the volume of end-of-life electronics projected to enter the waste stream.

While the number of programs being offered by private companies and manufacturers continues to increase, there are many areas of Ohio that are underserved. Even in those areas where opportunities are available, those opportunities do not provide adequate capacity for the volume of end-of-life electronics being generated. Furthermore, those opportunities are not always convenient.

The answer to how to manage end-of-life electronics may lie in a public-private partnership to develop a comprehensive recycling system. Many states have taken legislative action to force this system. At this time, Ohio is not exploring similar legislation. Ohio EPA will continue to monitor national trends and keep Ohio's decision makers informed of these trends.

Ohio EPA maintains and makes available via the Agency's Web site a list of recycling companies in Ohio that take electronics. In addition, Ohio EPA annual compiles a list of SWMDs that are holding electronics collection events and makes that list available via the Agency's Web site.